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AND ACCOUNTS

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COMMERCIAL ARITHMETIC AND ACCOUNTS

BY

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PART II



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PREFACE

THE present treatise on Commercial Arithmetic and Accounts has been written not only to meet the needs of that great and ever-increasing army of students which is receiving a thorough commercial training in our modern schools and colleges before entering on a business career, but also to provide for every one, who has to earn and invest money and discharge with it the everyday duties of a citizen, a comprehensive, interesting, and simply expressed exposition of the fundamental principles upon which the financial progress of the individual, of the urban community, and of the Empire depend.

It is becoming increasingly evident that purely arbitrary methods have to be abandoned, and that students must enter commercial life well equipped with a knowledge of the principles on which their calculations will depend, and endowed with the power of applying those principles. The changes and modifications in methods of calculation are so frequent and subtle that only students who have had a sound mathematical education are able to cope with the exigencies that continually arise in modern mercantile transactions. The day of the man who can do no more than "look up the tables" is past.

While endeavouring first and foremost to train the student for his future commercial work, we have yet kept in view throughout the requirements of various examinations, *e.g.* those of the Union of Institutes of Lancashire and Cheshire, the Society of Arts, etc. In each section of the book the fundamental principles are carefully explained, and copious "drill" examples are set to ensure that the student has thoroughly mastered them; following immediately on these "drill" examples are "applicative" examples, drawn for the most part from actual commercial transactions, and not evolved *ex cathedra*; the methods given being, as far as possible, in accordance with the recommendations of the Mathematical Association. No mention is made, *e.g.*, of "recurring decimals," as they are of academic

interest and not of commercial importance. On the other hand, "rough checks," "rough estimates," and the degree of accuracy to which a decimal should be taken receive careful attention throughout the work, and are illustrated by a large number of concrete examples.¹

In order to make the book commercial in spirit an attempt has been made to present, in perspective, *the commerce of the British Empire*, and on almost every page appear facts relating to the Colonies or Dependencies which have been linked up with the Mother Country, with one another, and with foreign countries by means of trade relationships. Among the latter, considerable prominence has been given to Russia, France, and Brazil.

In many cases it has seemed desirable to translate into English parts of records published in foreign languages, so as to place the most recent data at the disposal of the student, and, in addition, rather more than a thousand authorities in the various departments of commerce have given information which has proved invaluable to us.

We may quote the following as instances of the pedagogic method and spirit of the book:—

After the Metric System has been taught (Section XI.), its important bearing upon commerce is never again lost sight of. Mensuration is dealt with in Sections XII. to XIV., and we hope that some pleasure may be derived from learning it through its applications to commerce. The diagrams, many of which are original, the facsimile documents, and the coloured plates may prove useful in making difficult points clear, while the method of presentation in Section XIX. will, we hope, contribute to the simplification of the important subject of Double Entry in Accounts.

The Coloured Industrial Map will probably be found valuable

¹ Some "drill" examples and a few problems have been taken from examination papers set by the following authorities, to whom we tender our acknowledgments: The Lancashire and Cheshire Union of Institutes, the Society of Arts, the Institute of Chartered Accountants, the Chartered Institute of Secretaries, the London Chamber of Commerce, the Chartered Accountants of Scotland, and the Institute of Bankers.

if it is kept constantly open for reference as the examples are being worked.

The pleasure of paying a tribute to those who have so generously and willingly helped us is, indeed, very great.

We owe to Dr. W. P. Milne our sincerest thanks, not only for placing his wide experience at our disposal, but also for the *constructive* criticism which he has brought to bear upon the book.

Our acknowledgments are also due to the official representatives of Foreign Governments (attached specially to Commerce) accredited to this country, to the High Commissioners of the Colonies, and to some Government Departments at home, who have either lent (or given) us books which would otherwise have been inaccessible.

Mr. Gordon Groom, B.Sc., has rendered us invaluable assistance in working the examples, and we are also indebted to Mr. G. F. New, B.Sc., for help in this connection.

Our thanks are also due to the Controller of His Majesty's Stationery Office for permission to reproduce the War Loan Voucher and the Inland Money Order Form; to the Great Northern Railway Company for authorising the reproduction of their Goods Consignment Note; to the United Kingdom Temperance and General Provident Institution for similar permission in regard to the Insurance Policy; and to the Board of Trade, whose publications we have consulted.

A. R. P.
J. S.

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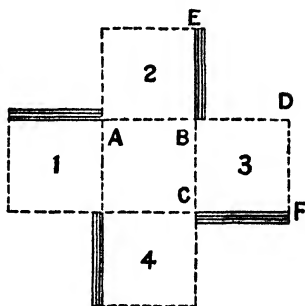
SECTION XIV

VOLUMES¹

A. Rectangular Objects

EXAMPLES. LIII.

EXPERIMENT 1.—Take a piece of stiff squared paper, draw upon it, and then cut out from it a figure such as is shown in the diagram. Each of the lines AB, BC, BD, BE, DF is 1 inch long. The paper is folded along the dotted lines shown, and the shaded parts allow one side of the cube formed to be stuck to the adjacent side. Thoroughly varnish the cube inside and out, and, if necessary, stop any small holes there may be with melted paraffin wax—"candle grease" if you like.



1. How many external surfaces has a cube (1) open at the top, (2) closed at the top (i.e. "covered in")?

2. How many edges has a cube (1) open at the top, (2) closed at the top?

3. Tabulate the number of edges and surfaces of the following objects: (1) A closed rectangular biscuit box, (2) the top of a counter, (3) a plain wooden door to an outhouse, (4) a covered box of sugar, (5) a pound packet of tea, (6) a sandwich loaf, (7) a jelly "square," (8) a closed box of kippers, (9) a closed handkerchief box, (10) a portmanteau, (11) an egg box, (12) a square of plate glass, (13) a jewel case, (14) a centimetre scale, (15) a lump

¹Some practical questions will be found in this section, many of which can be performed by the students themselves or, if it is thought more desirable, by the teacher.

of sugar, (16) a penny, (17) a "round" cocoa tin, (18) a football, (19) a solid iron bar, circular in section, (20) a cask, (21) a weather cone, (22) a goal-post, (23) a drum of pitch, (24) a glass tumbler.

Object.	Number of Edges.	Number of Surfaces.
(1) A closed rectangular biscuit box		

4. From the results of the last question, parts 1 to 15, state how many edges and how many surfaces there are in an object bounded by plane surfaces and having all its angles right angles.

5. Employing the results of Question 3, parts 15 to 24, fill in a table, giving in column 1 the names of the following objects: a sphere, a closed cylinder, a cylinder open at the top, and a closed cone; in column 2, the number of surfaces; and in column 3, the number of edges which each object has.

6. A covered cattle truck is to be entirely whitewashed inside, and painted outside except for the lower side of the floor. How many surfaces have to be whitewashed and how many painted?

7. What is the length of all the edges of a (rectangular) biscuit tin if each edge is 9 inches long?

8. What is the outside surface area of the tin referred to in the last question, presuming it to be covered?

9. What is the outside surface area of a refrigerator which is 3 ft. by 2 ft. by 2 ft.? (*i.e.* it is 3 ft. long, 2 ft. wide, and 2 ft. deep.)

10. What would it cost to gild the sides and top of an ornamental rectangular handkerchief box, 18 cm. long, 12 cm. wide, and 3.5 cm. deep, at a cost of 1 franc for 8 sq. cm.?

11. A Sheraton china cabinet is 2 m. high, 2.25 m. wide, and 0.8 m. deep; find the cost of glazing the sides and front at 1 mark 20 pf. per 250 sq. cm.

12. A box which contains Tasmanian apples is nailed parallel to its edges with five nails along the vertical sides, eight along each of the longer edges top and bottom, and six along each of the shorter edges top and bottom. Draw a diagram showing the method of nailing, and find how many nails are required for each box.

EXPERIMENT 2.—Make a cube exactly the same as in Experiment 1, but with its edges 1 cm. long, and, after having allowed it to dry thoroughly for forty-eight hours, fill up the

1 in. cube with water, using the centimetre cube as the measure, and so find how many cubic centimetres make 1 cubic inch.¹

EXPERIMENT 3.—Employ the inch or centimetre cube and the measure stated to write down the following:

- (1) The number of cubic inches in 1 pint, and (2) in 1 litre.
- (3) " " cubic centimetres " 1 litre, " (4) " 1 pint.
- (5) Express the volume of a $\frac{1}{2}$ -pint tumbler in cubic inches.
- (6) " " " " cubic centimetres.

13. From the results of parts 5 and 6 of the last question, find roughly (1) the decimal of a cubic inch which is equal in volume to a cubic centimetre, and (2) the decimal by which any number of cubic centimetres must be multiplied to give their volume in cubic inches.

EXPERIMENT 4.—Find the number of cubic inches of sand necessary to fill vessels, which should be made in cardboard to the dimensions given,² using the inch cube as a measure: (1) A cube of 2 in. edge; (2) a cube 3 in. edge; (3) a vessel 2 in. long, 1 in. high, 1 in. wide; (4) 3 in. long, 2 in. high, 2 in. wide; (5) $3\frac{1}{2}$ in. long, $2\frac{1}{2}$ in. high, 2 in. wide.

14. Tabulate the results of Experiment 4³ as follows:

No. of Question.	Dimensions of Vessel.	No. of Cubic Inches of Sand required to fill the Vessel.	Product of the Dimensions.
(1) . .	2" × 2" × 2"		
(2) . .	3" × 3" × 3"		
(3) . .	2" × 1" × 1"		
(4) . .	3" × 2" × 2"		
(5) . .	$3\frac{1}{2}" \times 2\frac{1}{2}" \times 2"$		

15. Make a statement concerning the number of cubic inches which the vessel contains and the product of the three dimensions, and so state a rule for finding the volume of a rectangular vessel.

16. What difference is there between the volume of the sand

¹ The student should not content himself with performing the experiment once, but should do it at least three times and take the average of the results. These remarks apply equally to succeeding experiments of a similar character.

² If one student makes one vessel, another the second, and so on, at home, the experiment can be performed very readily before the class.

³ Experiment 4 and Questions 14 to 16 can be repeated using a centimetre cube and vessels—(1) $3 \times 3 \times 3$ cm.; (2) $8 \times 2\frac{1}{2} \times 2\frac{1}{2}$ cm.; (3) $4\frac{1}{2} \times 4 \times 3\frac{1}{2}$ cm.; (4) $5 \times 4 \times 1\frac{1}{2}$ cm.

and the number of cubic inches obtained by multiplying the area of the base of each of the rectangular vessels by its height?

200 We now summarise the results of our practical work :

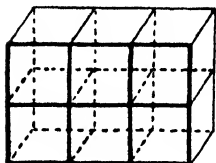
The volume of a rectangular vessel is the product of its length, breadth, and depth ;

$$\text{or } V = l \times b \times d ;$$

or volume = area of base \times depth or height.

The latter rule applies to ALL solids which are of uniform section, *e.g.* a cube, a triangular or any other prism, or a cylinder, but NOT to a cone or to a pyramid (see § 201).

It is easy to prove this relationship geometrically, thus: the figure represents a rectangular vessel 3 in. by 1 in. by 2 in. The base contains 3 square inches, and the total number of cubic inches is found, by counting, to be 6 cubic inches. Hence



$$V = l \times b \times d = 3 \times 1 \times 2 = 6 \text{ cub. in.},$$

or, $V = \text{area of base} \times \text{height}$
 $= 3 \times 2 \text{ cubic inches} = 6 \text{ cub. in.}$

A number of students should draw vessels with sides of very different lengths and so convince themselves of the truth of the rule.

201. We collect here for convenience a number of useful relationships for areas and volumes :

Areas.		Volumes.	
Rectangle . . .	Length \times breadth.	Rectangular solid	Length \times breadth \times height.
Parallelogram . . .	Base \times perpendicular distance between base and opposite side.	Any prism . . .	Sectional area \times height.
Triangle . . .	Base \times height $\div 2$.		
Trapezium . . .	Average length of the two parallel sides \times perpendicular distance between them.		
Circle	πr^2 .		
Ellipse	$\frac{\pi}{4} \times$ product of length of axes.		
Curved surface of cylinder ¹	Circumference or perimeter \times height.	Cylinder . . .	Area of base \times height $= \pi r^2 \times h$.
Curved surface of cone	Circumference of base \times slant height $\div 2$.	Cone	Area of base \times vertical height $\div 3$.
Curved surface of sphere	$4\pi r^2$.	Sphere	$\frac{4\pi r^3}{3}$.

¹ Note the total surface area of a cylinder = area of the curved surface + area of the two ends = circumference \times height + $\pi r^2 + \pi r^2 = 2\pi r h + 2\pi r^2$.

202. EXAMPLE.—Determine the volume of a case, the internal dimensions of which are 4 ft. 6 in. long, $1\frac{1}{4}$ yd. wide, and 36 in. deep.

$$\begin{aligned}\text{Volume} &= l \times b \times d. \\ &= 4\cdot5 \text{ ft.} \times 3\cdot75 \text{ ft.} \times 3 \text{ ft.} \\ &= 50\cdot625 \text{ cub. ft.} \\ &= 50 \text{ cub. ft. } 108 \text{ cub. in., to the nearest cubic inch.}\end{aligned}$$

EXAMPLES. LIV.

1. The dimensions given are the length, width, and depth of rectangular vessels. Write down their volumes in the units named.¹

- (1) 3 yds. by 2 ft. by 4 ft., in cubic feet.
- (2) 56 cm. by 30 cm. by 10 cm., in cubic centimetres.
- (3) 3 m. by 40 cm. by 65 cm., in cubic metres.
- (4) 4 yds. by 5 ft. by 18 in., in cubic feet.
- (5) $2\frac{1}{2}$ yds. by $4\frac{1}{2}$ yds. by 3 yds., in cubic yards.

2. What is the volume of a packet of tea 4 in. by $2\frac{1}{2}$ in. by 2 in.?

3. What is the volume in cubic centimetres of the packet of tea referred to in Question 2? (1 inch = 2·54 cm.)

4. A paving brick is 9 in. by $4\frac{1}{2}$ in. by $1\frac{3}{4}$ in.; find its volume in cubic inches.

5. What is the volume of a bag of flour 10 in. by $6\frac{1}{2}$ in. by $2\frac{1}{4}$ in.?

6. Express the volume of a tank, 3 ft. 6 in. by 4 ft. by 2 ft. 6 in., in cubic feet.

7. What weight of water would the tank in the last question contain? (1 cubic foot of water weighs 62·3 lb.)

8. Find the volume of a trough 1·88 m. long, 0·75 m. wide, 0·12 m. deep, giving the result in cubic metres.

9. How many litres of water would the trough in the last question contain?

10. How many cubic inches are there in a box which is 16 in. long, $12\frac{1}{2}$ in. wide, and 8 in. high?

¹ The student should be very careful to write down the units in which the answer to a question is expressed, *e.g.* :

Lengths are expressed in miles, yards, feet, metres, centimetres, millimetres ;
 Areas " " **SQUARE MILES, SQUARE METRES, etc.,** and
 Volumes " " **CUBIC " CUBIC " "**

and he should *not* multiply feet by inches or by yards, but reduce all measurements to the same units before working the sum.

11. The length of a laundry basket is 2 ft. 6 in., and the ratio of the length to the width is as 2 is to 1, while the depth is 1 ft. 3 in. Find its volume.

12. What would have been the volume in the last question if the ratio of the length to the width had been as 5 is to 3, the depth being 1 ft. 4 in.?

13. Compare the volume of a trough 3 ft. 3 in. by 2 ft. 6 in. by 8 in. with that of another trough 1 m. 25 cm. by 95 cm. by 15 cm. (2·54 cm. = 1 inch.)

14. A jewel case, 10 in. by 5 in. by $2\frac{1}{2}$ in., costs 15s. 6d., and another one, 14 in. by 6 in. by $3\frac{1}{2}$ in., costs £1 1s. Are the prices in proportion to the volumes? If not, why not?

Hint.—If the volume of the first case divided by the volume of the second case equals the price of the first divided by that of the second, then the prices are proportional to the volumes. See § 222.

15. If in the last question the prices are not proportional to the volumes, then find what must be the price of the second case in order that the prices may be proportional to the volumes.

Hint.—Find the price of 1 cubic inch of the first case, and taking this as a basis for the second case, find what its price should be.

16. From the last two questions, find by what decimal of £1 the jeweller is better or worse off by selling the second case for £1 1s. than if he sold it at the price found in Question 15.

17. A half-pound package of butter is $4\frac{1}{2}$ in. long, 2 in. wide, and $1\frac{3}{4}$ in. thick. What are the internal dimensions of a case which will contain twelve dozen half-pounds? Each row is to contain six packages placed end to end, and there are to be six rows in each layer of packages, the largest faces of which are horizontal.

18. If in the last question the wood of the case be $\frac{3}{8}$ in. thick, what are the external dimensions of the case?

19. How many apples, the average diameter of which, including packing material, is $2\frac{1}{2}$ in., can be packed in a case 1 ft. 8 in. by 1 ft. 3 in. by $12\frac{1}{2}$ in.?

20. A particular kind of briquette is $5\frac{1}{4}$ in. by $4\frac{1}{2}$ in. by $2\frac{1}{2}$ in. What size coal cellar would you want to hold 50 gross, presuming them to be packed in carefully (with their largest faces placed horizontally) twenty-four in a row and twelve rows?

B. Specific Gravity

203. The weight of 1 cub. in. and of 1 c.c. of water have been determined by weighing with great care. We assume the values given on pages 196 and 198.

Note.—The NUMBER OF TIMES that any volume of a substance is

heavier or lighter than an equal volume of water is called its **SPECIFIC GRAVITY**. Hence the specific gravity of gold is 19.3 (Question 9, p. 105).

EXAMPLES. LV.

1. If 1 Kgm. = 2.2046 lb., calculate the weight of 1 cub. ft. of water in Kilograms.

2. What is the weight of 1 cub. in. of gold if that metal is 19.3 times heavier than water?

3. What should be the weight of 1 c.c. of gold?

4. Explain why one of the last two questions is much simpler than the other, and suggest some ready means of simplifying the harder one, presuming that you can change the unit of weight¹ or unit of length as you please.

5. We give now the weight of 1 cubic foot of a number of different substances and ask the student to fill in column 3:

1.	2.	3.
Substance. ²	Weight of 1 Cubic Foot.	$\frac{\text{Weight of 1 Cubic Foot of Substance}}{\text{Weight of 1 Cubic Foot of Water}}$, or the Specific Gravity of the Substance.
Water . . .	62.321 lb.	
Salt . . .	74.7852 "	
Powdered chalk	69.306 "	
Powdered coal .	93.481 "	
Sand . . .	118.41 "	
Iron filings . .	448.711 "	
Mercury . . .	847.565	
Paraffin . . .	49.857	
Glycerine . . .	77.9	

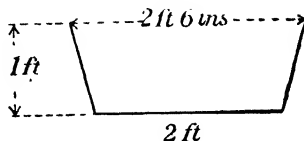
Use the results of the last question to work Questions 6 to 12:

¹ It is to be observed that we employ the term "weight" in its usually accepted commercial sense, and consequently do not discriminate between mass and weight.

² The student can easily find the weight of 1 cubic inch of powdered chalk, etc., by taking an inch cube, placing it in the left-hand pan of a balance, and counterpoising it with fine sand, and then filling up the cube with the chalk and weighing it in grains. Several cubes would be wanted for a set of experiments, and mercury being costly should be kept carefully and not thrown down the drain, for it would destroy the lead pipes. In just the same way we could determine the weight of a pint of water and of a pint of (say) methylated spirit, and so find ROUGHLY the specific gravity of the spirit or of any liquid.

6. A merchant is going to export salt in a case, 3 ft. by 2 ft. by 1 ft. 6 in., which weighs 18 lb. What is the total weight of the package?

7. A wheelbarrow is 2 ft. 6 in. long; what weight of sand will it hold if the volume of the sand equals the area of the section shown in the diagram multiplied by the length?



8. What volume should a case have in which to export half a ton (1120 lb.) of iron filings?

9. How many cubic feet are there in a "bottle" of mercury which contains 84 lb. of the metal?

10. What is the weight, in tons, of a million gallons of paraffin delivered from a well and run into suitable tanks? (1 gallon of water = 10 lb.; and 2240 lb. = 1 ton.)

11. What should be the weight of a pint of glycerine?

12. How many cubic feet are there in half a ton of powdered chalk?

13. Take the weight of 1 cubic foot of water as being 1000 ounces, and fill in the table given below:

Substance.	Specific Gravity of Substance.	Weight of 1 Cubic Foot of the Substance, or of 1 Gallon in the case of Liquids.
Alcohol	0.79	
Earth	1.60	
Brass	8.00	
Cork	0.24	
Wine	0.99	

14. Working as in the last question, and using the fact that 1 c.c. of water weighs 1 gram, find the weight of 1 c.c. of each of the substances, tabulating as before. Why is this question easier than the last?

A pint of pure water weighs a pound and a quarter.

15. Find the weight of 1 pint of each of the following liquids whose specific gravities are given in brackets: Lubricating oil (0.95), methylated spirit (0.85), linseed oil (0.94), turpentine (0.87), sea water (1.025), milk (1.03).

16. A gallon of water weighs 10 lb. and 1 cubic foot weighs 62·321 lb., find the number of gallons of water in 1 cubic foot.

17. Find, from the results of Questions 15 and 16, (1) the weight of a gallon of each of the liquids named; (2) the weight of 1 cubic foot; (3) the number of gallons of each to 1 cubic foot.

18. What volume of oil would be contained in a tank 10·6 m. long, 5·84 m. wide, and 3·6 m. deep?

19. If the specific gravity be 0·8, find the weight of oil in Question 18.

20. If a box 4 ft. by 3 ft. 9 in. by 2 ft. 10 in. were filled with gold, a cubic foot of which weighs 0·49 tons, what weight of the metal would the box contain?

21. A brick is 9 in. by $4\frac{1}{2}$ in. by $1\frac{3}{4}$ in., and it weighs 7 lb. How many times is it heavier than an equal volume of water?

22. What is the specific gravity of olive oil if a litre weighs 900 grams?

23. What is specific gravity of an oil if 1 cubic foot weighs 56·089 lb.?

24. What is the weight of a piece of lead 6 in. by 8 in. by 5 in.? (Specific gravity = 11·4.)

25. How many cubic feet of lead are there in a sheet 168 in. long, 56 in. wide, and $\frac{3}{8}$ inch thick?

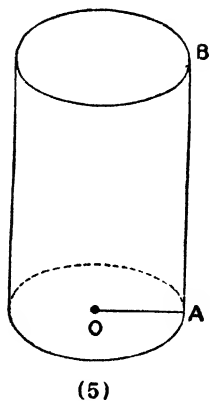
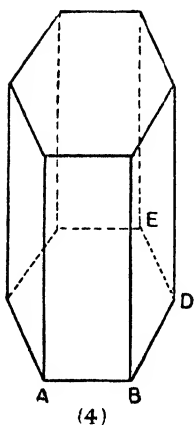
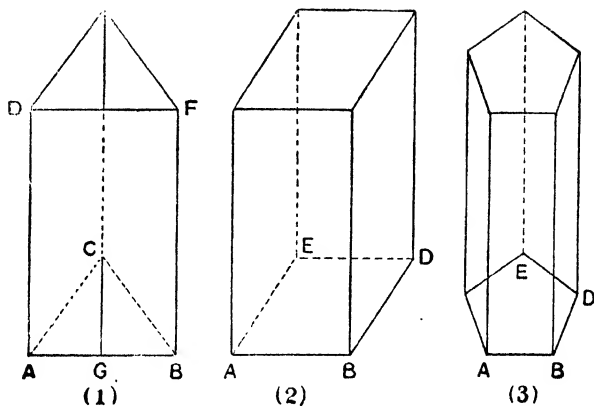
26. If a cubic foot of lead weigh 707·4 lb., what is the weight of the lead in the last question?

27. If the piece of lead referred to in Question 25 were used to cover a flat roof supported by six uprights, what decimal of a ton weight would each upright sustain, supposing the weight to be distributed evenly?

C. The Prism Law

204. Each of the objects represented in Figures 1 to 5 is of uniform sectional area. Any such object is called a PRISM. If its section is triangular, then it is called a Triangular Prism; if pentagonal (5-sided) or circular, it is called a Pentagonal Prism

or a Circular Prism, as the case may be. The usual name for the latter is, of course, a Cylinder.



The volume of *any* prism

= area of base \times height, or sectional area \times height,

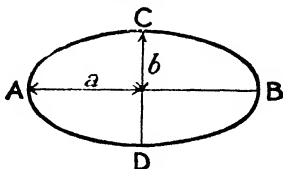
i.e. $V = A \times h$.

If the cylinder were only roughly uniform, such as a tree, then the volume would be approximately equal to the **average** sectional area \times height.

205. Tins of circular and elliptical section are largely used in commerce. For example, a world-famed firm of cocoa manufacturers puts up a quarter of a pound of cocoa in a cylindrical tin, 2 in. in diameter and 4 in. high, and an equally famous firm puts up mustard in small elliptical tins 2 in. high and $1\frac{3}{4}$ in. for the longer diameter and 1 in. for the shorter diameter of the bottom and top.

The area of an ellipse is $\frac{\pi \times AB \times CD}{4}$ or πab where a and b are the semi-axes.

If $a = b$ then the ellipse becomes a circle and $\pi ab = \pi r^2$ where $r = a$ or b .



206. EXAMPLE.—Find the volume of a cylinder of iron 8 ft. long and $3\frac{1}{2}$ in. in diameter.

Volume = area of base \times height

$$= \pi r^2 \times \text{height}$$

11

$$= \frac{\pi}{4} \times \frac{7}{4} \times \frac{7}{4} \times 8$$

$$= 77 \text{ cubic feet.}$$

Whence it is easy to calculate the weight of metal if we know its specific gravity.

EXAMPLES. LVI.

Apply the above rule (§ 204) to find the volumes of the following objects in cubic feet or cubic metres (Questions 1 to 7):

1. An oak strip which is square in section, edge 1 in. and length 5 ft.

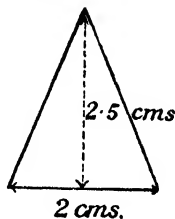
2. A plank, 12 ft. long, 9 in. wide, and $2\frac{1}{2}$ in. thick.

3. A whitewood strip, 4 in. \times 4 in. \times $8\frac{1}{2}$ ft.

4. A cylindrical rod, 6 ft. long and 1 in. in diameter.

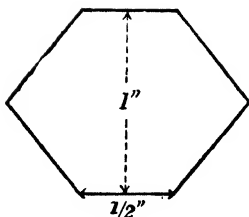
5. A bar of iron, of the section shown, 20 cm. long.

6. A roughly hewn tree whose diameter at three points is 35 cm., 30 cm., and 25 cm., and length 10 m.



7. The roller of a blind of the section shown, $1\frac{1}{2}$ yd. long. (See § 194.)

8. The section of a pillar which helps to support the roof of a church is in the shape of a regular hexagon of 1 ft. 6 in. side and height 20 ft. Find the volume of the brickwork of which it is made.



9. What weight must the foundations be capable of supporting if the specific gravity of the brickwork of the last question is 2.2 and the weight that the pillar supports is two-thirds of its own weight?

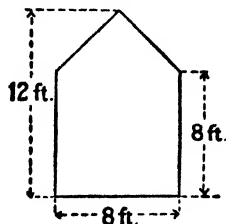
10. The Royal Albert Bridge, which carries the Great Western Railway over the Tamar into Cornwall, was erected by the great engineer I. K. Brunel, and opened in 1859. The supports in the middle are hollow octagonal cast-iron (not steel, observe) columns 10 feet in diameter and 100 feet high. Calculate the volume of the cavity inside each column.

11. Continuing the theme of the last question, the student is informed that the railroad is supported from two oval tubes made of malleable-iron plates, the diameters of each are 17 feet and 12 feet, while the mean length is 460 ft. Calculate the volume of the hollow in each tube, neglecting the thickness of the iron.

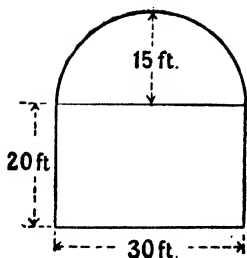
12. An oil merchant buys a drum of linseed oil which is 12 in. in diameter and 2 ft. 6 in. high. How many pints of oil does it contain?

13. A merchant offers a conical heap of sand for sale and asks £9 for it. A would-be purchaser offers him 3s. 6d. a cubic yard. The circumference of the heap is 132 feet and the height that of a walking-stick, namely, 3 feet. Does the merchant ask more than he is offered, or less? (§ 201.)

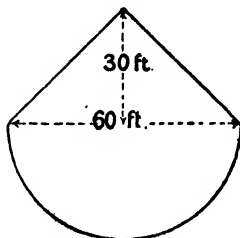
14. A Canadian farmer has a rick of hay 30 feet long, and shaped, roughly, as shown in the figure. He wishes to export it, and knows that 40 cubic feet go to the shipping ton. How many shipping tons has he?



15. How many cubic yards of merchandise could be stored in a shed shaped as shown in the figure, if its length be 120 feet?



16. In erecting a new building the gravel soil has to be excavated to a depth of 21 feet for cellars. The ground is at the corner of two roads and is shaped as shown. How many cubic yards of gravel have to be removed? What is the value of it at 2s. per cubic yard?



207. EXAMPLE.—A covered box is made of metal of specific gravity 5, and its dimensions are: internal, 2 ft. by 1 ft. by 9 in.; external, 2 ft. 2 in. by 1 ft. 1 in. by 12 in. Find its weight.

$$\begin{aligned} \text{Internal volume} &= 2 \times 1 \times \frac{3}{4} \text{ cub. ft.} \\ &= 1.5 \text{ cub. ft.} \end{aligned}$$

$$\begin{aligned} \text{External ,,} &= 2\frac{1}{8} \times 1\frac{1}{2} \times 1 \text{ cub. ft.} \\ &= 2.35 \text{ cub. ft. (to nearest } \frac{1}{10} \text{th)} \end{aligned}$$

$$\begin{aligned} \therefore \text{volume of METAL} &= 2.35 - 1.5 \\ &= 0.85 \text{ cub. ft.} \end{aligned}$$

1 cub. ft. of water weighs 1000 oz.

1 cub. ft. of metal ,, 5000 ,,

$$\begin{aligned} 0.85 \text{ cub. ft. of metal} &,, 0.85 \times 5000 \text{ oz} \\ &= 4250 \text{ oz.} \\ &= 0.12 \text{ tons,} \end{aligned}$$

EXAMPLES. LVII.

Miscellaneous Questions

(For any constants required, see §§ 145 and 146.)

1. Sappers wish to mine an enemy's trench 150 yds. from them, and to this end they have to dig a tunnel 4 ft. by 2 ft. 6 in. If they can throw out 1 cub. yd. of material (and fix up the sides of the tunnel as well) every ten and a half minutes, how long will it be before they can put the charge ready to blow up the trench?

2. A railway company has a truck for carrying gas in a cylinder which is 15 ft. long, and contains 6930 cub. ft. of gas which, on being forced into the cylinder, are compressed to one-third the volume they occupy under ordinary atmospheric conditions; what must be the diameter of the cylinder?

3. A timber merchant wants to have a saw-pit dug, and its dimensions are to be 20 ft. long, 8 ft. wide, and 8 ft. deep. The first 18 in. of soil are earth and the remainder clay. It costs 1s. and 4s. 6d. to dig out 1 cub. yd. of earth and of clay respectively. Calculate what it will cost to dig the saw-pit.

4. In a building constructed of reinforced concrete¹ the dimensions of a vertical rectangular pillar are $20\frac{1}{2}$ ft. by 15 in. by 12 in.; what is the volume of the pillar in cubic yards?

5. If the iron standard within the concrete referred to in Question 4 occupies 0·7 of the volume, determine the weight of the concrete if its specific gravity is 2·2.

6. In the west end of London stiff cardboard boxes are packed in dozens into skeleton crates. If the size of each cardboard box is 1 ft. 9 in. each way, and they are packed in three tiers of four in each tier, what are the dimensions of the crates?

7. If a room 25 ft. by 18 ft. by 15 ft. 6 in. be arranged to accommodate thirty-two people, determine how many cubic feet are allowed for each person.

8. How many loads of rough timber are there in a stack 40 ft. 6 in. by 25 ft. by 18 ft. 6 in., if a load of rough² timber is reckoned as being 40 cub. ft.

9. A cord of wood³ is 128 cub. ft. What will be the height of a stack of wood containing 30 cords if the ground on which it stands is 24 ft. by 16 ft.?

¹ That is iron rods or bars embedded in concrete.

² Squared timber is timber which is roughly squared off, while rough timber has not been treated in this way.

³ See Question 38, p. 309.

10. What is the weight of a load (50 cub. ft.) of walnut wood if its specific gravity is 0·7?

11. A hardware merchant in Birmingham consigns goods to a customer in South Africa in three cases whose dimensions are—

Case.	Length.	Width.	Height.
1 . . .	3 ft. 6 in.	2 ft. 6 in.	1 ft. 6 in.
2 . . .	2 ft. 9 in.	3 ft. 4 in.	2 ft. 6 in.
3 . . .	3 ft. 4 in.	2 ft.	3 ft. 6 in.

If a shipping ton of merchandise is 40 cubic feet, find the number of shipping tons consigned.

12. If a case of cloth is 4 ft. 6 in. long and 3 ft. 6 in. wide, what height can be allowed so that it may not exceed one shipping ton?

13. What is the average sectional area in square centimetres of a cylindrical glass measure, made in Belgium, capable of holding one-half an imperial pint, if the half-pint mark is to be 10 cm. from the bottom of the measure inside?

14. What is the diameter in centimetres of the half-pint measure of the last question?

15. A brass cylinder 4 in. in external diameter and $10\frac{1}{2}$ in. high, has internal dimensions $3\frac{1}{2}$ in. in diameter and $8\frac{1}{2}$ in. high. Find the volume of the metal.

16. Taking the specific gravity of brass as 8·00, find the weight of the metal in the last question.

17. The internal diameter of a bucket which is circular in plan is 11 in. at the top and 9 in. at the bottom; its height is 12 in. How many gallons of water will it hold?

18. A dredger, made by a French company, is provided with buckets whose capacity is 2500 litres each. They are elliptical in shape, 125 cm. being the length of the major (longer) diameter and 120 cm. that of the minor (shorter). What is the depth of each bucket?

19. How many buckets must there be on the dredger of the last question if it is to comply with a recent specification of the South Australian Government for a delivery of 27000 cubic feet an hour, and each bucket is used six times per hour? (1 in. = 2·54 cm.)

20. Trenches called "leats" run across Dartmoor, by means of which water is conveyed from the hills to the coast towns.

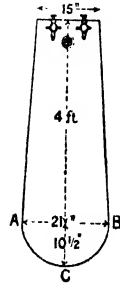
¹ Much of the water has now been "piped."

Some of these leats are said to have been dug by Sir Francis Drake, in whose honour "Ye Fishing Feaste" is still held. If a particular leat is 4 ft. 6 in. wide, with a depth of water of 8 in. flowing at 4 miles an hour, determine the number of gallons of water that it will deliver per day into the town which it feeds.

21. What is the volume of the circular "bob" of the pendulum of a grandfather clock if it is 5 in. in diameter and $\frac{3}{8}$ in. in average thickness?

22. What is the weight of the "bob" in the last question if the specific gravity of lead is 11.35?

23. It is usual for companies which supply water to do so at the ordinary charge, provided the bath does not contain more than 80 gallons when filled to the level of the overflow pipe. The diagram represents the average section of an ordinary bath. What depth of water could be put into this bath without exceeding the limit fixed. Is it a reasonable limit?



(Take the area of ABC as one-half of the semicircle of radius $10\frac{1}{2}$ in., so as to allow for the slope of the bath.)

24. The parapet of a terrace is ornamented with marble, and at intervals there are marble balls¹ 9 in. in diameter. What would be the weight of marble required for each ball if its specific gravity is 2.7?

25. A hemispherical silver rose-bowl is 28 cm. in internal diameter and 3 mm. thick. How many cubic centimetres of metal does it contain if 12 cub. cm. must be added for its supports?

26. What is the weight of the bowl of the last question in ounces Tr.? (The specific gravity of silver is 10.51.)

27. What is the value of the metal in the bowl of Question 25 if silver be worth 23½d. per oz.? (§ 145.)

28. What must be the internal diameter of a hemispherical "finger bowl" if it is to contain 0.352 litre of water?

29. What is the height of a cylindrical litre measure the internal diameter of which is 11.2 cm.?

30. If the metal in the last question be 2 mm. thick, and the measure has no cover, calculate the volume of the metal.

31. If the metal of which the measure of Question 29 is made has a specific gravity of 6.5, find its weight.

32. Emigrants to Canada are allowed two boxes, each

¹ See § 201.

2 ft. 5 in. \times 1 ft. 6 in. \times 1 ft. 6 in., free, on board ship, supposing they travel steerage. How many shipping tons will 325 emigrants carry, supposing each one takes the full quantity?

33. A firm of instrument makers wishes to quote for 1000 spherical copper balls each 2 in. in diameter. If the metal stand at £65 per ton of 2240 lb., what will be the actual value of the balls? (Sp. gr. of copper is 8.9.)

34. What is the internal volume of the cylinder of an engine if it be 6.8 cm. long and 2.2 cm. in radius of cross-section?

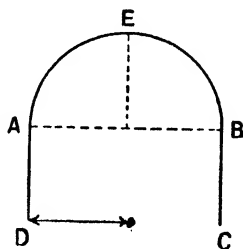
35. The dam at Gatun, on the Panama Canal, consists of a core of fine sand and clay surrounded with earth. It is 7700 ft. long, 115 ft. deep, 2100 ft. wide at the bottom, and 398 ft. wide at the top. Calculate to the nearest thousand the number of cubic yards of material that were employed in its construction.

36. The great dam at Assouan (600 miles south of Cairo) is $1\frac{1}{2}$ mi. long, 120 ft. high, 23 ft. thick at the top, and 81 ft. thick at the bottom. Calculate to the nearest thousand the number of cubic yards of masonry employed in its construction.

37. The Suez Canal is 87 mi. long, 240 ft. wide at the water level, 72 ft. wide at the bottom, and has an average depth of 29 ft. Calculate to the nearest thousand cubic yards the volume of sand and clay excavated in its construction.

38. Wood is sold in Canada by the "cord," one of which occupies a space 8 ft. by 4 ft. by 4 ft. In Regina a cord of wood is worth 9 dollars. In England, four bundles of wood occupy a space $7\frac{1}{2}$ in. by $7\frac{1}{2}$ in. by 5 in., and are sold for a halfpenny each bundle. Is wood dearer in England than in Canada or cheaper, and how many times?

39. The top of a pepper dredge is shaped as shown in elevation in the diagram. **ABCD** is a cylinder and **AEB** is a hemisphere, the mean diameter of each being 2.4 cm. The thickness of the metal is 0.7 mm., its specific gravity 6.5, and **AD** = 2 cm. Calculate the weight of metal necessary to make a gross of "tops," expressing the result in Kilograms.



40. The dimensions of the bottom of a reservoir are 1000 yds. by 250 yds. It contains 500 million gallons of water. What is the average depth of the water? (1 gallon occupies 277.272 cubic inches.)

41. What must be the area of a reservoir, in Hectares, in which the average depth of the water is to be 5·5 metres, and in which 110 million Hectolitres of water are to be stored?

42. Express the result of the last question in the decimal of a square mile.

43. The larger of the Latchford locks on the Manchester Ship Canal¹ is 600 ft. long, 65 ft. wide, and has a rise of 14 ft. 6 in. How many gallons of water are required to raise a ship from the lower to the higher level by means of the lock? (1 cubic foot water = 62·321 lb., and 1 gallon of water = 10 lb.)

44. The Empress Open Dock at Southampton is $18\frac{1}{2}$ acres in area, with a minimum depth of 26 ft. at low water. Calculate the number of gallons of water which enter the dock for a rise of 13 ft. in the tide above the low-water mark.

45. How many cubic yards of stone are there in the shaft of a circular column, if it is 14 ft. in diameter and 120 ft. high?

46. The height of a Corinthian column (such as the Nelson Column or those which form part of the façade of the National Gallery) is usually 9·78 times the diameter of its cross-section. What would be the volume in cubic yards of a column 7 ft. in diameter?

47. What weight must the foundations of the column of Question 45 be able to support if the specific gravity of the stone be 2·00?

48. There is a trade in pottery in South Devon in which the red clay of the neighbourhood is employed. The baking (for forty-eight hours) is carried on in an oven 9 ft. 6 in. high, 8 ft. 5 in. deep, and 2 ft. 6 in. wide, and 960 articles were in it on one occasion. Find the average number of cubic inches allowed per article.

49. A block of copper is 2 ft. by 6 in. by $3\frac{1}{2}$ in. What length of wire $\frac{1}{8}$ in. in diameter can be made from it?

50. The corporation of a town in Norway is inviting tenders for the supply of a stone crusher to crush 6 cub. m. an hour. Convert this into cubic feet an hour for the information of a British contractor who wishes to tender.

51. The corporation referred to in the last question requires two four-wheeled water-carts of tank capacity 1500 litres. Express this capacity in gallons.

¹ Opened for traffic 1st January 1894.

SECTION XV
WEIGHT AND CAPACITY

208. We shall assume the following relationships in this section unless otherwise stated (for *others*, see §§ 145 and 146):

1 cub. ft. of water	weighs 62·321 lb.
1 cub. ft. of any substance	weighs 62·321 × sp. gr. of that substance.
1 gallon of water	weighs 10 lb.
1 gallon	= 4 543 litres.
1 ton	= 1016·05 Kgm.
1 Kgm.	= 2·2046 lb. (Av.).
	= 32·151 oz. (Tr.).
1 litre	= 1·76 pint.
1 metric ton	= 2204·6 lb.
1 pood ¹	= 36 lb.
1 dessiatine ¹	= 2·7 acres.
1 franc = 9·513d.	1 kin ² = 1·323 lb. (Av.).
Yen 1 ² = 2s. 0½d.	1 koku ² = 4·96 imp. bushels.
1 dollar = 4s. 1d.	1 chō ² = 2·45 acres.

EXAMPLES. LVIII.

Miscellaneous Questions

1. How many trusses of old hay (56 lb.) can be placed on a cart constructed to carry 2 tons?

2. A load and a half of old hay weighs 27 cwt. How many trusses are there in a load?

3. A truss of new hay weighs 60 lb. What is the weight of a load (36 trusses) in hundredweights, quarters, and pounds?

4. A United States barrel of flour contains 196 lb. How many barrels can be filled from 36 cwt. of flour?

5. A bushel of rye or of maize weighs 60 lb. How many bushels are there in a consignment weighing 5 tons 3 cwt. 2 qrs.?

6. A bushel of English oats contains 39 lb. What is the weight of 115 qrs. 6 bushels in tons, to two places of decimals?

7. Potatoes are sold in one quality at 3 lb. for 2½d., and in another at 8 lb. for 5½d. Find the difference in price of 1 cwt. of each quality.

8. If 2 cwt. of potatoes costing 7s. 6d. per cwt. be mixed with

¹ Russia.

² Japan.

3 cwt. costing 6s. 8d. per cwt., what must be the selling price per stone in order to gain half the original outlay?

9. A dairyman buys 3 cwt. of butter for £12, and after mixing a gallon and a half of water with it sells it at 1s. 1d. per lb. What is his profit per pound?

10. A wine merchant mixes 80 gallons of wine at 15s. 6d. a gallon with 120 gallons at 12s. 9d. a gallon, and sells it at 2s. a pint. What does he gain per gallon, to the nearest penny?

11. 3 cwt. of coffee is bought for £8 8s. per cwt., and after being ground is mixed with 28 lb. of chicory at £5 12s. per cwt. The whole is sold for 2s. per lb. Calculate the total profit.

12. A provision merchant buys 21 cwt. of butter at £80 per ton, mixes with it 4 cwt. of inferior fat which costs him 15s., and sells 14 cwt. at 1s. per lb. He is then prosecuted, convicted, fined £15, and the rest of his mixture is confiscated. What does he gain or lose by the transaction?

13. What is the difference in weight between a bar of wood circular in section of $\frac{1}{2}$ inch radius and 3 ft. long, and an iron bar of the same size? (Sp. gr. of iron = 7.85, and of wood = 0.85.)

14. What is the weight of forty-eight iron bars, such as are used for making cart wheels, each of which is 20 ft. \times 1 $\frac{1}{2}$ in. \times $\frac{3}{8}$ in.?

15. What would be the cost of sending the iron mentioned in the last question from Birmingham to London at 15s. 8d. per ton?

16. Furniture is conveyed from London to a station 200 miles down the country for 42s. 6d. per ton. What is the cost per cwt.-mile?

17. If a merchant have 18 tons 7 cwt. 2 qrs. weight of furniture, what would it cost him to have his furniture removed under the conditions mentioned in the previous question?

18. The price quoted in Question 16 does not include packing, nor is it at the company's risk. A firm of carriers packs and accepts risk for conveyance at 4s. 9d. per cwt. Determine the total cost of packing and conveying the weight of furniture given in Question 17.

19. A bottle of mercury contains 84 lb. and costs £11 15s. Find the value of a consignment of the metal weighing 15 cwt. 2 qrs. 18 lb.

20. Nainsook and similar cloths (white, black, or coloured) imported into Egypt have to pay a duty of 239 millièmes per Kilogram. Find, in English money, the duty on a consignment of 1 ton, allowing 3 per cent. off the gross weight for tare. (1000 millièmes = £E1 = £1 0s. 6d.)

21. The largest iron ore deposit in South Australia is situated

about 40 miles from Port Augusta. The average yield of the ore is 68·5 per cent. of metallic iron, and it is estimated that 21 million tons of ore are available. Calculate the value of the iron in the ore at 62s. per ton.

22. Trebizond (Russia) tobacco made 21 roubles per pood¹ in 1914. What was the price per pound? (1 rouble=2s. 1 $\frac{1}{3}$ d.)

23. The total quantity of gold imported into India from all sources in 1913 was 6,813,489 oz., valued at £27,527,190. Calculate the average value of 1 oz. of gold to the nearest penny.

24. Taking the circumstances of the last question, find the average value of 1 oz. of silver if the importation of 107,190,427 oz. was valued at £13,693,978.

25. Up to the present the greatest productivity of beet sugar in Russia occurred in 1910-11, and then 193·36 poods were produced per dessiatine. Calculate the weight of sugar derived from one acre.

26. A company conveyed goods as follows:

	Tonnage.	Receipts.
		£
Merchandise	3020686	1128548
Coal, coke, and patent fuel	3612599	344808
Other minerals	1473072	175250

Find the receipts per ton in the case of each class of goods.

27. A great hundred of eggs consists of 120, and in the trade dairymen reckon that 8 large eggs or 10 small ones weigh 1 lb. Taking the tare of the containing case as 11 $\frac{1}{2}$ lb., find the cost of sending a great hundred of each size egg by rail at 2 $\frac{3}{4}$ d. per lb.

28. Very large quantities of platinum are produced in Russia and reach London through continental intermediaries. On one occasion no less than 33180 Troy oz. of the metal were pledged with Russian Banks because of the absence of a market. Presuming the value in English money per Troy ounce to be £5 10s. 6d., find to the nearest pound the amount of capital lying idle as a result of this absence of market.

29. An army of a million men has 20 tons of vaseline issued to it each month. Determine what is the average weight in ounces issued to each man per month.

30. If 1 cwt. of vaseline cost £1, find the value of this substance issued to the army in a year.

¹ This was a fairly high price.

31. A railway company has open goods wagons as follows :

Average Tare.	Number.
7 tons 3 cwt. 2 qrs.	202
9 tons 15 cwt. 1 qr.	9325

Find the average tare for these two classes of wagons taken together.

32. A steamship company has twelve steamboats of over 250 tons each. Their total registered tonnage is 4906·09 tons, and their indicated horse-power 44546. What is the average horse-power per hundred tons registered?

33. Last year 9600 chests of Excise opium were issued in Bengal, and their total weight was 14400 maunds. Taking 1 maund as 82·286 lb., calculate the average weight of each chest in pounds to one place of decimals.

34. The Russian tobacco production is slowly becoming more valuable, and consequently the importation of that commodity is diminishing in value. In 1912, 30400 poods valued at one and a half million roubles were imported. What was the average value in shillings per pound of the imported tobacco?¹

35. A railway is about to be built in Spain from Madrid to Valencia; the rails are to be 12 metres long and must weigh 40 Kilograms per lineal metre. Calculate the total weight of iron used in rails (single track) if the distance between the cities is 560 Kilometres, and also the number of rails which must be employed.

36. What is the duty on 3 cwt. 1 qr. 28 lb. 14 oz. of ivory exported from the Nyassaland Protectorate at the rate of 10s. per lb.?

37. What is the duty on 2 qrs. 18 lb. 8 oz. of asbestos at 6d. per lb. exported as in Question 36?

38. A duty of 1 centavo per Kilogram is imposed on paper imported into the Argentine to be used for newspapers. What is the duty per ton? (100 centavos = 2s.)

39. The grain elevator on the Manchester Ship Canal can deliver 1075 sacks per hour into the holds of vessels at the wharf. If this quantity weigh 120 tons, calculate in pounds the weight of a sack of grain.

40. If the elevator of the last question deliver grain in bulk, then its capacity is 450 tons per hour. Reckoning that a bushel of English wheat weighs 60 lb., calculate the number of bushels delivered per minute.

¹ In the year given, Russia exported tobacco of value 7,654,000 roubles.

41. A steamboat of 4500 registered tons sails regularly from Hong-Kong to Yokohama. Calculate the dues paid in English money, at the rate of sen 15 per registered ton per annum.

42. A duty of 80 reis per litre is imposed on beer of high fermentation whether imported into Brazil or of domestic manufacture; calculate the duty on a barrel of beer of 36 gallons, exported from England to Brazil. (1 milreis = 1s. 4d.)

43. Taking 1 gallon of water as weighing 10 lb. and the specific gravity of petroleum as 0.8, find the number of gallons by which the production of petroleum in Russia in the intervals given in Question 46 varied.

44. If leather, cut out for boots and shoes, pays a duty of 12 pesos per Kilogram on importation into Uruguay, find the duty per ton in English money. (1 gold peso = 100 centesimos = 4s. 3d.)

45. A duty of 25 reis is payable on each box of stearine, spermaceti, or paraffin candles weighing 250 grams or less, imported into Brazil. Find the duty payable on $3\frac{1}{2}$ cwt. of candles exported from London to Brazil. (1 milreis = 2s. 3d.)

46. In the first half of last year 2,245,814 poods of petroleum were produced in the Maikop region of Russia, while in the year before, the production was 2,563,846 poods. Express, in tons, the difference in the production for the years given.

47. Canada imported 4147 gallons of perfume from France in bottles not containing more than 4 oz. each in 1913. The value of the importation was 33987 dollars. What was the average value of the perfume per quarter-pint in English money?

48. The United Kingdom exported 537069 gallons of ale, beer, and porter into Canada in 1913, and the value of that quantity was 493212 dollars. What did the United Kingdom brewers charge Canada per quart, to the nearest halfpenny?

49. A Spanish construction company has undertaken to build twenty liners of a total tonnage of 100000 tons and of a value of £4,000,000. Find the cost of each liner in francs, and the cost per ton in francs.

50. The output of a continental coal syndicate was 3,918,000 metric tons of briquettes; convert this weight into tons, and calculate the value at 25s. 6d. per ton.

51. About 18 million poods of flax are exported from Russia in a (normal) year, and the production is $18\frac{1}{2}$ poods per dessiatine. Calculate what number of acres yield one ton of flax.

52. Convert the following weights into Kilograms correct to $\frac{1}{10}$, the details being for one of the best types of English motor cycle: Weight of engine, carburettor, magneto, and silencer,

90 lb.; weight of flywheel, $36\frac{1}{2}$ lb.; weight of magneto, 7 lb.; weight of carburettor, $3\frac{3}{4}$ lb.; weight of piston with rings, gudgeon pin, and springs, 2 lb.; weight of cylinder (bare), 13 lb.; weight of $3\frac{1}{2}$ H.P. machine, 214 lb.; weight of $5\frac{1}{8}$ H.P. machine, 242 lb.

53. In the Board of Trade returns we are informed that 788956 metric tons of pig iron were produced in Germany in November 1914, and 729822 metric tons in the previous month. Find, in English tons, the excess of the former over the latter.

54. Canada exported 600481 gallons of whale oil, valued at £48721, to the United Kingdom in 1913. Determine the average value of the oil per pint, to the nearest $\frac{1}{10}$ of a penny.

55. China imported 112,459,920 gallons of American kerosene oil in 1913, which was valued at 14,349,720 Haikuan taels. Taking the Haikuan tael as being worth 3s. $0\frac{1}{4}$ d., calculate the value of 100 gallons of oil in English money.

56. The yield of barley and wheat in Japan in 1913 was 25,050,450 koku from an area of 1,828,370 chō. Find the average yield in koku per chō and in bushels per acre.

57. The yield of wheat in Australia in 1913 was 91,969,547 bushels, from 7,339,101 acres. Calculate to two places of decimals the yield per acre, and compare with the result of Question 56.

58. Fish scales are used in the manufacture of iridescent glaze for pottery and for imparting a pearl finish to varnish, and they are exported from Russia. Find the price in roubles per pood if it be £3 10s. 6d. per ton. (1 rouble = 2s. 1d.)

59. In one week 242077 cwt. of oranges were imported into the United Kingdom. If the average weight of an orange is 4 oz., calculate the number imported in the week considered.

60. What is the retail value of the importation of the last question, if the oranges are sold at three a penny?

61. The large lock at Irlam, on the Manchester Ship Canal, is 600 ft. long, 65 ft. wide, and has a rise of 15 ft. How many tons of water will flow out of the lock in allowing a ship to descend from the higher to the lower level?

62. Last year there was a yield of 36.5 bushels per acre of oats in the province of Ontario. Convert this yield into Hectolitres per Hectare for the information of a French agriculturist.

63. If wheat costs 56s. a quarter, find what this price would be in francs per Hectolitre.

64. Last year New South Wales imported 63320 centals of oats, upon which a duty of £4749 was paid. What was the duty in shillings per quarter? (A bushel of oats weighs 40 lb.)

65. Express the duty referred to in the last question in

francs per quintal for continental customers, reckoning 1 quintal = 3·67 bushels.

66. Express a duty of 1 franc per quintal in pence per cental and in shillings per quarter.

67. Some carts in which ice is delivered at hotels and restaurants in the West End of London carry 27 blocks, each of which is 4 ft. 6 in. by 2 ft. 6 in. and 10 in. thick. If the specific gravity of ice is 0·85, what weight of ice does each cart carry?

68. What is the value of the ice in each cart (Question 67), if the retail price is 2s. per cwt.?

69. The average weight of each of forty-five coal carts which pass over a weighing platform loaded is 2 tons 9 cwt. 1 qr., find the total weight of the carts and their loads.

70. The average tare in the previous question is 6 cwt. 2 qrs., what is the weight of coal in the forty-five carts?

71. In a surveyor's office there is a map of London which is attached to a roller 5 ft. long and 1·5 in. in diameter. If the specific gravity of the wood of which it is made be 0·7, calculate the weight of a consignment of a thousand such rollers.

72. What is the weight of a dozen 5 ft. oak strips, of sp. gr. 0·8, square in section, each edge being $1\frac{1}{4}$ in. long?

73. What would be the weight of a sphere of platinum of radius 3·5 cm. if the specific gravity of platinum is 21·42?

74. Find the radius of a sphere of platinum weighing 89·76 oz. (Av.). (1 cubic ft. of water weighs 1000 oz.)

75. The Rhodesian gold output for January of this year was 70082 oz. as against 73889 oz. for December last. Find by how much the value of the output for January was less than for December, pure gold being worth £4 4s. 11½d. per ounce.

76. 1 lb. (Troy) of standard silver is coined into 66 shillings. If the value of silver be $28\frac{1}{8}$ pence per oz. (Troy), find the actual value of a shilling.

77. The alloy (standard gold) of which English sovereigns and half-sovereigns are made consists of 22 twenty-fourths pure gold, or 22 carats. What is the "fineness" of a sovereign—that is, how many parts are there of pure gold in 1000 parts of alloy?

78. 40 lb. Troy of standard gold is coined into 1869 sovereigns. What is the value of one Troy ounce of standard gold, neglecting the value of the base metal?

79. Employing the data of the last two questions, find the value of an ounce of pure gold.

80. What is the actual value of the fine gold in a sovereign which weighs 123·27447 grains?

81. A penny should weigh $\frac{1}{3}$ oz. Avoirdupois. What is the weight of £10 worth of pennies?

82. Express the weight of a penny as the decimal of 1 oz. Troy.

83. What is the actual value in English money of 1 gram of fine gold? (1 gram = 15.43235 grains.)

84. The gold 10-florin piece, which is the standard coin in the Netherlands, weighs 6.720 grams and is 900 fine. What weight of fine gold is there in the coin?

85. Find the actual value in English money of the gold in a Netherlands 10-florin piece (see Question 84).

86. 155 twenty-franc pieces,¹ 900 fine, weigh 1 Kgm. What is the value of the gold in a 20-franc piece? (See Question 83.)

87. 124 twenty-kroner pieces (Denmark and Scandinavia), 900 fine, are coined from 1 Kgm. of fine gold. What is the value of the gold in a 20-kroner piece?

88. A 10-kroner piece weighs 4.480286 grams. What weight of fine gold does it contain?

89. Since the passing of the Coinage Law in 1897, gold 5-yen pieces of Japan have weighed 1.1111 momme and are 900 fine. Find the weight of a 5-yen piece in grams, if 160 momme = 0.6 Kgm.

90. What is the value in English money of the gold contained in a 5-yen piece? (1 Kgm. = 32.151 oz. (Tr.).)

91. A 50-sen silver coin weighs 2.7000 momme and contains 800 parts of pure silver and 200 parts of copper. With silver at $22\frac{1}{8}$ pence per oz. (Tr.), find the value of pure silver in a 50-sen piece (see Questions 89 and 90).

92. What is the actual value of a 5-yen piece in terms of 50-sen pieces, ignoring the value of the copper in the latter?

93. The United States gold 10-dollar piece weighs 258 grs. (Tr.) and is 900 fine. What is the value of the gold which it contains? (Question 79.)

94. Taking the value of copper as £65 2s. 6d., of tin as £150, and of zinc as £60 per ton, calculate the actual marketable value of the metal contained in twelve pence,² given that bronze of which pence are made is an alloy of 95 copper, 4 tin, and 1 zinc, and that a penny weighs $\frac{1}{3}$ oz. (Av.).

95. Use the results of Question 76 and of Question 80 to determine the difference between the actual value of two sovereigns and of forty shillings.

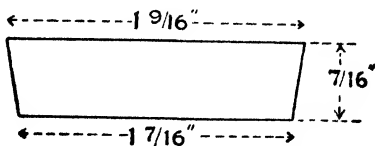
96. How could the Government make money by striking silver coins?

¹ See § 97 for the monetary systems of various countries.

² Bronze is not legal tender for amounts over 1s., nor is silver for amounts over £2.

97. A halfpenny weighs $\frac{1}{8}$ oz. (Av.), its diameter is 1 in., and its thickness $\frac{1}{16}$ in. What is the sp. gr. of the alloy of which it is made?

98. A brass weight is circular in shape and is shown in elevation in the diagram. It weighs 4 oz. What is the specific gravity of the metal of which the weight is made?



99. A pat of butter (such as one gets at a restaurant for 1d.) weighs $\frac{3}{4}$ oz. Find, to the nearest ten pats, the number that can be made from 1 cwt. of butter.

100. Find the cost of conveying 28 tons 5 cwt. 2 qrs. of raw cotton by goods train from Manchester to Bradford, a distance of 37 mi. 75 chs., if the charge per ton per mile is 2·18 pence, and the charges for loading, unloading, cartage, etc., are £6 12s. 8d. for the consignment.

101. What is the cost of conveying slate slabs¹ (unpolished, but packed in cases) per goods train from Leeds to Northampton, a distance of 120 miles, given that (1) the weight of the consignment is 42 tons 17 cwt. 3 qrs.; (2) the charge for transport is for the first 20 miles 1·8d. per ton per mile; for the next 30 miles, 1·65d. per ton per mile; for the next 50 miles, 1·25d. per ton per mile; for the remaining distance, 0·65d. per ton per mile; (3) terminal and other charges are £7 12s. 8d.?

102. The gates to the locks on the Panama Canal are made of sheet iron, with air- and water-tight compartments which help to take some of the dead weight off the hinges and pivots. A gate 65 ft. long, 55 ft. high, and 7 ft. thick weighs 450 tons. Calculate the average weight of the gate in hundredweights for every square foot of surface area in the front of the gate.

103. From the data of the last question find the average weight, in pounds, of every cubic foot in the volume of the gate.

104. How would it be possible to determine whether the lock gates were of solid metal, employing the data of Question 102, and knowing that the specific gravity of iron is 7·5?

105. The rubber tree grows wild in the northern parts of Brazil and it has been cultivated with great success, but the industry has not yet properly developed.² Last year 42,290,000 Kilograms of rubber were exported, at a value of 241,425,000

¹ See footnote, page 320.

² The Government is encouraging rubber planting by offering "bounties" just as the Queensland Government is doing with sugar.

milreis. Calculate the value of the export in shillings per lb. (15 milreis = £1.)

106. If copper stands at £64 10s. per ton on the London market, at what price must it stand in francs per Kilogram at Paris in order that French merchants may quote on equal terms with London merchants (disregard freight charges, etc.)?

107. A particular society in London collects tinfoil, which is sold in fairly large quantities and the receipts of the sale used for the benefit of a hospital. In the three years ending January 1915, 24881 lb. of metal waste tinfoil were sold for £236 16s. 1d. Find the average price paid for 56 lb.

108. What would be the cost of sending 20 dozen iron hinges $4" \times 1" \times \frac{1}{4}"$ from Birmingham to Bristol if the cost of transit per ton is 11s. 8d. (Class 1 goods),¹ and 1 cubic foot of iron weighs 500 lb.?

109. How many iron nails $3\frac{1}{2}$ in. long and of average diameter $\frac{1}{8}$ in. would there be in 10 lb. of the metal? (Sp. gr., 7.85.)

110. Employing the data of the last question, find how many nails there would be in a Kilogram.

111. In Trinidad and Tobago it is proposed to raise money for immigration and agriculture by imposing (among other things) an export duty of $1\frac{1}{2}$ d. on every 100 lb. of cocoa. What would be the duty on 2 tons 3 cwt. of cocoa?

112. At Busanga, in the Belgian Congo, there is an alluvial deposit of tin ore over a space of 33000 square yards to a depth of 1 yard. The ore is found in the form of cassiterite, and contains 78 per cent. of pure tin. Each cubic yard produces 15 lb.

¹ The student is informed that for the purposes of conveyance by rail there are Classes A, B, C, 1, 2, 3, 4, 5, for goods and minerals, while animals, carriages, and exceptional things (*e.g.* elephants, explosives, bullion, etc.) form separate sections, the maximum charges per mile for conveyance being fixed by Parliament.

Class A	would include	coal, sand, limestone.
" B	" "	bricks, china, clay, shot, building stone.
" C	" "	potatoes, rice, sawdust, spelter, waste paper.
" 1	" "	soap, solder, vinegar, timber, wheels.
" 2	" "	butter, cheese, cocoa, accumulators.
" 3	" "	carpets, china in hampers, cutlery.
" 4	" "	haberdashery, furniture, hares (dead).
" 5	" "	drugs, fruit (hothouse), mirrors, perfumery, plants.

The charges per ton per mile (*e.g.* up to 20 miles) range from 1d. in Class A to 4.3d. in Class 5, to which must be added loading, unloading, covering and uncovering charges, ranging from no charge for Classes A and B to 4s. for Class 5. (See Part III.)

of ore. Find, in tons, the probable weight of pure tin derivable from the whole deposit.

113. Lake steamers on the Continent carry 50 Kilograms of luggage free per passenger. How much should an English tourist pay if his luggage weighs 350 lb. and the excess charge is 5 centimes per Kilogram?

114. During the first three months of working, the average net tonnage of vessels engaged in the Pacific Coast trade with Europe which passed through the Panama Canal was 4068 tons. The average charge was 1.20 dollars per ton for tolls. Find the average cost for each vessel to pass through the canal, giving the result in English money. (1 dollar = 4s. 1.32d.)

115. From 1st January 1915 a *frasila* of rubber exported from British East Africa is liable to a duty of 36 rupees. If a *frasila* weighs 36 lb. and a rupee equals 1s. 4d. (fixed rating), calculate the duty per hundredweight in English money.

116. In Uruguay refined cotton-oil seed has to pay, on importation, a duty of 15 centesimos per Kilogram; find the duty per pound. (1 centesimo = $\frac{1}{2}$ d.)

117. If figs are imported into Switzerland to be used for distillation a duty of 40 francs has to be paid for 100 Kilograms. What is this duty in pence per pound?

118. Cocoa-nut oil imported into Greece must pay 435 drachma per 100 okes. Express this in shillings per pound, if 1 drachma = 9.5d., and 1 oke = 2.8 lb.

119. There was a famine in Shiraz (Persia) towards the close of 1913, and the enormous quantity (for Shiraz) of 1400 tons of flour, valued at £14448, was imported. What should have been charged for a barrel of flour of 196 lb. weight?

120. In the year 1914 the Korean and Japanese rice crops were above anticipation and there were 4 million koku left in stock. If 1 koku = 4.99918 imperial bushels, determine the quantity of rice in stock in bushels.

121. In the year 1912 the United States produced 1,243,269,000 lb. of copper, of value 205,139,340 dollars, and the United Kingdom produced 2569 tons, of value £211380. Compare the prices per ton in the two countries.

122. In the year 1913 the United Kingdom exported 12 $\frac{1}{2}$ million tons of coal to France, and this weight was $\frac{10}{57}$ of the total weight exported. Find the latter weight to the nearest thousand tons.

123. Free conveyance of 150 lb. of luggage is allowed on a first-class railway ticket in Great Britain, and 30 Kilograms on the Paris and Lyons Railway. How many more pounds can be

tourist travelling first class in Great Britain take free than in France?

124. How many Kilograms fewer are allowed free on the Paris and Lyons Railway than would be allowed to a French tourist in Great Britain?

125. Cutch¹ makes 28s. 6d. per cwt. in England; convert this into yen per kwam for the information of Japanese fishermen. (Kwam 1 = 8.27 lb. Av.)

126. Tenders are sought for the delivery of 270 tons of pitch for road purposes during the present year in Cairo. A firm in San Francisco tenders for this contract, and agrees to deliver the pitch *via* the Suez Canal. The dues through the canal are 6 fr. 25 c. per ton. Calculate in dollars, for the benefit of the American firm, the total freight charge for the cargo through the canal.

127. A merchant in London places an order in Jersey for 28 cwt. of tomatoes, supposing that the wholesale dealer in Jersey has quoted in English hundredweights. He subsequently finds out that the quotation is in Jersey hundredweights of 112.3 lb. If the value of the latter be 22s. 6d., find how many shillings the London merchant gains or loses by his mistake.

128. If the tomatoes referred to in the last question are sold in London at 4½d. per lb., and 20 lb. are damaged so that they are valueless, find what profit is made if the whole consignment cost £26 4s.

129. The value of the butter produced in Queensland last year was £1,512,210, and it made 11½d. per lb. Find the weight of butter produced in pounds, to the nearest hundred pounds.

130. The tractive effort of a modern type of locomotive is 22500 lb., and the total heating surface 1215.52 sq. ft. Calculate the pull for every square foot of heating surface as the decimal of a ton.

131. In Queensland it has been necessary to bore artesian wells which supply altogether 529,817,860 gallons per day. The cost of boring has been £2,538,875. If now the Government looks for a return of 5 per cent. every year on the capital spent, calculate the value of 1000 gallons of water, in pence, to two places of decimals.

132. A Russian firm sold 9,627,920 poods weight of iron girders in twelve months. Find the average sale in tons per month.

133. By how many pounds does 1000 poods differ from 16 tons?

¹ See Question 28, page 292.

134. The total quantity of rubber sold last year at Singapore was 44894 piculs, which ranged in price from 1s. 6·18d. to 2s. 6·66d. per lb. Find, in English money, the greatest possible difference there could have been in the sale price of the weight named. (3 piculs = 400 lb. Av.)

135. In 1912, 452 million quarters of wheat were produced in the world. Taking a quarter of wheat as 480 lb., find the weight of the wheat production of the world, to the nearest ton.

136. Under the same circumstances as detailed in the previous question, 182,500,000 quarters of barley of 400 lb. each in weight were produced. Calculate the weight of barley to the nearest ton, and then express the weight of barley produced in 1912 as the decimal of the weight of wheat produced in that year. (Question 135.)

137. Russia produced in 1910, 70,340,000 barrels of petroleum of 42 gallons each. The specific gravity of petroleum is 0·88. Calculate the weight of the production to the nearest hundred weight.

138. Electrically-driven turbine pumps of 88000 gallons per hour capacity are to be installed in a town in New Zealand, and a French firm wishes to contract for them. What must be the delivery capacity of their pumps in litres per hour so that they may comply with the specification.

139. In a country in Southern Europe the Government is prepared to allow electrical plant to be put down for industrial and illuminating purposes, and to allow a concession for the utilisation of the waters of the river near the site for purposes of generating the current, water to be used at a rate not exceeding 2500 litres per second. Express this rate in gallons per hour.

140. There is a considerable export trade in mackerel and pilchards from Cornwall to Italy or to South Africa, and the treatment to which the fish are subjected depends on whether they are to be exported in sealed tins or in barrels. A consignment of tinned iron from which the "tin boxes" are stamped weighs 3 tons 15 cwt. 3 qrs. 25 lb., and costs 14s. 6d. per cwt. Calculate the amount which the fish merchant must pay for it.

141. Under the circumstances of the last question, find the value of a shipload of salt for curing purposes, weighing 22 tons 16 cwt. 3 qrs. 23 lb., at a cost of 15s. per ton.

142. This year's yield of cotton in the United States is estimated at 15,966,000 bales of 500 lb. gross weight (excluding linters) and constitutes a record. Taking this yield as 207·9 lb. per acre, find the number of acres under cotton in the United States.

143. The price of lighting oil for home consumption is 7 francs 80 centimes per 100 Kilograms in Roumania. If the sp. gr. of the oil is 0.88, find the cost in pence per gallon.

144. A record crop of winter wheat in the United States produced 19 bushels per acre. Taking a bushel as 62 lb., find the yield in tons per acre.

145. If 50 bushels of wheat yield a ton of flour, and Australia produced 91,970,000 bushels last year, find the weight of flour to which this is equivalent.

146. If the ocean freight is 8.9 cents per bushel, find, in English money, the cost of sending 1 million bushels from New York to Liverpool. (Question 145.)

147. In converting 10 tons into Kilograms it is assumed that 2.2 lb. = 1 Kilogram, while a nearer value is 2.2046 lb. = 1 Kilogram. Find the error made in the first case.

148. Express the error in the last question as the decimal of a metric ton.

149. Cotton is grown in Siam, and 1 rai produces 1 picul of cleaned cotton. It is estimated that there will be 7996 rai under cotton during the present season. How many tons of cotton will be produced upon the basis of these figures? (1 rai = $\frac{2}{3}$ acre.)

150. The report of a gas manufacturing company in Japan states that 570 thousand kin of coal produced 3,270,000 cubic feet of gas and left 64 thousand kin of coke and 40 koku of coal tar. Calculate (1) the volume of gas produced from 1 ton of coal; (2) the proportion that the weight of coke bore to the weight of coal; (3) the number of gallons of coal tar per ton of coal.

151. From the data given in the last question, find (1) the value of the coal at yen 5 per 1000 kin; (2) the value of the coke at yen 4 per 1000 kin; (3) the value of the coal tar at yen 2.5 per koku.

152. Determine the value of the gas referred to in Question 150 at 2s. 8d. per 1000 cubic feet (the price charged around London).

153. The rate for the transport of goods in Morocco is 50 centimes per metric ton. Calculate the cost, in francs, of sending a number of packages from one part of the country to another, if the total weight is 3 metric tons 750 Kgm. 840 gm.

154. The French Government makes a charge of 2.8 francs per gram on gold mined in certain specified parts of Madagascar. What amount of money should be paid upon 58 gm. 5 dgm. 3 cgm. of gold (correct to $\frac{1}{10}$ franc)?

155. Last year a firm in the Erzgebirge (Austria) produced

10614 Kilograms of fine tin, valued at 55000 kronen. Taking 1 krone as 10d. and 1 Kilogram as 2·2046 lb., compare the price of tin in Austria with the price in London, namely, £190 per ton.

156. In 1912-13 the weight of barley produced in, and exported by sea from, British India was 12,303,532 cwt., and was valued at £3,705,457. If 50 lb. of barley are equal to one bushel, calculate the average price per bushel to the nearest penny (see Question 157 also).

157. If the average price of barley in the United Kingdom was 26s. 2d. per quarter during 1912-13, find how many times it was cheaper or dearer in the United Kingdom than in India.

158. The great dam at Assouan, on the Nile, holds back 1300 million cubic yards of water. If this were discharged at the rate of 10000 cubic feet per second (*i.e.*, roughly, the rate of the Thames in flood), how long would it take to reduce the volume of water to one-third of its original volume?

SECTION XVI

TIME¹

209. We know that the sun appears to move through the heavens, and, perhaps, that the stars also appear to do so, but we may not realise that the motion of the celestial bodies affords us our fundamental method of measuring time.

210. Let us imagine that the sun is fixed and that the earth is turning round from west to east, then will it be seen at

¹ An inquiry into ancient and modern methods of measuring time would prove most interesting to the student. The abysmal depths of the starlit skies of the south of Europe appealed to the imagination of the ancients, and many astronomical facts were known to them. Galileo is said to have used his "pulse" as a time-measurer when he observed the steady swinging of a lamp in the great cathedral at Pisa. In our own country King Alfred is said to have measured time by means of candles, which subsequently gave place to hour glasses, and pocket watches, early specimens of which are to be seen in the British Museum, were introduced in 1577. From a literary standpoint, Shakspeare often refers to a clock or to a watch, *e.g.* "The moon is down; I have not heard the clock" (*Macbeth*); "He's winding up the watch of his wit, presently it will strike" (*Tempest*); while Sir Thomas Browne speaks of "Time, which antiquates antiquities and hath an art to destroy all things."

We mention these facts to direct the student's thoughts into the domain of antiquity, of history, and of literature, so that his mind may be able to expatiate in realms other than that of commerce.

Petrograd before London, and at London before New York; or, we may say, that day begins at Petrograd before it does at London, and so on. In the same way the sun reaches its highest point in the sky at Petrograd before it does at London; and so it is noon at the former earlier than at the latter. This is expressed by saying that the **Local Time** at Petrograd is earlier than at London. If, then, the clocks showed local time at both places, those at the former would show 12 noon, and those in London some minutes earlier, and those at New York some minutes earlier still.

211. Under the circumstances mentioned each place in the world would have its own time, and no small confusion in catching trains, opening Stock Exchanges, etc., would result.

To obviate this, **all places in Great Britain take Greenwich time, as also do France, Belgium, Spain, and Portugal. Ireland, however, keeps to Irish time, and so it is 11.35 a.m.¹ in Ireland when it is 12 noon in England and in France.**

We may regard the countries mentioned above as forming a belt in which a standard time, *i.e.* Greenwich time, is observed.

212. The sun appears to describe a circle every day, and so it moves through 360° in twenty-four hours, or 15° every hour; consequently we can find the time at any place in the world if we know how many degrees it is east or west of Greenwich—that is to say, **the time at any place can be found if we know its longitude and also Greenwich time.**

EXAMPLE 1.—What is the time at Petrograd when it is noon at Greenwich, if the former be 30° E.?

Since Petrograd is east, noon there will be **BEFORE** noon at Greenwich, and therefore it will be **PAST NOON** at Petrograd when it is noon at Greenwich.

\therefore the clocks in Petrograd will be ahead of Greenwich and they are therefore “**fast.**”

Reckoning 1 hour for 15° we have 2 hours for 30° ;

\therefore the time at Petrograd is 2 p.m.

EXAMPLE 2.—What is the longitude of Brisbane if the clock is 10 hrs. 12 min. fast?

1 hr. fast means 15° E.

\therefore 10.2 hrs. ,, ,, 153° E.

¹This is the time kept on the railways.

213. Now, taking two cities in the same continent, Australia, we find that Adelaide has a different longitude from Brisbane and so a different local time; hence to facilitate business the belt system, in which a standard time is kept, is extended to the whole world.

For this purpose the surface of the earth is divided up into 15° belts, and places at the middle of each belt differ in time by 1 hour, while every place in one is regarded as different from every place in the other by that same time although they may be only a mile or so apart.

214. The Zone Time is as follows :

FAST.		
Country.	Central Meridian.	Fast on Greenwich.
England	Greenwich time.	
Belgium		
France		
Spain		
Portugal		
Mid-Europe	15° E.	1 hour.
East Europe	30° E.	2 hours.
South Africa		
Egypt		
Calcutta	90° E.	6 "
West Australia	120° E.	8 "
Japan	135° E.	9 "
South Australia	142½° E.	9½ "
Other States in Australia	150° E.	10 "
New Zealand	172½° E.	11½ "

SLOW.		
Country.	Central Meridian.	Slow on Greenwich.
<i>America—</i>		
Atlantic	60° W.	4 hours.
Eastern	75° W.	5 "
Central	90° W.	6 "
Mountain	105° W.	7 "
Pacific	120° W.	8 "

215. Suppose now a boat leaves Holyhead¹ at 9.30 a.m. and steams over to Dublin, at which place the local time is earlier

¹ This paragraph relates to conditions obtaining prior to 1st October 1916, on which date the legal time in Ireland was made to synchronise with that in Great Britain.

than in England (or, the Irish clocks are slow), on landing we must put our watches **back** 25 minutes. If, on the other hand, we left Liverpool and sailed to New York, and, on arriving there, our watches showed 12 noon, the city clocks would show 7.4 a.m. and we should put our watches **back** 4 hrs. 56 mins., NOT 7 hrs. 4 mins., observe, to agree with the local time.

In crossing the States, however, we should not alter our watches at every place we came to, but every time we crossed from one 15° zone to the next, and, as will be seen in § 214, there are five such zones.

Zone time is not kept in Holland, and Rotterdam is 18 minutes fast.

216. From the front at Margate it is possible to see the sun set in the sea, and if we were to take a perfectly adjusted chronometer and go down there and observe precisely the time that the sun set on 25th March, and then, after a year, were to repeat the same experiment, we should find that the interval of time between the two sunsets was 365 days 5 hrs. 48 min. 45.51 secs. Julius Cæsar regarded this interval as 365½ days. We reckon 365 days to a year, and are therefore short by 5 hrs. 48 mins. 45.51 secs., which in four years amounts to 23 hrs. 15 min. 2.04 secs.; we should therefore add on this time every four years, but we really add one day—the 29th February in leap year—and so in 4 years add 44 mins. 57.96 secs. too much.

In 400 years the error is 44.966×100 minutes, or nearly 75 hours, which is rather over 3 days.

∴ in 400 years three days must be dropped, so that although every century year, 1600, 1700, 1800, 1900, 2000, would be a leap year we do not call the three, the “hundreds” of which are NOT divisible by 400, “leap years.” Hence 1600 and 2000 are, with all other years divisible by four, leap years, but 1700, 1800, and 1900 are not, and so the three days are allowed for in 400 years.

217. In offices where bills are drawn or interest calculated (Section XXI. C.) the number of days between two given dates has to be determined, and although tables of days are provided, the student should work the first question in the following examples to familiarise himself with the method of calculation.

218. The student should read §§ 218 and 219 before working Questions 62 to 72 of Examples LIX.

EXAMPLE 1.—A pipe is 3 sq. in. in section, and water flows through it at the rate of 12 ft. per second; calculate the number of gallons delivered per hour.

In 1 second a volume of water 3 sq. in. in sectional area and 12 ft. long is delivered.

$$\therefore \text{volume delivered per second} = \frac{3}{144} \times 12 \text{ cub. ft.} \\ = \frac{1}{4} \text{ cub. ft.}$$

$$\therefore \text{ " " " hour} = 900 \text{ cub. ft.}$$

$$\therefore \text{weight " " " " } = 900 \times 62.321 \text{ lb.} = 56088.9$$

and since 1 gallon = 10 lb.

$$\text{number of gallons delivered} = 56089 \div 10.$$

$$= 5609, \text{ to the nearest gallon.}$$

219. EXAMPLE 2.—Three pipes supply oil to a tank and one empties it. The first three can fill it in 3, 5, and 6 hours respectively, and the last empty it in 12 hours. How long does it take to fill the tank with all four pipes open?

The 1st fills it in 3 hrs. ; \therefore it fills $\frac{1}{3}$ rd in 1 hr.

The 2nd " 5 " \therefore " $\frac{1}{5}$ th "

The 3rd " 6 " \therefore " $\frac{1}{6}$ th "

\therefore all three fill $\frac{1}{3} + \frac{1}{5} + \frac{1}{6}$ "

i.e. $\frac{21}{30}$ "

The 4th empties it in 12 hrs. ; \therefore it empties $\frac{1}{12}$ th in 1 hr.

So all four pipes leave $\frac{21}{30} - \frac{1}{12}$ full "

$$\text{or } \frac{42 - 5}{60} = \frac{37}{60} "$$

\therefore the whole is full in $\frac{60}{37}$ hrs.

i.e. $1\frac{23}{37}$ hr.

= 1 hr. 37 mins., to the nearest minute.

220. Read this before working Questions 77 to 79, Examples LIX.

EXAMPLE 3.—Two trains leave two stations 156 miles apart at the same time, and they travel at 60 miles per hour and 30 miles per hour respectively. How far will the quicker one have travelled before they meet?

They will meet in just the same time as they would if one train travelled at (60 + 30) miles per hour and the second remained still.

Now a train travelling at 90 miles per hour would take $\frac{156}{90}$ hour to run 156 miles.

\therefore they will meet in $1\frac{11}{15}$ hr., or in 1 hr. 44 mins., and since the quicker one runs at 60 miles per hour they will meet when it has travelled

$$60 \times 1\frac{11}{15} \text{ mile} \\ = 104 \text{ miles.}$$

If they had been travelling in the same direction we should have subtracted the speeds and proceeded as above.

EXAMPLES. LIX.

Miscellaneous Questions

1. How many days are there between the following dates in an ordinary year? (*N.B.*—Only one of the two dates given is counted.)

Jan. 1 to Jan. 18.	May 28 to Sept. 30.
Jan. 3 to Feb. 1.	Mch. 18 to Oct. 3.
Jan. 12 to Feb. 27.	June 10 to Nov. 18.
Jan. 21 to Mch. 3.	May 16 to Nov. 28.
Jan. 29 to Apr. 4.	Apr. 15 to Oct. 29.
Feb. 5 to Mch. 29.	Feb. 24 to Nov. 29.
Feb. 21 to Apr. 15.	Feb. 20 to Dec. 16.
Mch. 28 to Apr. 30.	Jan. 28 to Dec. 10.
Mch. 31 to May 30.	Jan. 15 to Nov. 18.
Apr. 18 to May 30.	Jan. 17 to Dec. 30.
Apr. 29 to June 24.	Jan. 18 to June 25 (leap year).
May 15 to July 25.	Feb. 15 to Dec. 26 "
May 19 to Aug. 29.	Mch. 9 to Nov. 27 "

2. Four motor-cars ran over a given distance in 10 min. 36 secs.; 18 min. 30 secs.; 19 min. 25 secs.; and 15 min. 2 secs. respectively. What was the average time taken?

3. Four successive trains take 20 min. 18 secs.; 25 min. 20 secs.; 20 min. 20 secs.; and 18 min. 30 secs. to run from one station to the next. What length of time must a merchant allow, on the average, from the one to the other?

4. Four of the men employed on building a collier work as follows: (1) 14 days 15 hrs. 30 min.; (2) 12 days 18 hrs. 25 min.; (3) 17 days 16 hrs. 20 min.; (4) 15 days 12 hrs. 10 min. What is the total time taken, and what is the average time?

5. Express the result of the last question (1) correct to the nearest day; (2) correct to the nearest hour.

6. A contractor employs his men on an overtime job so that they actually work 12 hrs. 35 min. per day. They take 25 min. for breakfast and 50 min. for dinner. How long do they have for travelling, sleeping, and living?

7. A commercial traveller leaves Leeds at 10.15 a.m., arrives in London at 1.53 p.m., where he transacts his business and

catches the 8.45 p.m. from Victoria and gets to Paris at 6.3 a.m. What length of time did he spend actually travelling?

8. A bricklayer in Queensland works as follows: Monday, 8 hrs. 30 min.; Tuesday, 6 hrs. 15 min.; Wednesday, 5 hrs. 45 min.; Thursday, 9 hrs. 15 min.; Friday, 10 hrs. 30 min.; Saturday, 4 hrs. 45 min. What length of time does he work during the week?

9. What does the bricklayer in Question 8 earn per hour to the nearest halfpenny if he is paid £3 6s. per week?¹

10. Taking the times in Question 8, and assuming that all time over eight hours per day is paid for at overtime rate, namely, half the ordinary hour rate of 1s. 4d., extra per hour, find how much the workman earns.

11. Employing the data of Question 5, page 350, and knowing that at certain seasons of the year the water flows in the canal at the rate of 11000 cubic feet a second, find the speed of the water in metres per hour.

12. Find, to the nearest shilling, what a merchant's income per day is if he finds he has made £556 15s. in the year.

13. Find the times occupied on the following journeys (read horizontally):

	Time of Departure.		Time of Arrival.	Time on Journey.
London	10.30 a.m.	Plymouth	2.37 p.m.	
Liverpool Street, London	8.40 p.m.	Antwerp	8 a.m.	
Liverpool	2 p.m.	Rotterdam ²	6.11 a.m.	
Charing Cross, London .	10 a.m.	Paris, <i>via</i> Folkestone and Boulogne	5.20 p.m.	
Charing Cross, London	4.30 p.m.	Paris, <i>via</i> Dover and Calais	11 p.m.	
Victoria	10 a.m.	Paris, <i>via</i> Newhaven and Dieppe	5.59 p.m.	
Waterloo	9.30 a.m.	Paris, <i>via</i> Havre . . .	11.20 p.m.	

14. The times taken to run from one station to the next on one of the London tube railways are, in minutes, as follows: $2\frac{1}{4}$; $1\frac{1}{2}$; $1\frac{5}{8}$; $1\frac{9}{10}$; $1\frac{3}{4}$; $2\frac{3}{8}$; $1\frac{1}{8}$; $2\frac{5}{12}$. What fraction of an hour is taken on the journey from terminus to terminus?

15. What is the average time between two stations? (Question 14.)

16. The times of trains taken from a time-table are: Waterloo, 9.35 p.m.; Vauxhall, 9.40 p.m.; Clapham Junction, 9.47

¹ This is the average rate of wages in Queensland. See *Queensland Year Book*, p. 171.

² Rotterdam time, see § 215.

p.m. ; Earlsfield, 9.52 p.m. ; Wimbledon, 9.56 p.m. ; Surbiton, 10.11. What is the longest interval of time between any two stations ?

17. In the previous question find the average interval of time between two stations.

18. A contractor at Lille employs men who work as follows in his cotton mills :

25 men,	$5\frac{1}{2}$ days a week,	$8\frac{1}{2}$ hours per day.
30 „	$3\frac{1}{2}$ „	9 „
40 „	6 „	$7\frac{1}{2}$ „

For how many hours work has he to pay at the end of the week ?

19. What is the amount earned in wages in Question 18 if the average earnings are 1.25 franc per hour per man ?

20. If 1000 labourers earning $10\frac{1}{2}$ d. an hour work 8 hours a day for $5\frac{1}{2}$ days a week, what amount is lost to them in wages if they strike from Monday 10th January to 10th April in the year 1916 ?

21. One mason in Newfoundland works $8\frac{1}{2}$ hours a day for 26 days during June, and another works $12\frac{1}{2}$ hours a day for the first ten working days and for the last five. Which of the two earns the more, and by how much ? (Reckon the wages 35 cents per hour, and that a dollar = 4s. $1\frac{1}{2}$ d. Note that 1 cent is reckoned as $\frac{1}{2}$ d in Newfoundland.)

22. Employing the data given in Question 107, page 320, calculate the average weight of tinfoil (in ounces) received each month during the three years referred to.

23. Find the weekly income of the hospital (Question 22) derived from the sale.

24. The cost of maintenance of the transporter bridge¹ over the Wye is £1822 per annum. What must be the average receipts per day in order that the cost may be covered ?

25. If the average price charged for person or vehicle crossing on the bridge mentioned (Question 24) be 1.3d., determine the number of persons or vehicles which must be carried across each week in order that the corporation may not lose money.

26. Women and girls arriving in Winnipeg can get board and lodgings in reliable hostels for a dollar a day. What would be the cost in English money of staying at such a hostel for six weeks ? (1 dollar = 4s. 2d.)

27. In Victoria, ploughmen engaged on pastoral dairying or agricultural holdings can earn £65 a year and be provided with rations. Some French emigrants are proposing to go to Australia,

¹ Page 162, note 2.

and wish to know whether their earnings of 4 francs a day without rations leave them better or worse off than they would be in Australia. Reckoning that their rations would cost them 1 fr. 50 c. per day, decide whether they had better emigrate or not.

28. Find, in miles per hour, the average speed of travelling from London to Paris by each of the four routes referred to in Question 13, if the distances are as follows: *via* Folkestone and Boulogne, 259 miles; *via* Dover and Calais, 287 miles; *via* Newhaven and Dieppe, 224 miles; *via* Havre, 340 miles.

29. What saving in time is there on the sea passage from England to France if one travels *via* Dover and Calais rather than *via* Folkestone and Boulogne, if the distances are respectively 22 and $26\frac{1}{4}$ nautical miles, and the ships can travel at an average speed of 18 knots?

30. By how many days and hours is it quicker to travel from Liverpool to Wellington (New Zealand) *via* the Panama Canal rather than by the Suez-Aden-Colombo route, if the distances are, respectively, 11425 and 12989 nautical miles, and the average speed of travelling is 17 knots?

31. The grain elevator on the Manchester Ship Canal can (*inter alia*) discharge 350 tons of grain an hour from vessels at the wharf. If the elevator were to work for 8 hours each working day for one month (27 days), what would be the total weight of grain landed?

32. A merchant sets his watch at 10.30 a.m. by St. Paul's Cathedral clock as he takes a taxi, and begins his journey to Venice, where mid-European time¹ is kept. Must he put his watch back or forward to make it agree with the time shown by the magnificent twenty-four-hour clock² in the Torre dell' Orologio?

33. It is proposed to construct an eastern quay and an approach channel to a port in Spain at an estimated cost of 1,080,247 pesetas, and the contract must be completed in three years. Calculate the cost per month in English money.

34. Lisbon is 9° W. What alteration would a wine merchant have to make in the time shown by his watch if he came from Lisbon to London?

35. The time observed in British South Africa is east European time. What is the time at Cape Town when it is 7.30 p.m. in London?

¹ If the merchant had put his watch to agree with the local time in Venice, he would have moved the hands 48 minutes.

² This was constructed by Giovan' Paolo Rinaldi. Two "Moors" in bronze strike the hours. Compare with the clock in old St. Dunstan's Church, London, and the one at Hampton Court Palace.

36. Panama is 80° W. It is 3.15 p.m. in London. What is the time at Panama?

37. If it takes a ship five days to travel from Plymouth to New York, a distance of 2957 nautical miles, find the speed of the ship in knots.

38. Find the speed of the ship in the last question in statute miles per hour.

39. The distance from Waterloo Station to Oxford Circus is $2\frac{1}{2}$ miles. It takes 27 minutes to walk up to the Circus and 24 minutes to walk down to Waterloo. Find the difference in miles per hour between the rate of walking up from, and that of walking down to, the station.

40. The *Mauretania* ran 676 nautical miles in one day, and thereby created a record. Was her speed greater or less than that of an express train travelling 60 miles per hour, and by how much?

41. Burma is $97\frac{1}{2}^{\circ}$ E. By how much is the time there fast or slow on London time?

42. The eastern States of Australia are ten hours fast. How many degrees is the central meridian for those States east of London?

43. In America, Atlantic time is 4 hours slow and Pacific time 8 hours slow. What is the difference in longitude between the central meridians of the Atlantic and Pacific States?

44. If Havana, which is 83° W., keeps the eastern American time, namely, 5 hours slow, find the time at Havana when it is 11.30 a.m. in London, and find how much the actual time differs from the eastern time.

45. The distance from St. Pancras, London, to Belfast *via* Heysham is 407 miles. The train leaves the London terminus at 6 p.m. and passengers land at Belfast at 6.20 a.m. Irish time. Find what length of time is spent on the journey, and the average speed in miles per hour.

46. Hong-Kong is 9785 nautical miles from Liverpool *via* the Suez Canal,¹ Colombo, and Singapore, and 13957 nautical miles *via* Panama, San Francisco, and Yokohama. The time of transit by the former route is 30 days. Calculate (1) the speed in knots, and (2) the time saved by going by the Suez route rather than by the Panama route (to the nearest half a day).

47. It takes 3.75 minutes to raise a steel girder by means of a derrick and to put it in its proper position in the framework

¹ The attention of the student is drawn to the fact that the Suez Canal route is shorter for steamers from Liverpool to the chief ports of Australia as well as to Tientsin and Yokohama, while the Panama route is the shorter to New Zealand.

of a large building. Reckoning that the engine runs on the average $7\frac{1}{2}$ hours per day, how many girders can be placed in position in five days?

48. A gas fire used for warming an office consumes 30 cubic feet of gas per hour. Find the cost of burning it, on the average, 9 hours a day from 25th December to 29th March, if gas is 3s. per thousand cubic feet.

49. An electric radiator consuming 1.6 units an hour gives as much warmth as the fire referred to in the previous question. If the power costs $1\frac{1}{4}$ d. a unit, what is the amount of the bill for the electrical power supplied for the quarter named? Compare this result with that of the last question.

50. The United States pays £50000 per annum in respect to its privileges over the Panama Canal; calculate the number of dollars per day that this annual expenditure represents.

51. If the Suez Canal is 90 miles long and ships require 16 hrs. 8 min. to pass through it, calculate the speed of the ships in metres per hour for the benefit of continental captains.

52. A house decorator wishes to quote for putting in a kitchen range; he reckons that he will have to put two men and a boy on the job, and that it will take 4 days of $8\frac{1}{2}$ hours each to finish. The material will cost £7 10s. all told. The first man must be paid 1s. $3\frac{1}{2}$ d. an hour, the second $11\frac{1}{4}$ d. an hour, and the boy 5s. He also wants to make £2 for himself. What price must he quote?

53. On some of the London tube stations a small automatic collecting-box informs us that a particular hospital needs a penny a second for its upkeep. What annual income is necessary?

54. Presuming that out of the income referred to in the previous question all but $\frac{1}{1000}$ has to be spent in the course of the first 50 weeks of the year, find the average weekly cost of upkeep of the hospital, and the extra amount necessary to leave no deficit.

55. A modern linotype machine turns out 132000 copies of a newspaper per hour. How many is this per second, and how long must the machine work to produce the whole daily circulation of $1\frac{1}{4}$ million copies?

56. Bergen is 1018 Km. from Rotterdam. How long would it take a cargo boat travelling at 10 knots to steam from the former port to the latter?

57. A Norwegian firm proposes to inaugurate a boat service between Norway and the Pacific Coast ports, and the steamers, driven by Diesel engines,¹ will run at 11 knots. What time

¹ Page 351 note.

must be allowed for the following runs: Southampton to New York, 3076 nautical miles; New York to Colon,¹ 1980 nautical miles; Colon to Valparaiso,² 2650 nautical miles?

58. The total exports of Spain to Newfoundland have increased in value from £16700 in 1910 to £25500 in 1913. Calculate the average monthly rate of increase.

59. The value of the exports from Sierra Leone to Germany in 1912 was £675000, and in 1913, £822200. Calculate the average monthly rate of increase.

60. The value of the net tonnage of British vessels entered into and cleared from Natal and the Cape of Good Hope in 1900 was respectively £2,547,639 and £8,538,713, while for them both in 1913 the value was £8,422,069. Calculate the average weekly increase or decrease in the period given.

61. Rosario is one of the principal ports in the Argentine and is connected by several railway systems with the Provinces of Santa Fé and Córdoba, which produce maize and wheat, and linseed, respectively. Given that 20000 tons of grain can be loaded in 8 hours at the port, calculate the output if the plant works 8 hours every **working** day for three months (reckon 365 days to a year, and allow for 13 Sundays).

62. The area of a pipe³ is 7 sq. cm., and water flows through it at the rate of 350 cm. per second. How long will it take to fill a cattle trough which will hold 110 litres?

63. One pipe can deliver enough water to fill a tank in $10\frac{1}{2}$ minutes, another in $15\frac{1}{2}$ minutes. If they are allowed to supply water together, how long will it take to fill the tank?

64. If one pipe can deliver enough oil to fill a vat in $3\frac{1}{4}$ hours, another in $2\frac{1}{2}$ hours, and a third in $1\frac{1}{4}$ hour, how long will all three of them running together take to fill the vat?

65. If, in the last question, another pipe be provided which can empty the vat in 48 minutes, how long will it take to fill it if all four taps are open?

66. A stone merchant has bought a gravel pit and has five men digging in it. Two of them working separately can each fill a cart in 45 minutes, while the other three, being less experienced workmen, can fill it in 50, 55, and 60 minutes respectively. How long will all five men working together take to load three carts?

67. A labourer can dig up 1 cwt. of clay in $15\frac{1}{2}$ minutes, how long would it take him (to the nearest hour) to dig 5 tons 16 cwt. 2 qrs.?

¹ On the Atlantic side of the Panama Canal.

² The largest port on the Pacific coast of South America.

³ See §§ 218 and 219.

68. The area of cross-section of a pipe is 0.8 sq. in., and oil flows through it at the rate of 10.5 feet per second. How long will it take to fill a tank 10 ft. by 8 ft. by 5 ft. 6 in.?

69. If a steel drum be 2 ft. 6 in. high and 15 in. in diameter, how long would the pipe of the last question take to deliver enough oil to fill it?

70. A pipe is 3 cm. in diameter and it is used to siphon out wine from a barrel. If the rate of flow be 630 cm. per second, find how long it will require for 500 litres to be drawn out.

71. The envelope of an airship may be regarded as cylindrical in shape, 140 feet long and 20 feet in diameter. After it has risen into the air the pilot discovers that there is a leak, and that the gas is escaping at the rate of 40 cubic feet per second. He knows that the ship cannot remain in the air with less than 12000 cubic feet of gas. How long has he to bring the vessel to anchor safely?

72. A vat of oil containing 15000 gallons is provided with three pipes, one for delivering the oil and two for running it off when it has been heated sufficiently. The bores of the pipes are 1 inch, $\frac{3}{4}$ inch, and $\frac{1}{2}$ inch respectively. The smallest one delivers 5 gallons per minute. If the vat is one-third full, how long may all three pipes be turned on before it is full? (The delivering capacity is proportional to the sectional area.)

73. If the average wages of each man referred to in Question 66 be $10\frac{1}{2}$ d. an hour, and gravel be worth 4s. 6d. a cart load, what must the merchant charge per load if he makes 3s. 6d. per load for himself and charges 2s. 6d. extra for carriage?

74. A contractor has to cut a trench in a road to lay gas mains, and he agrees to do the work in $5\frac{1}{2}$ days. He puts five men on it and at the end of $2\frac{1}{2}$ days finds that two-fifths has been done. How many more men must he put on to finish the job in time?

75. It is 1.14 p.m. in Cape Town when it is 4.51 p.m. in Bombay. What is the difference in longitude between these cities?

76. It is 10.12 p.m. in Brisbane (Queensland) when it is 6.59 a.m. in Philadelphia. What is the longitude of Philadelphia if Brisbane is $152\frac{1}{2}$ E.?

77. The morning express to Fishguard leaves Paddington at 11.30 a.m., and the London express leaves Fishguard at 10.35 a.m. If the distance between the stations is 265 miles, find at what time the trains will meet if they travel at the same rate and take 7 hours on the journey.¹

¹ See § 220,

78. How far from London will the trains of the last question meet?

79. The distance from Liverpool to Belfast is 135 nautical miles. A cargo boat puts out from Liverpool at 10.30 a.m. and travels at an average speed of 15 knots. The Irish boat leaves Belfast at 12.30 (Irish time) and steams at 20 knots. At what time will the boats be able to speak one another (Greenwich time)?

REVISION QUESTIONS. II.

A. (1)

SECTION XL

1. A merchant purchases 86.753 mgrms. of radium, but upon weighing the metal he finds he has 0.0865 gram. By what decimal of a gram is the weight he actually receives greater or less than the weight stated on his invoice?

2. A dealer in precious metals bought the following weights of gold: 5 oz. 15 dwt. 18 grs.; 16 oz. 12 dwt. 12 grs.; 26 oz. 18 dwt. 15 grs.; 36½ oz. Find the total weight purchased.

3. If half a bushel of large potatoes is added to 2⅔ pecks of small ones, what fraction of the total quantity is 2¼ pecks?

4. What decimal of a pint of ink will an inkpot contain if 234 of them can be filled with 3⅙ quarts of ink?

5. A grocer sells the following quantities of vinegar during the first four months of the year: 15 galls. 3 qts. 1 pt.; 18 galls. 1 qt.; 25½ galls.; 68 qts. Find, to the nearest quart, the quantity sold.

6. Calculate the value of the vinegar referred to in the last question at 5½d. a pint.

7. Three casks of petroleum contain respectively 86 gallons, 78 gallons, and 58 gallons. $\frac{3}{4}$ of the first, $\frac{5}{8}$ of the second, and $\frac{1}{2}$ of the third are sold. What is the value of the remainder at 8½d. a gallon?

8. The petrol tank on a motor-car will hold 23 gallons. The owner fills up the tank and subsequently finds that it has been leaking. He therefore drains out the petrol and finds he has only 12½ pints of the spirit. If the value of a gallon be 1s. 6d., how much has the leak cost the motorist?

9. If 1 Kilometre = 0.6213824 mile, make out a nine-multiple

table for converting Kilometres to miles, and express 562 Kilometres, 530 metres, and 100000 centimetres in miles.

10. From the data given in the last question construct a table for converting metres into yards, and then express 375 metres in yards.

11. Express an acre as the decimal of a Hectare, given that 1 sq. metre = 1.19603 sq. yd., and 4840 sq. yds. = 1 acre.

12. Captain Absolute purchased a truck of coal containing 8 tons 15 cwt. 2 qrs. at 24s. 6d. per ton, and was charged eleven guineas. How much more did he pay than was really due?

13. The present price of copper is £65 2s. 6d. per ton. Calculate the cost of a consignment of 3 tons 18 cwt. 1 qr. 18 lb. of the metal at the price given.

14. We find by referring to our newspapers that the price of copper yesterday was £64 15s. 6d. per ton. How much would have been saved if the consignment referred to in the last question had been purchased yesterday? (Answer to the nearest shilling.)
Look in your newspaper and find the price of copper to-day.

A. (2)

1. Prepare an invoice from the following details: 7th Jan. 1914. Messrs. Wilkinson & Co., 55 George St., Wigan. Bought of Rylands & Son Ltd., Market St., Manchester—100 pcs. 36 in. \times 40 yds. white calico @ 10s. (£50); 50 pcs. 30 in. \times 40 yds. Oxford shirting = 2000 yds. @ 6d. (£50); 10 pcs. 27 in. \times 10 yds. fine lawns @ 6s. (£3); 20 pcs. 30 in. \times 30 yds. foulard prints = 600 yds. @ 5d. (£12 10s.). Total, £115 10s. Packing charges, 5s. 6d. Discount, 10 per cent. Per L. and Y. Rly.

2. Make out an invoice for the following items, vendors and purchasers being as in Question 1: 56 yds. calico, 3½d. per yd.; 12 yds. unbleached calico, 3d. per yd.; 16 yds. silk, 4s. 6d.; 18 yds. merino, 2s. 3d.; 12 yds. navy serge, 2s. 6d. Receipt this invoice on 30th June 19—, using the name J. Jones, allowing a discount of 1d. in the 1s., and signifying that you merely act for Rylands & Son Ltd.

3. Prepare an invoice from the following details: The Excell Folding Box Co. Ltd., to Wilkins, James, & Co. 5th June. Terms, 2¼ per cent., 1 month. Paid 30th June. Folding boxes—2 dozen 25 \times 17 \times 5½ at 3s. 9d.; do., 30 \times 18 \times 5½ at 5s.; do., 20 \times 10 \times 5½ at 2s. 9d.

4. Make out an invoice for the following articles bought from Henry Smith, corn dealer, Ormskirk, by Thomas Jones: 23 trusses of hay at 2s. 6d. per truss; ½ cwt. mixed corn at 4s. 1d.

per stone; 700 lb. of bone meal at £5 10s. per ton. Receipt the invoice, and allow 1s. in the £1 discount for cash.

5. Make out an invoice for: 96 lb. tea at 2s. 7½d. per lb.; 20 lb. cheese at 10d. per lb.; 3 cwt. sugar at 2½d. per lb.; 20 lb. steak at 1s. 1d. per lb.; 10 lb. lamb at 1s. 3d. per lb. Prepare an adhesive receipt for this account.

6. Prepare a statement, dated 30th June, for accounts as follows: Jan. 10, £6 3s. 4d.; Feb. 6, £2 10s. 4d.; April 15, £5 8s. 6d.; May 8, £5 3s. 6d.; June 18, £3 5s. 8d.; and for which payments were made: Jan. 31 and March 31, 3 guineas each; May 30, 10 guineas.

7. Make out an invoice from the following: James & Son, bought of Hollsworth & Co., Golden Square, W.C. Jan. 18, 19—. Goods as under. "Fancy goods cut off to order cannot be received back." No. 5864—3½ watered silk at 8s. 9d.; disc., 1s. 6½d. No. 15980—6½, as 6, white drill at 3s. 9d.; disc., 1s. 2d. No. 8123—5 dark blue at 9s. 6d.; disc., 2s. 4d. Pattern 8134, piece 5624, cashmere 3⅝, as 3½, at 6s. 6d.; disc., 10d. Class No F 513, piece No. 10008, 4 tapestry at 6s. 6d.; disc., 1s.

8. Prepare a complete set of credit documents for the following, from the order being given to the receipt being sent, and make the appropriate entries in the vendor's subsidiary books:

P. FRAQUELIP,

Fish Salesman and Derring Curer,

1560 FISH STREET HILL, BILLINGSGATE.

July 8, 191...

<i>Can send.....</i>		
(1) Lowestoft mackerel	4s. 6d. per hundred	
(2) Boxes mackerel	5s. 8d. per box	
(3) Boxes herrings	4s. 0d. per box	
(4) Barrels ditto	per barrel	
(5) Salmon	2s. 6d. per lb.	
(6) Fresh herrings	per	
(7) Sprinkled herrings	per	
(8) Smoked haddocks	per box	
(9) Large boxes best kippers	3s. 6d. per box	
(10) " " kippers	2s. 6d. per box	
(11) Shrimps, red		
(12) " " brown		
(13) Best fillets	per box	
(14) Winkles	12s. per bushel	
(15) Whelks		

Lobsters and crabs, lowest possible market prices.

If requiring, please write or wire at once.

Yours faithfully,

P. FRAQUELIP.

The quantities sent to J. Rogers, 56 Old Street, N.E., 12th July, were: 300 (1); 5 (2); 6 (3); 10 lb. (5); 8 (9); 8 (10); 3 (14). Account settled by order cheque crossed on Roberts' Bank, July 13. Returns valued at £2.

The student should work through some of the questions in Examples XXXIX. before proceeding to B. (1).

B. (1)

SECTION XII.

1. If a yard of linen is worth 1s. 11d., and a hank contains 300 yards, find the value of a spindle of linen of 48 hanks.

2. Find the result of the previous question, taking the West of England count of 320 yards to the hank.

3. Find the cost in English money of putting down 599 miles of tram line in Russia at a cost of 500 roubles per verst. (1 verst = 0.66 miles, and 1 rouble = 2s. 1d.)

4. How many pieces of calico $3\frac{1}{2}$ yards long can be cut from a bale 290 yds. 2 ft in length?

5. How much calico will be left over in the previous question?

6. How many reels of cotton, each containing 400 yards, can be wound from half a mile of cotton?

7. If the width of a railway compartment, from the back of one seat to the back of the opposite one, is 5 ft. 2 in., how long will a coach be which contains fourteen such compartments and a luggage van 20 ft. $6\frac{1}{2}$ in. in length?

8. A compartment, as referred to in Question 7, accommodates five people on each seat, the length of which is 7 ft. 6 in. How much space is allowed for each person?

9. Fill in the spaces in the following table for the information of continental booksellers. Size of bound books:

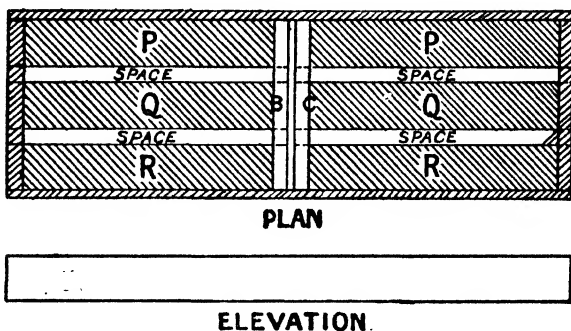
Name.	Dimensions in Inches.	Dimensions in Centimetres.
Demy 18mo	$5\frac{3}{4} \times 3\frac{3}{4}$	
Large crown 8vo	$8 \times 5\frac{1}{4}$	
Royal 8vo	$10 \times 6\frac{1}{4}$	
Imperial 8vo	$11 \times 7\frac{1}{2}$	
Crown folio	15×10	

B. (2)

1. The stroke of a compound locomotive engine is $25\frac{3}{16}$ in. Express this distance in centimetres for a Roumanian railway engineer.

2. What is the diameter, in centimetres, of the cylinder of the most recent type of locomotive, given that the radius is 8.5 inches?

3. The figure shows, in plan and in elevation, a box in which eggs are imported from Denmark; find what length of



Scale, $\frac{1}{2}$ inch = 1 foot. (Thickness is NOT to scale.)

$\frac{3}{8}$ in. wood and what length of $\frac{3}{4}$ in. wood is required to make the box and the cover. (The transverse pieces A, B, C, D, are $\frac{1}{2}$ in., all the rest is $\frac{3}{8}$ in. wood.)

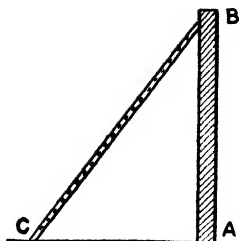
4. The length from the extremity of the tail-board of a cart to the end of the shafts is 10 ft. $10\frac{1}{2}$ in.; the length from the extremity of the tail-board to the front of the cart is $\frac{1}{20}$ of the whole length. What is the length of the shafts?

5. The front of a wardrobe consists of two plate-glass plates, each 15 inches in width, and they occupy together $\frac{7}{12}$ of the front; find the width of the wardrobe and the width of the woodwork part of the front.

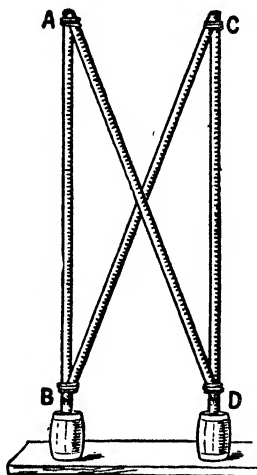
6. The distances from London to Dover and Dover to Ostend are in the ratio of 1.07 to 1. If the latter is 98 Kilometres, find the former.

7. Express the distances in the previous question in miles.

8. **AB** is the wall of a house 28 feet high, **BC** is a ladder 34 feet long. How far must it be placed from the lower part of the house **A** in order just to reach to the top of the house?



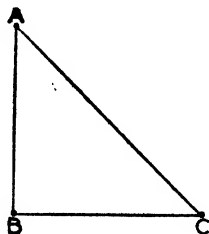
9. **AB** and **CD** are two scaffold poles 10 feet apart and 30 ft. 6 in. high. What must be the length of the cross pieces **AD** and **BC**?



B. (3)

1. A merchant has five triangular shelves in the corner of his office placed at heights of $25\frac{1}{2}$ inches above one another. The edges of the shelves next to the walls are 18 inches long. Find the dimensions of a door which has to be put up so as just to reach from the first shelf to the fifth, and cover them all in front.

2. In employing the ferro-concrete method of constructing buildings a large derrick is mounted on a platform supported by three rectangular frames. If **A**, **B**, **C** represent, in plan, the three supports, and the triangle **ABC** the platform, find the length of **AB** and **BC**, which are equal, if **AC** is 85 feet.



3. Estimate the cost of placing chairs 15 inches wide around a bandstand at a seaside resort, given that the bandstand is 30

feet across, that there is a clearance of 10 feet all round between it and the row of chairs, and that each chair costs 7s. 6d.

4. What length of single track rails will be required for a curve of radius 3765 feet, if its length is $\frac{1}{80}$ th of the circumference of the circle of which it forms part?

Note.—The inner rail will not be quite as long as the outer, but we can regard them as being of equal length for the purpose of this question.

5. What does it cost to make the iron band for a cart wheel 3 ft. 6½ in. in diameter at 5½d. a foot?

6. A builder finds that he has to use on the average 63 ft. 8 in. of $\frac{3}{8}$ -in. gas-pipe in each house he erects. What is the total length of pipe used in building a row of twenty houses?

7. What would the pipe referred to in the previous question cost for the twenty houses at 3¼d. per foot?

8. The flexible wires (usually called "flex") by which electric lamps are hung in the ordinary way in houses costs 2s. 3d. per dozen yards. If it requires 2 ft. 6 in. of flex for each lamp, find the number of lamps which can be hung with 3 dozen yards of wire, and the cost of the flex for each lamp.

9. Allow 2s. 9d. as the cost of the lamp, 4s. 6d. per half-dozen as the cost of shades, and reckoning that an electrician can hang five lamps an hour, earning thereby 1s. 1½d., calculate the cost of hanging twelve lamps, including cost of material and labour, expressing the result in francs for the convenience of a French customer.

B. (4)

1. Convert the following distances into Kilometres for a French traveller: London to Brussels, 231 miles; London to Plymouth (rail), 225 miles; London to Cologne (*via* Harwich), 351 miles. (100 Kilometres = 62 miles.)

2. The *Diario Oficial* (Santiago) publishes a decree by virtue of which a railway 23 Kilometres long, with a gauge of 1.435 metres, may be built to connect up two iron mines in Chile. What will be the length of the railway in miles and the decimal of a mile, and the gauge in feet and the decimal of a foot?

3. The Tay Bridge, which is the longest in the world, is 2 mi. 73 yds. long. How long would it take the engine of a train travelling 30 miles an hour to cover the length of the bridge?

4. The population of the United States is 91,972,000, and there are 255 thousand miles of railway. What length of railway is there per thousand of the population in the United States?

5. Taking the population of the United Kingdom as 46 millions, and the total length of its railway system as 23420 miles,

find the length of railway for every thousand of the population. Comment on the results of this question and of the last.

6. Large manufacturers in the north of England sell ready-made skirts. If each one requires $3\frac{5}{8}$ yards of material, how many skirts can be made from half a mile of cloth?

7. If the manufacturer in Question 6 buys the cloth at 13.8d. per yard, pays 1s. for making, and sells each skirt for 6s. 11d., what profit does he make on every gross of skirts that he sells?

8. If a woman takes $3\frac{3}{4}$ hours to make one of the skirts referred to in the last question, and it costs her $1\frac{3}{8}$ d. to provide odds and ends at wholesale price, what does she earn per hour, and what could she earn per week, working 10 hours a day for 6 days?

C. (1)

SECTION XIII.

1. What must be the area of a desk in order that it may be possible to place a drawing-board, 23 in. \times 16 in., upon it and have 2 inches to spare all round?

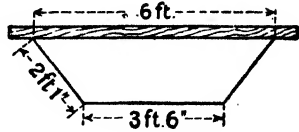
2. A glazier provides glass, putty, and sprigs, and puts in the glass for $10\frac{1}{2}$ d. per square foot, and he also sells glass for 3d. a square foot, always reckoning fractions of an inch as an inch. Supposing the cost of putty, etc., to be $\frac{1}{2}$ d. per foot of glass, how much does a shopkeeper save by buying the material and putting in a pane of glass $19\frac{1}{4}$ in. \times $29\frac{1}{2}$ in. for himself, rather than employing the glazier?

3. A piece of land 50 yards by $22\frac{1}{2}$ yards is purchased by a cinema company. The local rating authority by-laws require that a space of 1 ft. 6 in. shall be left on three sides of the building, while the front must be in the same line as the ordinary frontage to the pavement. The walls of the building are to be 9 inches thick; find the available floor space inside the building.

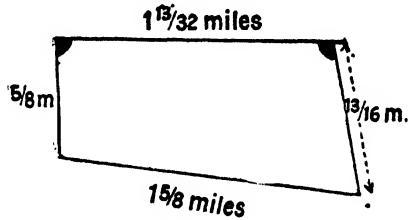
4. A space 16 inches by 18 inches is allowed for each person in the building described in the last question, and two gangways each 4 feet wide run the whole length of the house. What is its seating accommodation?

5. If one-eighth of the seating accommodation referred to in Question 4 is set apart for 1s. seats, one-half for 6d. seats, and the remainder for 3d. seats, what amount of money is taken when the house is full?

6. The top of a window of the shape shown in the diagram has to be covered with sheet lead 5 lb. per foot super. How many square feet of lead will be required, and what will be the weight of the metal. (Allow $1\frac{1}{2}$ square feet extra for overlapping.)



7. One of the large parks of London is shown diagrammatically in the figure. Calculate its area in square miles (to two decimal places) from the dimensions given. (Assume both shaded angles to be right angles.)



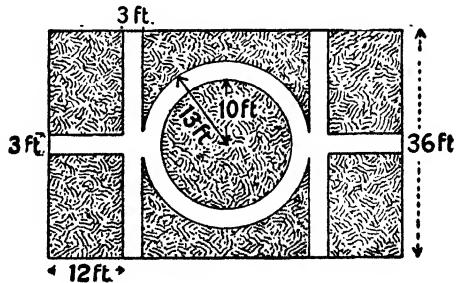
C. (2)

1. The radius of the bottom of a tin, cylindrical in shape, is 1 inch, and it holds $\frac{1}{4}$ lb. (net) of cocoa. What must be the radius of the bottom of a half-pound tin of the same height?

2. The circumference of a motor tyre measured over the studs is 990 mm., and the thickness of the inflated tyre (*i.e.* the distance between the outer surface of the studs and the rim of the wheel) is 5 cm. What is the radius of the wheel to which the tyre can be fixed?

3. A room is 18 ft. 6 in. by 12 ft. 9 in., and it contains a circular table 5 ft. in diameter. What fraction of the available space is occupied by the table?

4. A gardener marks out a garden as shown in diagram. Calculate the cost of gravelling the paths (not shaded) at 1s. 6d. per square yard.



5. The radius of a two-shilling piece is $\frac{9}{16}$ in., and the diameter of a shilling is $\frac{15}{16}$ in. Express the area of the latter as a decimal of that of the former.

6. The diameter of the top of a glass tumbler is 7 cm. and of the bottom 6 cm. What difference is there between the area of the top and that of the bottom of the tumbler in question?

7. What is the average sectional area of the tumbler referred to in the last question?

8. Milk is brought into London from Wiltshire, Hampshire, and other counties, in large cans made of tinned iron. The diameter of the top of one which we measured was 14 inches, and of the bottom 22 inches. Find the average sectional area.

C. (3)

1. Find the cost of asphaltting a road the total area of which is 0.56 of an acre at a cost of 2s. 5½d. per square yard.

2. How much would it cost to plough 56 ares 50 square metres of land at a cost of 56 francs per are?

3. What would it cost to carpet a hall whose area is 136 sq. m. 50 sq. dm. at 8½ francs per square metre?

4. What is the value of 25 Hectares 36 ares 58 square metres of forest land in Southern Germany at 350 marks per Hectare?

5. What would be the value of the timber on the land in Question 4, at 5400 marks per Hectare?

6. The area of the City of Westminster is 2555 acres, and its rateable value is £6,619,069. Find, for the information of the municipal authority at Paris, the rateable value in francs per Hectare. (1 Ha. equals 2½ acres, and 25 francs equal £1.)

7. The area of the main roads of a borough is 128 ac. 5 sq. chs. 325 sq. yds.; find the cost of watering these roads during the summer months at 5s. per acre.

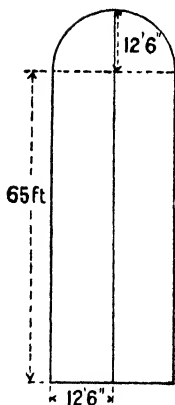
8. The area of the forests and plains in Japan Proper is 28,451,434 chō, and the production of this area was valued at yen 102,342,867. Determine the average value of the production in shillings per acre. (Yen 1 = 2s. 0½d., and chō = 2.45 acres.)

9. If 8,592,300 kwan of tea were produced from 30060 chō, find the number of tons per acre. (Kwan = 8.27 lb. Av.)

10. The Dominion of Canada, which became a British possession in 1763, has an area of 3,729,700 square miles; express this area in Hectares, and find how many times it is larger than France, the area of which is 51 million Hectares.

11. The total yield of grain in Russia last year was 55,167,000 tons, and the rate of yield was 560 lb. per acre. How many square miles were under grain in Russia last year?

12. There are two large wrought-iron gates, giving entrance to an important building in Westminster. Find the area of each gate from the dimensions given, and calculate the cost at 15s. 9d. per square foot.



D. (1)

SECTION XIV.

1. At a particular barracks the soldiers are provided with small steel lockers, 2 ft. 6 in. long, 1 ft. 6 in. wide, by 15 in. deep. What space will be required to provide locker accommodation for 250 men?

2. A large crucible placed over a furnace contains molten glass. The average dimensions of the crucible are 5 ft. 6 in. by 4 ft. 3 in. by 2 ft. 6 in. If a square foot of glass, $\frac{1}{8}$ inch thick, is retailed at 3d., what is the retail value of the contents of the crucible?

3. A steam hammer consists of a block of steel 3 ft. 6 in. by 2 ft. 6 in. by 2 ft. 6 in. Find its weight, if steel is 7.75 times heavier than water, a cubic foot of which weighs 62.32 lb.

4. The specific gravity of indiarubber is 0.95. Find the weight, in Kilograms, of a piece 25 cm. by 18.5 cm. by 2.5 cm.

5. What would be the weight of a piece of rubber 18 in. by 15 in. by 3 in.? Does it take you longer to work this question than the last, if so, why?

6. What is the value of the rubber of the last question at 2s. 9d. per lb.?

7. How many ounces (Av.) of benzine are there in a half-pint, if its specific gravity is 0.8?

D. (2)

1. A watering-can is circular in plan and its diameter is 1 ft. 2 in., while its height is 1 ft. 9 in. How many cubic feet of water will it hold?

2. How many gallons of water will a nurseryman pour on to some tomato plants if he has to empty the watering-can referred to in the last question twenty-five times in order to water them properly?

3. Water flows through a garden hose-pipe at the rate of five gallons in three minutes. If it is allowed to "sprinkle" a lawn for $8\frac{3}{4}$ hours, how many gallons of water will have been used?

4. A commercial traveller drives about to his various customers in a carriage, the dimensions of which are 6 ft. 6 in. by 4 ft. 3 in. by 4 ft. 6 in. If he allows $11\frac{1}{2}$ cubic feet for himself, what space remains for his boxes of samples?

5. A room is 20 ft. by 18 ft. by 14 ft. 6 in. What fraction of the whole space is occupied by a case 10 ft. by 5 ft. by 2 ft. 6 in.?

6. A stack of squared timber measures 80 ft. by 30 ft. by 25 ft. 6 in. How many loads does it contain, reckoning 50 cubic feet to a load?

7. How many cubic feet of cast-iron are there in a ton if the specific gravity of the iron is 7.2?

8. The internal dimensions of a covered rectangular box are 18 in. long by 15 in. wide by 12 in. deep, and the external 20 in. by 17 in. by 15.6 in. What is the thickness of the wood at the sides and at the top and bottom, and how many cubic feet of wood are there?

9. The average length, width (beam), and draught of a ship are 150 ft., 12 ft. 6 in., and 10 ft. 6 in. respectively. What is its displacement, reckoning 35 cubic feet to the ton?

D. (3)

1. A cistern is 1.75 m. long and 80 cm. broad. If there are 189 litres of water in it, find the depth of the water.

2. A French merchant wishes to export goods by a British ship, and he knows that a shipping ton is 40 cubic feet (for merchandise). Find what may be the greatest height of a case, 85 cm. long and 75 cm. wide, in order that it may not exceed one shipping ton.

3. How many cubic metres are there in a shipping ton?

4. The average diameter of a particular kind of orange is 6.5 cm., and the fruit is arranged in a case in six rows of thirty in a row. Find the dimensions of a case which will contain 900 such oranges.

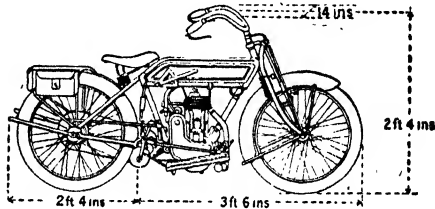
5. The Government of India has undertaken irrigation work in the Punjab for the purpose of developing the land in that

province and of affording peaceful employment for the people. To this end the great Chenab Canal has been constructed. It is 250 feet wide and 11 feet deep. Find how many times the sectional area of the canal is greater than that of the front of an ordinary dwelling-house in England, $25\frac{1}{2}$ feet long and 30 feet high.

6. A warehouse, the dimensions of which are 55 by 25 by 20 feet, is heated by means of hot water radiators, consisting altogether of thirty-six tubes,¹ the average surface area of each of which is 400 square inches. Calculate the number of cubic feet in the room for every square foot of heating surface.

7. Using the result of the last question, find the number of radiator tubes necessary to heat (1) an office, $25 \times 28 \times 22$ feet; and (2) the foyer of a theatre, $36 \times 28 \times 25$ feet.

8. A motor bicycle is packed into a skeleton crate for shipment from London to Spain. Calculate from the dimensions given (allowing 2 inches extra on the length, breadth, and height for clearance and packing) the decimal of a shipping ton that the crate would occupy, and calculate the cost of shipment (f.o.b.) at 15s. per ton.



E. (1)

SECTION XV.

1. A tea merchant buys three chests of tea each containing 80 lb., and he pays £8, £10, and £12 respectively for them. He wishes to sell the whole quantity at a profit of $2\frac{1}{2}$ d. per lb. What must be the selling price per pound?

2. 4 cwt. of Demerara sugar is purchased for 30s. per cwt., mixed with 128 lb. of sand, and sold at 6d. per 2-lb. bag; what is the profit per pound?

3. 56 gallons of spirit, costing 20s. 6d. a gallon, are mixed

¹ Radiator tubes are usually black, because the amount of heat radiated from a black surface is greater than that radiated from a white, bright, or coloured surface.

with 38 gallons at 24s. 6d. a gallon; what must be the selling price per pint in order to gain £20 on the whole quantity?

4. Last year the silver production of Queensland was 604979 oz., valued at £68438; and the figures for the year before were 569181 oz. and £66188. Did the average value of 1 oz. of silver vary from one year to the next, and if so, by how much?

5. The domestic production of silver in the United States amounted to 67,929,700 ounces fine in 1914, and the value of this was 37,225,000 dollars. Calculate the price per ounce in English money, reckoning 4s. 1d. to a dollar, and compare with the result of Question 4.

6. The Russian Ministry for Finance is said to be considering a Government monopoly in tea. If the Government carries out its proposals it appears that about 5 million poods of tea would be bought annually by the Government at 10 roubles per pood. English firms can reckon that the retail price would be 1s. 8d., 2s. 6d., or 4s. 7d. per Russian pound ($14\frac{1}{2}$ oz. Av.). Calculate the net revenue in roubles and in pounds sterling, presuming that the selling price of the tea per pound is the average of the prices given. (1 rouble = 2s. $1\frac{1}{3}$ d.; 1 pood = 36 lb.)

E. (2)

1. There is a demand in Venezuela (according to consular reports) for cotton knitted goods. Last year 179533 Kgm., valued at £47710, were imported. What was the value of the imports per pound in English money?

2. In a month 38576 bars of soap were issued to the Army. If a bar of soap weighs 1 lb., calculate in tons and hundred-weights, correct to 1 cwt., the weight of the soap.

3. Calculate the monthly cost of the soap at 3d. per pound. (Question 2.)

4. The weight of brass in a rifle cartridge is $184\frac{1}{2}$ grains. If 26 million are fired each day and $\frac{1}{20}$ th of the metal is recovered, find to the nearest ton the weight of metal lost per diem.

5. It is estimated that the consumption of *imported* sugar in South Africa is 2000 tons per annum. Taking the population as 5,973,000, find to the nearest pound the consumption per head per annum.

6. Tenders are invited in Egypt for the supply of 12000 okes of oil for Diesel engines.¹ Taking 1 cubic foot of the oil as weighing

¹ A Diesel engine is an internal combustion engine—that is to say, it resembles a motor-car engine rather than a locomotive. Very cheap crude oil can be used as fuel, and the explosion is produced by the heat generated on compression.

50 lb. Av., calculate the number of gallons of oil which must be contracted for. (1 oke = 2.5 lb. Av.)

7. 147.5 tons of tin oxide valued at £16823 were obtained by crushing 14455 tons of ore. Calculate the number of pounds (to two decimal places) of tin oxide obtained per ton of ore, and the value (to the nearest penny) of 1 cwt. of tin oxide.

8. Naphtha has been discovered in Southern Italy at a depth of 400 metres, and the well appears to be very deep and able to yield 2000 litres per day. Express the depth of the well in fathoms, and the monthly yield in gallons, reckoning thirty days to the month. (1 litre = 1.761 pint.)

9. In consequence of the acreage under wheat having been reduced, the New Zealand Government has imported 500000 bushels. What is the retail value of this importation at 40s. per quarter?

10. France exported to Canada last year 37420 gallons of olive oil (for soap manufacture or for canning fish), which was valued at 53677 dollars. What was the value per pint to the nearest penny? (1 dollar = 4s. 1½d.)

E. (3)

1. In the egg boxes referred to in Question 3, B. (2), page 342, it was found by actual weighing that the average weight of nails per box was 12.75 oz. How many boxes could be nailed up with 1 cwt. of nails?

2. From the data of the last question, find, as the decimal of a Kilogram, what weight of nails is used for each box.

3. A particular Cornish mine recently sold 12½ tons of tin ore for £1246 17s. 6d.; what was the average price per hundred-weight?

4. On the same day (Question 3) 205¾ tons of tin ore were sold for £19892. Find the average selling price per hundred-weight of ore.

5. A "bottle" of mercury contains 84 lb., and on looking in the paper we find its price is £12 5s. a bottle; what is the price per pound?

(The student should look up the price of mercury in his own paper and see whether it has advanced or declined since the question was set.)

6. £1E, *i.e.* an Egyptian £1, weighs 8.500 grams, 875 fine; what is the actual value of the coin in English money?

7. The standard coin in use in India is the silver rupee, which is $\frac{1}{16}$ fine and weighs one tola, or 180 grs. Troy, while

1 lac = 100000 rupees. Find the value of the silver contained in a lac of rupees at $22\frac{7}{8}$ d. per ounce.

8. 19,562,549 centals (100 lb.) of wheat were exported from Australia in 1912-13, and the value of this export was £6,403,237; what was the average price per bushel of 62 lb.?

9. Wheat grown in Japan in the year 1912-13 made 11.28 yen per koku. If 1 koku = 4.96 bushels, and 1 yen = 2s. 0.58d., find the difference in price (in English money) between the average price per bushel of Japanese and of Australian wheat in the year mentioned. (See Question 8.)

10. Last year 623658 acres of land in Ontario were under barley, and produced 29.3 bushels per acre. If one bushel weighs 50 lb., calculate in tons and hundredweights the weight of barley grown in the year.

E. (4)

1. 1,033,445,264 kin of salt were produced in Japan in 1912-13, and the value was yen 11,690,404. What is the value of 1 lb. of salt if 1 kin = 1.3228 lb. Av., and 1 yen = 2s. 0.582d.?

2. A 20-yen piece of Japan weighs 16.6665 grams, and contains 900 parts in 1000 pure gold; express the value of the gold in the coin in francs. (See Question 83, page 318.)

3. The gong of a type of table-bell largely used in restaurants is $2\frac{6}{11}$ inches in external diameter. It is hemispherical in form and made of metal $\frac{5}{8}$ inch thick. Calculate the number of cubic inches of metal used in its construction, and the weight if its specific gravity be 7.

4. Which is cheaper, 3-in. nails sold in London at $3\frac{1}{2}$ d. per lb., or in France at 80 centimes per Kilogram?

5. The drivers of coal-delivery carts are often furnished with a tube of iron 6 ft. 6 in. long, $1\frac{1}{4}$ in. in external, and $\frac{5}{8}$ in. in internal diameter. Calculate the weight that such a bar adds to the cart if the specific gravity of iron be 7.8.

6. In the Commonwealth of Australia in 1913 there were 3,216,276 acres under hay, and the production was 3,936,638 tons. Find, to the nearest quarter, the weight produced per acre.

7. In the United States in the year 1913, 48,954,000 acres were under hay, and 64,116,000 short tons were produced. Calculate, to the nearest quarter, the weight produced per acre in the United States, and determine, by making a comparison with the last question, how much more or less per acre the yield was in the United States than in Australia.

8. The total quantity of sea fish caught in two successive years on all Irish coasts, and the value thereof, is :

Weight (Hundredweights).	Value (£'s).
894144	306786
676392	294625

Find the price per pound in each of the two years given, tabulating the answer.

9. Find the value of the fish referred to in Question 8 in francs per Kilogram.

10. 2107 cwt. of potatoes were imported into the United Kingdom during the week ending Feb. 6, 1915. Find their retail value at 7 lb. for 6d.

11. What is 7 lb. for 6d. in marks per Kilogram ?

F. (1)

SECTION XVI.

1. From the following table calculate the average time taken on a journey from London to Birmingham :

London : Time of Departure.	Birmingham : Time of Arrival.	Time on Journey.
9.10 a.m.	11.10 a.m.	
9.50 a.m.	12.48 p.m.	
11.5 a.m.	1.5 p.m.	
2.35 p.m.	4.35 p.m.	
4.55 p.m.	7.50 p.m.	

2. Taking the distance of Birmingham from London as 110 miles, and using the result of Question 1, calculate the average rate of travelling in miles per hour (to one-tenth of a mile).

3. A lift makes fifteen journeys an hour and works for 6 hours a day for 6 days a week, and the cost of running is 2s. 6d. a day ; what is the annual cost of running the lift, and the cost per journey ?

4. Seamstresses are said to earn 1s. 6d. a day by making bags for a particular army. Calculate the utmost they can earn per hour, working $15\frac{1}{2}$ hours a day.

5. A servant's wages are £22 a year, and her employer may deduct 3d. a week therefrom for her insurance. What are the net weekly wages of the servant concerned ?

6. A stone crusher can crush 2 cubic metres of stone in 10 minutes. If it works for $8\frac{1}{2}$ hours a day and 22 days and 4 half-days in a month, determine the number of cubic metres of stone it would crush.

7. My watch tells me it is 8.30 a.m.¹ as the ropes are cast off the ship at Holyhead. On arriving at Dublin I find that the time by the city clocks is 12.5 p.m. If Dublin is $6\frac{1}{4}^{\circ}$ west of Greenwich, find the time spent on the voyage and the speed in knots, if the distance from Holyhead to Dublin is 60 nautical miles.

F. (2)

1. Some time since, one battleship was $2\frac{1}{2}$ leagues from another, and a torpedo boat destroyer conveyed the Admiral from one to the other. If the T.B.D. made 28 knots, how long did it take the Admiral to transfer his flag from one ship to the other (to the nearest minute)?

2. The distance from Queenborough to Flushing is 114 nautical miles. An English boat leaves Queenborough at 7.45 a.m. and steams at 15 knots. Three hours later the mail-boat leaves Queenborough and steams at 20 knots. Which boat will get to Flushing first, and how long will it be there before the other arrives (to the nearest minute)?

3. It takes $2\frac{1}{2}$ days to put down a rough track, a mile long, for tip wagons. Find to the nearest half-day how long it will take to lay down 12 mi. 6 fur. 8 chs. 15 yds. of track.

4. The Board of Trade returns show that in Brazil there is a tendency to deal in preserved meat frozen, or otherwise treated. One firm has a "saladero" (slaughter-house) where 50000 head of cattle and 100000 sheep can be dealt with annually. Determine how many cattle and how many sheep can be slaughtered per working day, and find the value of the carcasses at 340 milreis per head for cattle and 80 milreis for sheep. (Give the result in English money at 15 milreis to the £1.)

5. Taking the data of Question 4, page 351 E. (2), determine the weight of metal lost between January 1 and April 23, 1915 (to the nearest ton).

6. A reservoir contains 900 million gallons of water and supplies a town of 120000 inhabitants. What must be the daily consumption per person to the nearest gallon in order that the water may hold out from June 24 to September 2 and leave 250000 gallons in the reservoir?

¹ My watch gave me originally Greenwich time, NOT Holyhead local time, for Holyhead is $4^{\circ} 48'$ west, and is therefore earlier than Greenwich.

7. A self-emptying cistern is 2 ft. 6 in. by 1 ft. by 10 in., and the diameter of the section of the siphon pipe within it is $1\frac{1}{2}$ in. If the water flows out at the rate of 20 ft. a second, how long will it take to empty the tank, presuming no water flows in during the process?

8. A merchant has an electric radiator in his office which costs him $1\frac{1}{2}$ d. per hour. It is switched on at 9.30 a.m. and switched off at 6.30 p.m. every day but Saturdays, when it is not run after 1.30. What should be his quarterly account?

9. The pumps on a ship can pump out 2000 gallons a minute, and the ship having been holed has made 5000 gallons of water before the pumps can be got working. The influx of water is at the rate of 150 gallons a second, and the ship will sink when she has 100000 gallons in her. How long have the crew to get their boats out and equipped?

SECTION XVII

PROPORTION

221. In the succeeding pages we shall attempt to show the great variety of uses to which both

PROPORTION and
PERCENTAGES (Section XVIII.)

can be put in commercial operations.

A. (1) a. Direct Proportion

222. The price paid for a consignment of tea depends on the number of chests included therein.

If 1 chest costs £7 10s., 2 chests will cost £15, and so 50 chests will cost £375.

∴ the price of the consignment is proportional to the number of chests of tea dispatched.

EXAMPLE 1.—Two chests are filled with tea in the proportion of 3 lb. in the former to 5 in the latter, which contains 55 lb. How much does the former contain?

The first contains $\frac{3}{5}$ of the weight in the second; or $\frac{3}{5}$ of 55 lb., which equals 33 lb.

EXAMPLE 2.—The ratio of lead to tin in a particular kind of solder is as 1 to 2. How many pounds of tin will be needed if $28\frac{1}{2}$ lb. of lead are used?

There is twice as much tin as lead. \therefore if $28\frac{1}{2}$ lb. of lead are used, $56\frac{1}{2}$ lb. of tin will be required.

EXAMPLE 3.—A coal merchant sells 58 tons of coal for £55. At what price must he sell 264 tons to make the same profit per ton?

We employ the unitary method, which consists in finding the cost of *one* ton and then of 264 tons.

58 tons of coal cost £55

1 ton costs $\pounds \frac{55}{58}$

\therefore 264 tons cost $\pounds \frac{55}{58} \times 264$

= £250, to the nearest £1.

EXAMPLE 4.—The ratio of the population of Australia (exclusive of full-blooded aboriginals) in 1912 to that in 1913 was as 1 : 1.0296. The population in 1912 was 4,730,000. Find, to the nearest ten thousand, the population in 1913.

The population in 1913 was 1.0296 times as great as that in 1912;

$$\begin{aligned} \therefore \text{the population required} &= 4,730,000 \times 1.0296 \\ &= 4,870,000. \end{aligned}$$

EXAMPLE 5.—The cost per ton of conveying some agricultural products from Pará to Liverpool is 40s. per ton, and the freight charge to Havre bears to that to Liverpool the ratio of 7 : 8. Calculate the freight per ton from Pará to Havre in French money, at 1 franc = 9.5d.

$$\begin{aligned} \text{Freight per ton, Pará to Liverpool} &= 40\text{s.} \\ \text{“ “ “ Havre} &= \frac{7}{8} \text{ of } 40\text{s.} \\ &= 35\text{s.} \\ &= \frac{35 \times 12}{9.5} \text{ francs} \\ &= 44.2 \text{ francs.} \end{aligned}$$

β. Inverse Proportion

223. The greater the number of men employed in repairing a bridge the shorter will be the time required to do the work. If, for example, 150 men can paint it in 5 days, then 300 men can do it in $2\frac{1}{2}$ days. We say, then, that the time taken to do a

piece of work is inversely proportional to the number of men employed.

EXAMPLE 1.—A railway company employs 36 men to repair the permanent way, and they take $2\frac{1}{4}$ days. How many days will 45 men take?

Employing the unitary method as before, we have :

36 men do the work in $2\frac{1}{4}$ days
so that 1 man does the work in $2\frac{1}{4} \times 36$ days

$$\begin{aligned} \therefore 45 \text{ men will do the work in } \frac{2\frac{1}{4} \times 36}{45} \text{ days} &= \frac{9}{4} \times \frac{36}{45} \text{ days} \\ &= 1\frac{4}{5} \text{ day.} \end{aligned}$$

EXAMPLE 2.—A farmer can feed 50 cows for 3 weeks for £15. He buys 25 cows more. How much does it cost him to keep them for 1 month?

50 cows kept for 3 weeks cost £15

$$1 \text{ cow} \quad \text{,,} \quad 3 \quad \text{,,} \quad \frac{15}{50} = \frac{3}{10}$$

$$75 \text{ cows} \quad \text{,,} \quad 3 \quad \text{,,} \quad \frac{3}{10} \times 15 = \frac{45}{2}$$

$$75 \quad \text{,,} \quad \text{,,} \quad 1 \text{ week} \quad \text{,,} \quad \frac{45}{2 \times 3}$$

$$\begin{aligned} \therefore 75 \quad \text{,,} \quad \text{,,} \quad 4 \text{ weeks} \quad \text{,,} \quad \frac{15}{2} \times \frac{4}{3} \\ = \text{£}30. \end{aligned}$$

EXAMPLES. LX.

- 56 bottles of port cost £11 4s., what will 10 dozen cost?
- Rice is sold retail at 7 lb. for 1s., find the cost of 1 cwt.
- A french polisher in Cape Town can earn 50s. a week for an eight-hour day and half a day on Saturday. What does he earn per hour to the nearest farthing?
4. The ratio of the height of a column to its diameter is 16 : 1. What will be the height of a column the circumference of which we measure and find to be 66 feet?

5. A dairyman purchases daily 28 churns of milk (each of which contains, on the average, 17 gallons), and he pays 3d. a quart. What should he pay for 83 churns of the same capacity?

6. The wholesale price of dried fruit bears to the retail price the ratio of 6 : 11. What is the retail price of a consignment which costs £20 wholesale?

7. If sugar costs, wholesale, 32s. 6d. per bag of 112 lb., what must be the retail price per 14 lb. to gain $\frac{1}{16}$ d. per lb.?

8. A motor-car costs £600 and loses value as follows: $\frac{1}{3}$ of its original value the first year, $\frac{1}{4}$ of the reduced value the next, $\frac{1}{5}$ of that value the next, and $\frac{1}{6}$ of that value the next. Express its value at the end of the fourth year as a fraction of its original cost.

9. A contractor puts 15 men on a job and they finish it in 8 days. How many days would 25 men have taken, reckoning that they all work at the same rate?

✕ 10. The ratio of yen 1 to a United States dollar is as 68·055 : 137. If the value of a dollar is 4s. 1·32d., find in English money the value of yen 1, to one-tenth of a penny.

✕ 11. The area of the British possessions in the West Indies is to the area of the possessions in Europe as 0·10123 : 1. If the former is 12300 square miles, find the latter, to four significant figures.

✕ 12. If in soldering up the lead over a bay window a plumber uses 9 lb. of solder, how much tin does he use, and what is its value at £142 per ton, if the solder contain one part of lead to two parts of tin?¹

13. The value of wool (scoured) exported from Australia in 1913 (eight months) was £2,574,000, and in 1914 £2,624,000. If the same rate of increase obtains for 1915, estimate the value of the exportation for that year.²

✕ 14. In the year 1913 Southern Rhodesia produced 689954 oz. of gold, valued at £2,903,270. If the same rate held good for 1914, what was the value of the 854480 oz. produced in that year? (The actual value in 1914 was £3,580,210.)

15. Southern Rhodesia³ also produces the thermal insulator,

¹ This is the composition of soft solder. Hard solder contains—copper 40, zinc 60 : and jeweller's solder—fine gold 5, copper 2, zinc $1\frac{1}{2}$, fine silver $1\frac{1}{2}$.

² In all such questions the student must be careful to take a sufficient number of figures in multiplication or division to ensure the degree of accuracy required in *commercial* operations. Here the answer correct to £1000 would be sufficiently close.

³ The most important productions of Southern Rhodesia, after gold, are chrome iron ore and coal.

asbestos. The value of the 487 tons produced in 1914 was £8612. What was the value of the 290 tons produced in 1913, supposing the market did not change from 1913-14? (The actual value was £5224, how was the market going?)

16. The Governor of the Falkland Islands reports that 221930 barrels of oil were produced from 4544 whales caught in 1913-14 off the South Shetlands. If 621 whales were caught off the South Orkneys, what should have been the number of barrels of oil produced if the whales were as productive of oil as those off the South Shetlands? (Actual number of barrels produced by South Orkneys whales was 21750; draw conclusions.)

17. If the approximate value of 21750 barrels of whale oil is £87000, what is the value of 221930 barrels?

18. 654650 cwt. of plumbago valued at £556450 were exported from Ceylon in 1912-13, and 570810 cwt. in 1913-14. What was the value of the latter if the value per hundredweight was the same as in 1912-13? Is the plumbago market rising or falling if the actual value was £603150?

19. The Commonwealth of Australia imported 2,966,000 lb. of coffee and chicory in 1912, valued at £117170, and 3,174,900 lb in 1913. Find the value of the latter. (Market steady.)

20. Japan produced 2,725,260 kwan of steel in 1911, and 3,309,520 kwan in 1912. If the value of the latter was yen 745800, find the value of the former.

21. A drum of oil is 14 in. in diameter, 2 ft. 6 in. high, and it is worth £7 15s. 6d. What should a drum 18 in. in diameter and 3 ft. high be worth, to the nearest sixpence?

22. If 10 metres of silk are sold in Paris for 38 francs, how much should be paid in London for 6 yards?

23. France exported to the Dominion 260850 lb. of cheese, valued at 55450 dollars, last year, and 102100 lb., valued at 22200 dollars, the year before. How is the market moving?

24. A contractor puts 20 men on to repair a road, reckoning that they will finish it in 15 days. At the end of 10 days he puts 12 more men on. In how many more days will it be finished?

25. If each of the 12 men of the last question were able to work half as quickly again as each of the original 20, how many days would it have taken to finish the work after they were put on?

26. A builder agrees to finish a hospital by June 1, or to forfeit 50 guineas a day for every day, or part of a day, after that date. On May 15 he reckons that the 85 men he has on it will finish it by June 15. How many more must he put on to finish it in time?

27. If the builder in the last question had put on 8 men more, how much would he have been fined?

28. The Customs revenue of Australia for the first two months of the financial year 1914-15 was £2,526,000; estimate the revenue for the year and determine by how much it will be greater or less than the TOTAL for 1913-14 if it amounted to £9,114,000 for the first EIGHT months.

29. A quantity of gas for lighting railway trains occupies 10000 cubic feet at the ordinary atmospheric pressure of 14 lb. per square inch. It has to be compressed into a cylinder 15 feet long and 7 feet in diameter for conveyance by rail. What pressure will it exert on the cylinder if the volume is inversely proportional to the pressure?

30. Hong-Kong is 9834 miles from London, *via* the Suez Canal, and the time of transit is 29 days. By how many miles per hour would it be necessary to increase the average speed to deliver the mails 12 hours earlier?

31. A ship is crossing the Atlantic and the steam pipe bursts. There are 350 men on board, with food enough to last 11 days. To be on the safe side, the captain cuts down rations so that the food will hold out for 25 days. If the original weight of food was 10 tons, by how much must each man's allowance be cut down?

32. A draper has 25 high-power gas burners outside his shop, and each burns 30 cubic feet of gas in $2\frac{1}{2}$ hours. He does away with them and installs 8 new ones, the power of each of which is 2.75 times greater than each of the others. In what time will they consume the same quantity of gas?

33. The caterers on a dining-car train provide food on the assumption that 150 people will take tickets for lunch. As a matter of fact, 196 people take tickets, and the size of the portion given to each is consequently reduced. If the actual value of the lunch was 2s. per person under ordinary circumstances, what would be the value of the reduced lunch?

34. If there were 38 boys in the workhouse with Oliver Twist, and each was allowed half a pint of "thin gruel," how much less would Oliver have had if there had been 57 boys there?

35. A battle cruiser can cover 1000 nautical miles in $40\frac{1}{4}$ hours; by how many knots must its speed be increased to cover the distance in 38 hours?

36. If 385 men can turn out £10000 of munitions of war in $5\frac{1}{2}$ days, how many men would have to be employed to turn out £35500 worth in 22 days?

37. A mason employs 36 men who build a wall in 10 days of

6 hours each; how many men would be required to do the work in 7 days of 8 hours each?

✓38. How many cubic feet of gold of specific gravity 19·32 are equal in weight to 0·58 cubic foot of platinum of sp. gr. 21·45?

✓39. If 28 miners dig 15 metric tons of coal in $8\frac{1}{2}$ hours, how many metric tons will 100 miners dig in 3 days of $5\frac{1}{2}$ hours each?

40. If a continental express covers 400 Km. in $4\frac{1}{2}$ hours, by how much must its speed be increased or decreased so that it may cover 88 feet in 1 second? (100 Km. = 62 miles.)

41. A tank containing 500 litres supplies a house with water, and it is provided with two pipes of diameter 3·5 cm. and 4·5 cm. If the first is used for emptying the cistern it takes 25 minutes. How long would it take using (1) the other pipe alone, (2) both pipes?

A. (2) Temperature

224. Among the many matters to which a merchant has to give his attention we must include the temperature of his warehouses and offices. There are three scales of temperature, named the Centigrade (C.), the Fahrenheit (F.), and the Réaumur (R.).

The standard temperatures are those of melting ice, **Freezing-Point**, and of steam, under atmospheric pressure, **Boiling-Point**, and they are marked 0° and 100° C., 32° and 212° F., and 0° and 80° R.

225. A thermometer was invented by Galileo in 1592, and a greatly improved kind of instrument was made by Fahrenheit, 1714. The zero point of the latter was fixed by immersing the instrument in a mixture of ice, water, and sal-ammoniac; the 32° point by immersing it in a mixture of ice and water; a third point, "blood heat," by placing the thermometer in the armpit of a healthy man; a fourth, by placing it in steam at atmospheric pressure. The interval between the 32° , freezing-point, and the 212° , boiling-point, was divided into 180° to correspond with the number of degrees in a semicircle!

Celsius, a Swedish astronomer, invented the Centigrade thermometer (c. 1740), and graduated it very conveniently from 0° to 100° .

Réaumur, a French scientist, made the thermometer which bears his name in 1731. He also performed experiments in artificial incubation and on the making of steel.

226. It is clear that a range of 100° C. = a range of 80° R., and that any conversion from one to the other is simply a matter of proportion.

The conversion from, or to, F. is more difficult, but it depends upon the fact that 0° C. and 32° F., are corresponding temperatures (namely, the freezing-point of water), while 0° C. and 0° F. are not. Therefore, in converting say 30° C. to F., we proceed as usual, taking a range of 100° C. = a range of 180° F.; find, by

proportion, the range F. corresponding to a range of 30° C. and then add 32° .

Thus—

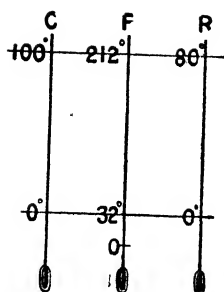
EXAMPLE 1.—Convert 30° C. to F.

Here a range of 100° C. = a range of 180° F.

\therefore a range of 30° C. above freezing-point = a range of $\frac{180}{100} \times 30$ or 54° F.

ABOVE freezing-point F., that is to say, above 32° F.

or a range of 30° C. = a range of $54^{\circ} + 32^{\circ}$, or 86° F. ABOVE 0° F.



227. EXAMPLE 2.—Express 62° F. in C. degrees.

In converting 62° F. to C. we say that 62° F. is 30° above the 32° F., that is, above the freezing-point F., and, therefore, we convert *not* 62° but $62^{\circ} - 32^{\circ}$ or 30° F. to C., since of those 62° , 32° are *BELOW* the freezing-point.

Hence, a range of 180° F. = a range of 100° C.

and, " " " 30° F. = " " " $16\frac{2}{3}^{\circ}$ C.

\therefore 62° F. corresponds to $16\cdot6^{\circ}$ C.

The following rules are convenient :

To convert any temperature to F., use the proportion (100° C. or 80° R. to 180° F.), and *add 32*; and to convert *from* F., *subtract 32*, and *then* use the proportion 180° F. to 100° C. or 80° R.

228. The Centigrade thermometer is used universally for scientific purposes, the Fahrenheit for domestic, meteorological, and clinical purposes in this country, while the Réaumur is used in Russia and in some parts of Germany.

EXAMPLES. LXI. (a)

- Convert 25° , 38° , 46° , 300° , -50° C. to R.
- Convert 22° , 25° , 38° , 40° , -20° R. to C.
- Express 24° , 36° , 44° , -15° C. in F. degrees.
- Convert 15° , 25° , 38° , -10° R. to F.
- Convert 64° , 112° , 98° , 210° F. to C.
- Convert 56° , 200° , -36° , 32° F. to R.
- A doctor finds the temperature of a patient to be 98° F., what is it C.?
- If a particular kind of porcelain melts at 1500° C., what is its melting-point F.?

9. The temperature of a storage room for furs is 38° F., what is the corresponding C. temperature?

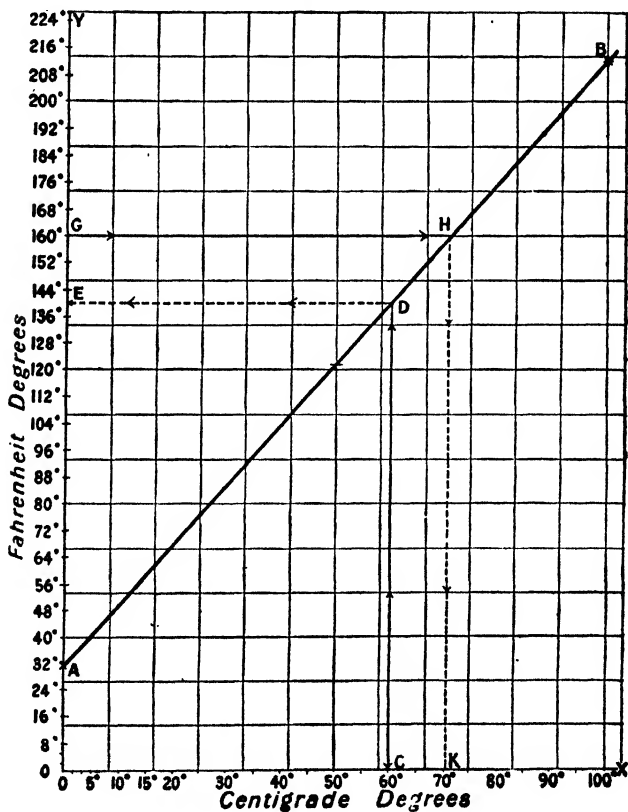
10. Express the following melting-points in F. degrees: silver, 962° C.; gold, 1064° C.; copper, 1085° C.; platinum, 1710° C.

11. The temperature of a particular form of arc lamp is 4000° C., express this in F. and R.

12. Gunpowder ignites at 550° F., express this in C. degrees.

GRAPHICAL METHOD OF CONVERTING TEMPERATURES

229. We divide the horizontal line OX into convenient



lengths to represent C. degrees (3 units = 5°) and the vertical line **OY** into lengths to represent F. degrees (3 units = 8°). Now, 0° C. is the same temperature as 32° F., and so the point **A** is the temperature 0° C. converted into F. In the same way 100° C. and 212° F. represent the same temperature;

\therefore **B** represents 100° C. converted into F.

Join **AB**; then this line enables us to convert any C. temperature into F. or *vice versa*.

EXAMPLE 3.—Express 60° C. in F., using the graph.

The point **C** represents 60° C. Follow up the vertical through **C** till it cuts **AB** in **D**. Draw a horizontal **DE** to meet **OY** in **E**. **E** represents 140° F.

\therefore 60° C. corresponds to 140° F.

EXAMPLE 4.—Express 160° F. in C., using the graph given.

Draw the horizontal line **GH** through 160° F. and drop the perpendicular **HK**. Then **K** is the C. temperature corresponding to 160° F. But **K** is 71° C.

\therefore 160° F. corresponds to 71° C.

230. It will be seen that there is no question of adding or subtracting 32° in this method, and, by taking the scale sufficiently large, the graph can be made suitable for all commercial purposes. By drawing **OX** along to the left, it is possible to read off temperatures below 0° C.

EXAMPLES. LXI. (b)

1. Construct a graph for reading off R. degrees in terms of C. degrees.
2. Use the graph to confirm the results obtained in Questions 1 and 3. (Examples LXI. (a).)
3. Draw a graph for reading off F. degrees in terms of R. degrees.
4. Employ the graph in Question 3 to test the results of Questions 4 and 6. (Examples LXI. (a).)
5. Construct a graph for reading the temperatures 94° to 106° F. in C. degrees, and use it for determining to one place of decimals how many Centigrade degrees the temperature of a patient, namely, 104° F., is below the boiling-point of water on the C. scale.

B. (1) Capital : Partnership

231. Suppose you want a motor bicycle costing £60, it may be that you have not managed to save enough money to buy it, and so you will probably go to an intimate friend and ask him to lend you some part of the purchase money. You have in hand now a sum of money with which you do business; we will call it your **CAPITAL**.¹ With it you buy the bicycle and take out the necessary licences. Had you gone to any one other than a close friend you would have had to give some written guarantee for the repayment of the money, and you would also have had to pay something for the use of it. This sum we shall call **INTEREST**.

232. Again, suppose you have been in a business for a number of years and, having saved £500, wish to start in business for yourself, but find your capital is not enough. You say to Smith, one of your friends, "Look here, you have two hundred pounds; put it with my £500 and let us open a business for ourselves as estate agents." You and Smith agree upon this course, enter into **PARTNERSHIP**, and are now **Partners**. Suppose you make £70 profit in the first year. Since you provided £500, and Smith £200, you will take good care that he does not have half the profit, for he did not provide half the capital. You really put £500 out of £700, and he put £200.

∴ you get $\frac{500}{700}$ of £70, i.e. £50; and he gets $\frac{200}{700}$ of £70, i.e. £20.

If in the second year you make £560 profit, then you will have $\frac{5}{7}$ of £560 = £400, and he, $\frac{2}{7}$ of £560 = £160.

233. Let us imagine that your business has grown so that you feel justified in opening offices in other places. You may need more capital, and can do one of two things to raise it: (1) Take others into partnership with you, arranging to pay them so much a year, or a certain fraction of the profits; or (2) form a limited liability company, which we shall describe on pages 492 and 493.

234. EXAMPLE 1.—Two merchants put £5000 and £4000 into a business, and the profit is £3000. What amount should each receive if the division of profits is to be in proportion to the capital supplied?

Total capital = £9000.

The first merchant gets $\frac{5000}{9000}$ of £3000 = £1666 13s. 4d.

and the second " $\frac{4000}{9000}$ of £3000 = £1233 6s. 8d.

∴ the amounts received are £1666 13s. 4d. and £1233 6s. 8d.

¹ For the means by which a Government may raise capital, see page 374.

EXAMPLE 2.—Three merchants put, respectively, £3000, £2500, and £4800 into a business on the understanding that the first shall receive £300 per annum as manager, and the second one £250 as secretary, while the balance of the profits shall be divided in proportion to the capital advanced by each. If the profits amount to £1683, calculate the amount each receives apart from salary.

TOTAL PROFITS	= £1683
Amount paid in salaries	= 550
Net amount available for division	= <u>£1133.</u>
 TOTAL CAPITAL	 = £10300.
The first partner receives $\frac{3000}{10300}$ of £1133 ;	= <u>£330.</u>
The second " " $\frac{2500}{10300}$ of £1133	= <u>£275.</u>
The third " " $\frac{4800}{10300}$ of £1133	= <u>£528.</u>

∴ the amounts received apart from salary are £330, £275, and £528, respectively.

EXAMPLE 3.—A firm of chemists is controlled by three directors, who agree to divide the profits in the ratio of 1 : 2 : 3 (read 1 is to 2 is to 3). What amount should each receive out of a profit of £3000 ?

If the profits were divided into 6 parts (*i.e.* 1 + 2 + 3 parts) then the first director should have $\frac{1}{6}$, the second $\frac{2}{6}$ or $\frac{1}{3}$, and the third $\frac{3}{6}$ or $\frac{1}{2}$.

∴ The first director receives $\frac{1}{6}$ of £3000 = £500 ;	
The second " " $\frac{1}{3}$ of £3000 = £1000 ;	
The third " " $\frac{1}{2}$ of £3000 = £1500.	

Check the result by adding together the three amounts received, and seeing their sum is equal to the total profit.

EXAMPLE 4.—Three merchants enter into an arrangement whereby one puts £5000 into the business for 6 months, the next puts £8000 in for 12 months, the third £12000 for 15 months. The first receives £450 as his share of the profits, what does each of the others receive ?

£5000 for 6 months	is equivalent to	£30000 for 1 month	¹
£8000 for 12	" "	£96000	" "
£12000 for 15	" "	£180000	" "
∴ the whole amount put in is	" "	<u>£306000</u>	" "

∴ the first merchant should receive $\frac{30000}{306000}$, or $\frac{5}{51}$ of the profit.
But he actually receives £450.

$$\therefore \frac{5}{51} \text{ of profit} = £450; \quad \frac{1}{51} \text{ of profit} = £\frac{450}{5}$$

$$\text{and } \frac{4}{51} \text{ (i.e. all the profit)} = £\frac{450}{5} \times 51 = £4590.$$

∴ the second merchant receives $\frac{96000}{306000}$ of £4590 = £1440;
and the third " " $\frac{180000}{306000}$ of £4590 = £2700.

The shares of the last two are £1440 and £2700 respectively.

EXAMPLES. LXII.

1. Two merchants enter into partnership; one puts in £4500, the other, £3600. At the end of the year the profit is £1620. How much should each receive?

2. If three partners agree to advance £5000, £8000, and £7000 respectively towards the development of a business, and the profit at the end of the first half-year is £4350, how much more would the second partner receive than either of the others?

3. The profit on a business was £1300. One partner advanced £2550, and received £340 as his share. What amount did the second partner advance?

4. Four business men agree to divide the profits of their business in the ratio of 1 : 2 : $2\frac{1}{2}$: 3. If the profits were £3400 17s., how much should each have?

5. In what ratio should the profits of a business be divided if the partners put money into it as follows: £3000, £5700, £4500, £6500?

6. If the profit made from the business of the last question amounted to £2364, what should be the share of each partner?

7. The profit on a business is £1375; divide it so that one partner receives twice as much as the second, and four-fifths the share of the third.

8. One partner puts £350 into a concern for 15 months,

¹ Note that £5000 lent for 6 months is NOT equivalent to £5000 ÷ 6 for 1 month, as many students imagine.

another puts £580 into it for 18 months, a third, £375 for 12 months. Divide the profit of £504 15s. between them.

9. Thomas Williams advances £5000 for 3 years. Henry Jones comes into his business after 9 months and advances £3000, Jacob Joseph comes in with £10000 after 15 months. In what ratio must the profits be divided at the end of the three years?

10. If the profits of the last question were £2268, how much should Jacob Joseph receive for his contribution?

11. A landlord has a piece of land which he lets to some farmers on the understanding that they pay him in proportion to the area of their allotments. If he receives £301 10s. per annum in rent, and the areas of the allotments are $3\frac{1}{2}$, $4\frac{1}{2}$, $2\frac{1}{8}$, $5\frac{1}{2}$ acres, determine the rent each farmer pays.

12. The land agent to a particular prince allows farmers to use some land for grazing purposes. One farmer puts 50 cattle on the land for 180 days; another, 80 cattle for 150 days; a third, 75 cattle for 200 days; and a fourth, 120 cattle for 150 days. The landlord receives £253 2s. 6d. for his kindness after the land agent has deducted one-tenth for his expenses. How much did each farmer pay?

13. What did it cost each farmer per cow per day? (Question 12.)

14. A commercial traveller takes a ticket from London to Paris and pays 25s. 9d. for it. London to Dover is $77\frac{1}{2}$ miles; London to Calais is 103 miles; and London to Paris is 287 miles. If the various companies receive an amount proportional to the mileage run over, assign (as if in the Clearing-House) to the English railway company, to the steamboat company, and to the French company its proper amount.

15. Ascertain for the information of the Railway Clearing-House the proportion in which a charge of 105s. must be divided among three railway companies for the conveyance of a consignment of fruit, if the mileage on the railways was respectively 85 miles, 120 miles, and $80\frac{1}{2}$ miles.

16. A butcher pays £80 per annum for his shop, and puts £580 capital into his business. After five months he takes in a partner who advances £380 capital. Find what proportion of the rent the latter should pay, and how much he should receive out of a profit of £240 10s. at the end of the year.

17. A forage dealer employs three men in his business. The first receives three times as much as the third, and the third half as much as the second, while the dealer himself takes as much as all three of them. Divide a profit of 144s. 6d. a week between them.

18. Three Portuguese planters go to Brazil, where they remain for ten years and develop a vineyard. The record of their prosperity is given below. If they advance the capital of 13620 milreis in the proportion of 9 : 20 : 40, and the income is divided at the end of the tenth year, calculate the amount each should receive and the profit each made.¹ (Observe that no return on the capital expended is received until the fourth year.)

A VINEYARD (SOUTH BRAZIL)

Year.	Expenses—Items.	Total Amount in Milreis.	Produce per Hectare.	Income in Milreis.
1	Labour, 120; manure, 500; planting, 200; plants, 1000; stakes, 250; administration, 360	2430	—	—
2	Fencing, 1500; labour, etc., 650	2150	—	—
3	Total expenses	1040	—	—
4	Including wine-making	2000	5 pipes of wine of 480 litres each	1000
5	„ „	1000	10 pipes	2000
6	„ „	1000	20 „	4000
7-10	„ „	4000	80 „	16000
	Total	13620	115 pipes	23000

Net profit per Hectare, £160.

19. Four partners enter into business together. The first advances £2500, which he takes out at the end of 15 months; the second advances £560 for 18 months; the third, £1000 for 10 months; and the fourth, £3500 for 2 years. The profit is £696 18s.; divide it among the partners.

B. (2) Rates

235. We who live in towns know that the Corporation is responsible for providing an efficient sanitary system, sufficient lighting, a suitable number of open spaces, and for keeping the roads clean and in proper repair. The INCOME necessary to perform these various duties is raised by charging each householder a certain amount of money for the privilege of living in the town. The authorities conclude that if a man can afford to live in a house rented at £80 a year, he can pay more towards the upkeep of the

¹ With acknowledgments to *Brazil*, J. C. Oakenful.

town than the man who lives in a house rented at £30 a year. They therefore take (usually) $\frac{5}{8}$ of the rental and call that the **Rateable Value**, thus: *Rental*, £84; *Rateable Value*, $\frac{5}{8}$ of £84 or £70; and then "demand" each householder to pay a rate varying from 5s. to 15s. a year on every £1 in the rateable value of his house. A demand note and rates receipt are shown on Plates X. and XI. (facing pp. 372 and 373).

The rates vary with the locality, *e.g.* Westminster, 6s. 10d. in the £; Birkenhead, 7s. 10d. in the £.

236. It is important, in opening a business, to ascertain the rateable value of the property and the amount of the rates in the pound. Let us illustrate this:

A merchant has two offers open to him, one for premises rented at £126 per annum, where rates are 10s. in the pound, and another at £132, where the rates are 8s. in the pound. Which will be the cheaper?

CASE 1.			CASE 2.		
		<i>s. d.</i>			<i>s. d.</i>
Rental	£126	0 0	Rental	£132	0 0
Rateable value	£105	0 0	Rateable value	£110	0 0
Amount of rates	£52	10 0	Amount of rates	£44	0 0
Rent	£126	0 0	Rent	£132	0 0
+ Rates	52	10 0	+ Rates	44	0 0
= Total annual cost	£178	10 0	= Total annual cost	£176	0 0

Hence we see that, although the rent in the second case is higher, the rates are lower than in the first, and, other things being equal, it is cheaper to open a business in the latter place.

237. We might say that the rates of a town constitute the income of the Corporation for the purposes of keeping the town in a proper and orderly manner.

It would not be possible out of the rates for one year to meet a large capital expenditure, *e.g.* £60000 for a park, but, by borrowing the capital, the rates can be used to pay that back in, say, sixty years, and also to pay the annual interest.

The Corporation may borrow the necessary capital, with the consent of Parliament, either by issuing stock (Section XXII.) or by executing a mortgage deed on the security of the rates, and guaranteeing a certain rate of interest,¹ usually 3 to 4 per cent

¹ § 313.

For example, the Corporation of a suburban town issues to the ratepayers the following form :

BOROUGH OF BENDON.

The Corporation of Bendon are prepared to receive Loans of £50 and upwards in multiples of £10 on security of the Rates, at £3 10s. per cent. per annum. Interest will be paid half-yearly on 30th September and 31st March, and the Loans will be repayable at any time at six months' notice.

Further particulars may be obtained on application to the Borough Treasurer, Town Hall, Bendon.

P. JOHNSON HICKS, *Town Clerk.*

238. All that has to be done in lending to the Corporation is to fill in a proper form saying that you wish to lend (*e.g.*) £100, and that the interest is to be paid to you. The borough treasurer then prepares a mortgage deed on the general district rates, has it properly stamped,¹ signed by the mayor and town clerk, and embossed with "the seal of the mayor, aldermen, and burgesses" of the town. It is then delivered to you, and when you wish to draw out your money you give notice and, when it is paid over to you, sign the deed declaring you have received the money, and then the Corporation receives the deed back again and cancels it.

239. EXAMPLE 1.—The rental of a shop is £60 and its rateable value is £50 ; the poor rate is 2s. and the district rate is 2s. 3d. in the pound, and the "Inhabited House Duty" (payable not to the local authority but to the Government) is 4d. in the pound on the RENTAL. How much do the local authority and the Government receive respectively ?

Poor rate = 2s. in the pound ; ∴ rates due = £5.
 District rate = 2s. 3d. in the pound ; ∴ „ = £5 12s. 6d.
 ∴ Total payable to local authority = £10 12s. 6d.
 Inhabited House Duty = 4d. in the pound on *Rental* = £1
 ∴ the Government receives £1.

EXAMPLE 2.—If the rates on a house amount to £5 7s. 6d. per half-year, and they stand at 3s. 7d. in the pound for that half-year, calculate the rateable value of the property and its rental if the former is five-sixths the latter.

¹ The amount of all stamp duties can be ascertained from Somerset House.

The problem is simply this: If 3s. 7d. is paid upon £1, upon what sum would £5 7s. 6d. be paid?

$$\begin{aligned} \text{The rateable value is } & \frac{\text{£5 7s. 6d.}}{3\text{s. 7d.}} \times \text{£1} \\ & = \text{£} \frac{1290}{43} = \text{£30.} \end{aligned}$$

$$\begin{aligned} \therefore \text{Rental} &= \frac{6}{7} \text{ of } \text{£30} \\ &= \text{£36 per annum.} \end{aligned}$$

EXAMPLES. LXIII.

Note.—We shall assume rateable value = $\frac{1}{2}$ rental, and that the rates are per annum, unless otherwise stated.

1. Calculate the amount payable annually in rates on premises of rental £84 per annum, if the rates are 8s. 6d. in the pound.

2. Calculate the result of the last question if the rateable value is eleven-twelfths the rental, and rates 2s. 8d. per quarter.

3. The rateable value of a warehouse is £2500. The rates for the first quarter are at 2s. 1d. in the pound; for the second, 2s.; for the third, 2s. 3d.; and for the fourth, 2s. 4d. Calculate the amount paid in rates in each quarter and in the year.

4. Which is more remunerative, and by how much—(1) To let a row of forty-eight small houses at 12s. 6d. a week each, inclusive; or (2) at £7 10s. a quarter, where the tenant pays the rates at 6s. 4d. in the pound? Would the difference in the income derived clearly justify the cheaper method?

5. The rent of a store is £120 per annum, and the rates stand at 7s. 6d. in the pound. What amount must be paid in rates?

6. The rateable value of the City of London is £5,717,000 to the nearest £1000, and the rates stand at 7s. 6d. in the pound. Find, to the nearest £1000, the income derived from the rates.

7. The rateable value of Birkenhead is £696660. What increase, to the nearest penny, must be made in the rate in order to produce £8000 more income?

8. Taking the population of Birkenhead to be 140000, determine the average amount contributed by every five persons to the rates if they are 7s. 10d. in the pound per annum.

9. A landlord owns two houses in different boroughs. The rent he receives is £42 and £54, and the rates stand at 7s. 8d. and 6s. 9d. respectively. Determine which house is the cheaper from the tenant's standpoint.

10. If rates are 1s. 8d. in the pound per quarter, what would

be the rental of a house which was charged £21 13s. 4d. per annum in rates ?

11. If we take the urban (city and town) population of Australia to be 2,950,000, determine what amount of money would be produced, reckoning an average rateable value of £28 per annum per household of five people, and rates at 8s. in the £.

12. A corn merchant has two shops, for which he pays £80 and £98 rent per annum. The former is in a town where the rates are 8s. 6d. in the pound, and the latter in another town where the rates are 8s. in the pound. Which is the cheaper shop ?

13. The rateable value of a suite of offices is raised from five-sixths to eleven-twelfths of the rent at the same time as the rent is raised by one-seventh of its original amount. Calculate the total increase in cost per annum if the first rateable value was £70 and the rates were 6s. 8d. in the pound per annum.

14. A row of thirty-six flats is let at 15s. a week each inclusive of rates. The rateable value is eleven-twelfths of the rental, and rates are at 7s. 6d. in the pound per annum. Income-tax¹ is 2s. 2d. in the pound and is charged on five-sixths of the gross rental. Calculate the net annual income of the landlord.

B. (3) Taxes

240. Not only does the Corporation of our town require us to pay something towards the upkeep of the town, but the Government also asks for a certain amount, because we occupy a house in the country. The TAX imposed by the Government upon householders is called the Inhabited House Duty, and amounts to 3d. in the pound for houses (not shops) of rental £20 to £40 per annum, 6d. from £40 to £60, and 9d. in the pound for houses of rental over £60 per annum.

Again, the very fact that we live in this country enables us, if we wish, to enter into business arrangements and to make profits, the Government affording us protection from aggression, from robbery, and from fraud, the while. It is therefore fair that, out of the profits made, or the income earned, we should pay a little to the Government.

The amount paid in the pound is a TAX upon our income, and so is called an "income-tax."

241. For purposes of income-tax assessment incomes are divided into two classes :

¹ See B. (3) for full explanation ; here, simply deduct 2s. 2d. in the pound on five-sixths of gross rental.

(a) **Earned Income**, which includes our salary, or the profits of our business; and

(b) **Unearned Income**, which includes interest on money in the bank dividends upon stock (page 480), or rent from property we may have.

242. Income-tax is not charged on incomes below £160, while all below £700 are allowed an abatement ranging from £160 below £400, to £70 between £600 and £700.¹ A merchant, therefore, making £350 a year would pay income-tax on £350 - £160 = £190; and one making £650 would pay on £650 - £70 = £580. An abatement of £10 is allowed for each child under sixteen years of age, and no tax is charged on insurance premiums (page 380). The tax on earned incomes is lower than on unearned, and it may range from 9d. to 2s. 6d. in the pound.

243. The income which the Government derives from this tax is used, as far as it will go, for national purposes, and although last year it amounted to £45,000,000, and this year will be much more, it is insufficient, and the Government has had to inaugurate (1) Customs tariff, (2) Excise duties, (3) licences, (4) stamp duties,² etc., to provide a sufficient income.

See Question 37, page 15.

The non-tax revenue, *i.e.* revenue from postal and other services, Crown lands, and Suez Canal shares, amounted to £34,000,000 in the same year.

If, in an emergency, the Government needs a large amount of money, it appeals for a loan, and issues stock (§ 354).

244. EXAMPLE 1.—A clerk's income is £200 per annum, and the income-tax is 9d. in the pound. He is not charged any tax upon the first £160 of his income, nor on £8 he pays in insurance premiums. What income-tax does he pay?

$$\begin{array}{r}
 \text{Total income} \qquad \qquad \qquad = \text{£}200 \\
 \text{Tax not paid on} \qquad \qquad \qquad \text{£}168 \\
 \text{Net income chargeable} = \underline{\text{£}32} \\
 \\
 \text{Tax at 9d. in the pound} = \frac{32 \times 9}{12} \text{s.} \\
 \qquad \qquad \qquad \qquad \qquad \qquad = 8\text{s.}
 \end{array}$$

¹ The remarks in this paragraph refer to normal times. At present the income-tax is much more comprehensive.

² THE CUSTOMS TARIFF includes Import duties on beer, playing-cards, ether, spirits, wines, confectionery, etc. The tariff of some other countries is very much more complicated than ours. (See *Underwood Tariff Bill*, published by Dorland Agency, 1s.; also *Queensland Year-Book*, pp. 153-170; and *Whitaker's Almanack*, pp. 408-418.)

EXCISE DUTIES are payable on beer, spirits, etc., manufactured in the country.

LICENCES are payable (*e.g.*) by auctioneers (£10), hawkers (£2), pawn-

EXAMPLE 2.—A merchant's net income is £2220, and he has paid an income-tax of 1s. 6d. in the pound; what was his gross income?

A net income of 18s. 6d. is derived from gross income of £1 ;
 ∴ " " 1s. " " " " " " 20
 " " " £2220 " " " " " " " " 18·5^{s.};
 ∴ " " " " " " " " " " of $\frac{20}{18\cdot5} \times £2220$
 = £2400
 ∴ gross income = £2400.

EXAMPLES. LXIV.

1. If a merchant pays his clerks as follows: Chief clerk, £300; second clerk, £220; third clerk, £180; and each is allowed an abatement of £160; calculate their net incomes if the tax stands at 10d. in the pound.

2. Income-tax on unearned income is 1s. 2d. in the pound. If a merchant have property producing an annual income of £550, and he is allowed to deduct one-sixth for repairs, what amount of tax does he pay?

3. The managing director of a steel works has an income of £580 per annum, he is allowed an abatement of £120, and pays £35 per annum for his life insurance. What is his net income after income-tax has been deducted at 10½d. in the pound?

4. A timber merchant's net income is £3000 per annum, and he has paid income-tax at the rate of 1s. in the pound. What was his gross income?

5. The director of a company receives £500 a year as salary and derives £250 from some investments. On the former he is allowed an abatement of £150, and the income-tax is 8d. in the pound; on the unearned part of his income he pays 1s. 2d. in the pound. What is his net income after deducting income-tax?

6. If one's gross income is £560 and net income £540, what is income-tax in the pound if an abatement is allowed on £120?

7. What is the income-tax, when £8 15s. is the tax on £335, the abatement being £160?

brokers (£7 10s.), and by retailers of wines and spirits (from £5 upwards).

STAMP DUTIES are imposed on all documents when it is necessary for them to have a legal value—that is, a value in a court of law. For example, if you had a house and let it for £20 per annum, you would have a 4s. stamp put on the agreement, and then it would be valid, otherwise it would not.

8. A commercial traveller's net income is £450. Three-fifths of his gross income pays 9d. in the pound, and the remainder 1s. What is his gross income, and how much is "unearned income"?

9. A grocer pays £58 a year rent, and he may deduct the income-tax paid on the rent.¹ If it stands at 2s. 3d. in the pound, what is the net amount he remits to his landlord?

10. A merchant whose income is £450 per annum is allowed an abatement of £150. He pays £15 for life insurance, and he has four children, on each of whom he is allowed an abatement of £10. Find his net income after the tax at 1s. 3d. in the pound has been deducted.

11. A banker's income is made up as follows: Salary, £450; rent from property, £220; dividend from investments, £180; interest, £150. He is allowed abatement of £150 of his earned income, and pays 10d. in the pound on this, and 1s. 2d. on the unearned part. What is his net income?

12. Suppose you have saved £180 and lent it to the Corporation of St. Julius, which agrees to pay you $3\frac{1}{2}$ per cent. on your money, less income-tax. And suppose still further, that your income is less than £160 a year. What amount must you reclaim from the State if the tax is 1s. 2d. in the pound?

13. On November 17, 1914, the British Government raised its great war loan of £350,000,000, and is paying $3\frac{1}{2}$ per cent. upon this amount. If the creditors of the Government are paying 2s. 6d. in the pound income-tax, calculate the amount derived in income-tax from this immense loan.

14. The area of rural lands included in taxable returns in the Australian Commonwealth was, in thousands of acres, 64028, and the average tax per acre was 3·314d. The tax for Western Australia (the lowest in the Commonwealth) was 0·984d. last year. What amount of money would the Government have lost if the average tax had been that of Western Australia.

15. From the data of the last question, determine the amount of money the Commonwealth could raise by increasing the average value of the tax on rural lands by $\frac{1}{2}$ d. per acre.

16. A merchant pays £15 15s. income-tax one year when it stands at 9d. in the pound, and £22 the next year, when it stands

¹The merchant pays his landlord £85 a year in rent, therefore the landlord must pay income-tax on the £85. But the State demands the tax from the tenant (and so makes sure of it), who may deduct it from the first rent paid after the tax has been paid by him. The landlord may be fined if he refuses to allow the amount of the tax, but he need not allow it unless it is deducted from the first rent paid after the date of the receipt.

at 11d. in the pound. By how much has his income increased? (Neglect the abatement.)

17. Three merchants enter into partnership with £7000, £5500, and £8400 respectively. At the end of the year the first partner pays £10 10s. income-tax at 9d. in the pound. What did each receive out of the profits?

18. In the last question, find the total amount by which the Government benefited through the profits made in the business.

B. (4) Property

245. Property may be divided historically, rather than logically, into two classes :

(A) **Real Property**, which includes land and everything annexed to land, such as houses, timber, mines, sporting rights, title-deeds, etc. It is not subject to absolute ownership, but is only the subject of estates ; on intestacy it descends to the heir, and it is always governed by the law of the place where it is situated.

(B) **Personal Property** consists of all property not included under (A), such as goods, money, and leasehold interests in land. On intestacy it is divided among the next of kin and is governed by the law of the owner's domicile.

246. Real Property may be—

(a) **Freehold**, when it remains in the hands of the owner until he sells or otherwise disposes of it ; and

(b) **Leasehold**, when it reverts to the original holder after a given number of years, which is often either 99 or 999 years.

A tenant may take the lease of a house for three, five, or seven years.

In case (b) the leaseholder has to pay a ground rent to the landlord, which reaches a most princely figure in London and other great cities, but for ordinary houses of rental of £30 per annum it may be about £5 to £10 per annum. At the expiration of the period of the lease the property reverts to the owner. In a large part of the West End of London to-day leases are expiring and houses are being pulled down and rebuilt, to be leased at a much higher figure than before.

247. The Rental of a house or of land is the amount paid for the use of the same, and varies very much from place to place. A house costing £40 a year in the suburbs of London would cost perhaps £30 in the Provinces.

If a house were let for £30 a year, and the landlord asked £510 for it freehold, then he would require $510 \div 30 =$ seventeen years' purchase.

248. EXAMPLE 1.—What rate per cent.¹ does a house

¹ It may be necessary to read §§ 266 and 267 on Percentages before working through this section.

costing £750 and let for £50 per annum bring to the owner?

Income on £750 = £50

$$\text{“ “ } £100 = \frac{50}{750} \times 100 = £6.6.$$

∴ the rate per cent. = 6.6.

EXAMPLE 2.—A piece of land brings in a ground-rent of £10 10s. a year, and the owner wants fifteen years' purchase for the freehold. Find its value.

Value of freehold = £10 10s. paid for fifteen years
= £157 10s.

EXAMPLE 3.—A shop costs £1500; at what rental must it be let to produce 7 per cent.?

If it cost £100 its rental would have to be £7.

$$\begin{array}{rclcl} \text{“ } & £1 & \text{“} & \text{“} & £\frac{7}{100} \\ \text{“ } & £1500 & \text{“} & \text{“} & \frac{7}{100} \times 1500 \\ & & & & = £105. \end{array}$$

EXAMPLE 4.—What must be the number of years' purchase to obtain 6 per cent.?

If £6 be paid in rent per annum it will take $100 \div 6 =$ or 16.6 years to produce £100.

∴ the number of years' purchase = 16.6.

EXAMPLE 5.—If a property is sold on a twelve years' purchase basis, what rate per cent. is this?

Now, rent \times number of years = purchase money, and for every £100 purchase money the rent must be $£\frac{100}{12} = £8$ 3s.

∴ the rent must be 8.3 per cent. of the purchase money.

EXAMPLES. LXV.

Find, to two places of decimals, the rate per cent. derived from the following properties, tabulating the answers (Questions 1 to 8):

1. A hotel costing £50000 and producing £8000 per annum.
2. A bungalow costing £380 and producing £40 per annum.
3. A corner shop costing £8560 and producing £180 per annum.
4. A railroad costing £1,500,000 and producing £78000 per annum.

5. A line of steamers costing £15,875,000 and producing £1,000,000 per annum.

6. A house costing £850 and producing £42 per annum.

7. A farm costing £985 and producing £350 per annum.

8. A shop costing 5894 dollars and producing 450 dollars per annum.

If the owners of the following properties are prepared to sell at the number of years' purchase given, calculate the selling price (Questions 9 to 15) :

Annual Rental at	Years' Purchase.	Annual Rental at	Years' Purchase.
9. £586 . . .	12	13. £42 10s. . .	18
10. £9000 . . .	15	14. 1000 dollars . . .	12½
11. £150 15s. . .	15½	15. 850000 francs . . .	14¼
12. 1200 guineas . . .	10		

At what rental must the following properties be let to produce the percentage required (Questions 16 to 21)?

Value of Property.	Percentage Required.	Value of Property.	Percentage Required.
16. 5869 francs . . .	10	19. 29,000,000 lire . . .	15
17. 1,000,000 dollars . . .	12½	20. £5,633,000 . . .	7½
18. 89865 gulden . . .	8½	21. 3000 guineas . . .	9¼

22. What must be the number of years' purchase to produce — (1) 3½; (2) 7¼; (3) 8½; (4) 15½; (5) 20½; (6) 25 per cent.?

23. What percentage of the purchase money must the rent of a property be if it is reckoned at (1) 7; (2) 8; (3) 15; (4) 12½; (5) 18½; (6) 25 years' purchase?

B. (5) Insurance

249. In a particular town there are forty thousand houses, and in the course of the last five years not twenty of them have been destroyed by fire. In the same time the actual loss sustained by burglary has been, perhaps, slightly higher, while the number of people who have died would be very considerable. We may say, then, that the risk of fire is small and of burglary slightly greater, while it is highly probable that all of us will die.

Now, it is easy to see that representatives of the forty thousand householders can meet together and agree that the average value of the contents of their houses is £200, and decide that they will each pay 1s. 6d. per cent. on that value, pool the proceeds, and, if any house is burnt down, replace the contents

out of the pool. It is clear that if the owner of any house does not enter into the arrangement he may lose a great deal of money, and possibly become a bankrupt, if his house is burnt.

250. Now the householders will contribute altogether 1s. 6d. \times 40000 or £3000. If three houses are completely burnt down, the pool of £3000 will have to pay £600, and leave balance in hand of £2400 for the next year. If fifteen houses were destroyed, nothing would be left for the next year.

Now, instead of the householders doing this among themselves, insurance companies exist, and we apply to them for a **policy**—that is, an agreement to the effect that if we pay them, say, 1s. 6d. per cent. on the value of our property, they will replace the same, up to a value stated if fire destroys it.

Inasmuch as the elaborate system of fire-calls reduces the chances of complete destruction to a minimum, it is obvious that fire insurance companies can make very large profits, which they can invest and increase still further, and so it pays to invest money in the shares of such companies (page 491).

251. The Greeks virtually applied the principle of insurance to their shipping ventures, and, indeed, if Antonio had but insured his argosies he would never have had to run the gauntlet of Shylock's revenge.

Risks of every kind are covered by insurance, such as the fall of a chimney-pot, a crop of wheat being injured by hail, or a ship sinking. By paying 2s. 6d. per annum an employer can be covered against his servant (say) cutting her hand, whereas if he did not insure he might have to pay £200 or £300 damages. By paying a small **premium** he throws his responsibility on to the shoulders of the company, which can afford to pay the damages because, of the large number insured, only a few suffer injury.

LIFE INSURANCE

252. In the case of life insurance, the **PREMIUM** (that is, the amount paid annually to secure any required cover) must be high, for the risk of dying is very much higher than that of fire.

The best insurance offices require the **PROPOSER** (the one who seeks insurance) to be examined medically, and upon the report of the doctor being good, they "accept" his life. After he has paid the premium they issue a policy (**Plate XII.**, p. 382).

253. A whole life policy is payable at death.

An **endowment policy** is payable at the age of 50, 55, 60, etc., or previous death, and involves a slightly higher premium.

A **BONUS** is an amount added to a policy as a result of the company's investing its premium income and making a profit.

If you, aged 20, had a policy for £500 payable to you in 30 years, and at the end of 20 years did not wish to pay any further premium but wanted a cash payment, the office would call upon you to **SURRENDER** the policy and offer you, say, £250, which would be called the **SURRENDER VALUE**, and it would represent the total amount you had paid in premiums together with the interest earned, *less* a certain amount for the risk the company had taken in insuring your life.

254. Tables, called **Mortality Tables**, have been compiled in which we find recorded the **Expectation of Life** both of men and of women. With the help of such tables, and a knowledge of other matters which enter into the question, insurance offices determine the premium to be paid at any age of entry. The following is a part of such a table:

Age.	General Male Population.	Life Offices' Experience.	Abstainers' Experience.	Females.
	Years.	Years.	Years.	Years.
15	45·2	47·8	51·5	47·6
20	41·0	43·7	47·4	43·4
25	37·0	39·6	43·5	39·4
30	33·1	35·6	39·3	35·4
35	29·2	31·7	35·1	31·5
40	25·6	27·9	30·8	27·8
45	22·2	24·2	26·6	24·2
50	18·9	20·6	22·5	20·6
55	15·8	17·2	18·6	17·2
60	12·9	14·1	15·1	14·1
65	10·3	11·2	11·8	11·3
70	8·1	8·7	9·0	8·8

255. Typical rates for various kinds of insurance are:

Fire.—Buildings of private residences, 1s. 6d. per cent.

 " " business premises, 1s. 6d. to 2s. 6d. per cent.

Bulgary.—1s. 6d. to 10s. per cent.

Employers Liability.—2s. 6d. to 20s. per servant.

Whole Life Assurance—

	Age at entry, 20.	Annual Premium,	£	s.	d.
<i>Without profits.</i>			1	9	2
<i>With</i>	"	"	2	0	0
"	"	"	2	9	6
"	"	"	3	5	0
"	"	"	4	11	10

Insurance of parcels sent abroad by **POST**, 4d. for £12, and 2d for each additional £12 up to 5s. 10d. for £400 (maximum).

Accident Insurance, £1 to £8 per annum according to benefits required and nature of employment.

Marine Insurance depends entirely on the character of the goods, port of shipment, and destination, and upon international relations. It may range from a few shillings to four or five guineas per cent. A merchant in the Midlands tells us that he paid 20 per cent. in the early part of the year 1915.

Underwriters are those who guarantee the amount of the policy if and when it becomes due—that is, they take the risk.

256. LLOYD'S.—Edward Lloyd was a Welshman who, at the close of the seventeenth century, opened a coffee-house in Tower Street, London, where underwriters and shippers dropped in for a chat. A little later, Lloyd moved to the corner of Lombard Street, where his coffee-house business was rapidly subordinated to all sorts of shipping transactions, at which the auction “pulpit” now in the Captain’s Room was used.

1726. Lloyd’s list was issued.

1774. Lloyd’s moved to the Royal Exchange, where it still finds its home.

1850. There were 200 underwriters, now there are more than three times as many.

It has agents in every port, and intelligence stations everywhere. It is, in fact, the centre and soul of the shipping world.

257. EXAMPLE 1.—What is the value of a warehouse which is insured at 1s. 6d. per cent., the owner paying 22s. 6d. per annum premium ?

Owner pays 1·5s. on £100

$$\therefore \text{he pays } 22\text{s. } 5\text{d. on } \frac{100}{1\cdot5} \times 22\cdot5 \\ = \text{£}1500.$$

EXAMPLE 2.—A merchant has goods to the value of £99750, which he insures at the rate of 5s. per cent. What must be paid per annum in order to cover both stock and premium ?

A policy for £100 covers goods valued at £99 15s., and premium, 5s.

“ “ $\frac{£100}{99\cdot75}$ covers goods valued at £1 and the premium.

∴ “ “ $\frac{£100}{99\cdot75} \times 99750$ covers goods valued at £99750 and premium.

∴ value of policy is £100000.

Proof.—Policy is for £100000. Premium on that amount is £250.
∴ value of goods covered = £100000 - £250 = £99750.

EXAMPLES. LXVI.

1. The value of a certain property is £380. What is the premium to insure it against fire at 1s. 6d. per cent. ?

2. A merchant wishes to insure his furniture and effects at his private house against fire and burglary to the extent of £750 fire and £550 burglary. The premiums are 1s. 9d. and 1s. 6d. per cent. respectively. What is the total amount he must pay ?

3. The life insurance premium for a clerk aged 32 is £2 11s. 4d. per cent. What is the annual premium for a policy of £450 (with profits) ?¹

4. A company has 250 branches in the United Kingdom, the average value of which, for fire insurance purposes, is £485. What is the total premium to be paid, reckoning 1s. 9d. per cent. ?

5. A draper pays £28 15s. 9d. per annum in fire insurance premiums. Two-thirds of this amount is payable on his ordinary stock and one-third on a particularly inflammable part (*e.g.* celluloid combs, cotton wool, flannelette, etc.). If his stock is valued at £35700 for insurance purposes, what is the rate per cent. for his ordinary stock and for the inflammable part of it, if the value of the latter is one-seventh of the whole ?

6. A jeweller has a valuable stock which is insured as follows (when placed in a safe at night): Precious stones—premium, £258; value of stock, £34400. Gold articles—premium, £375; value of stock, £60000. Silver articles—rate, 5s. per cent.; value of stock, £1000. Find (1) the total premium paid; (2) the rate per cent. for precious stones and for gold articles.

7. From the following details make out a statement for the total insurance premium due to the Beadle Insurance Corporation from Stoop & Co.:

FIRE.—Value of premises, £1500; rate per cent., 1s. 6d.	
" " goods (A), £13000; " " 2s.	
" " " (B), dangerous, £3000; rate per cent., 3s. 6d.	
BURGLARY.—Value of goods, £8000; rate per cent., 2s.	
INSURANCE OF EMPLOYEES.—Total, £10000; av. rate per cent., 3s.	
" " MACHINERY.—Value, £12500; " " 4s.	
FIDELITY GUARANTEE on £8500; av. rate per cent., 5s. 6d.	

8. If a clerk insures his life for £500 when he is 20 years old,

¹ An insurance company may receive as much as £1,000,000 a year in premium income. It will invest this money and make a considerable profit. If it be a MUTUAL OFFICE, then those who hold "with profit" policies will share this profit between them. If, however, it is a COMPANY OFFICE then the shareholders may take half the profit and what remains will be divided. The bonus is usually declared quinquennially. In one office, at least, it amounted to £2 2s. per cent. per annum.

and pays a premium of £2 17s. 4d. per cent., he will receive, in an office with which we are acquainted, at the age of 55, £974 (at present rates). Does he gain or lose money over the matter, and if so, how much? (Remember, in estimating the position, that we are **excluding** the interest which could be obtained by investing the premiums year by year, and that he had £500 cover, at least, all those 35 years. See Part III. for further information.)

9. A junior clerk comes to me saying that he can insure his life for £250, at the rate of £2 16s. 4d. per cent. with profits, or for £2 4s. 6d. per cent. without profits, the insurance being an endowment insurance payable in 35 years. The profits will amount to £200. In which of the two ways shall I advise him to insure, and how much will he benefit by following my advice?

10. The captain of a liner insures his life for £1500, and pays at the rate of £4 9s. 1d. per cent. for an endowment insurance payable in 25 years (his age is 40 years). He is drowned after he has paid 18 premiums. What does the company lose if the bonuses in the 18 years amount to £550?

11. Three merchants consign goods to the value of £825 from Leeds to Suez, and effect an insurance for £960 upon the same. On delivery they receive a (code) cablegram saying that $\frac{7}{15}$ of the goods have been spoiled. The value sent by each of them was $\frac{2}{5}$ by the first, $\frac{4}{15}$ by the second, and the residue by the third. If the rate of insurance was £2 5s. per cent., find how much each merchant should pay for the insurance, and how much each should receive in compensation for damage, which is to be taken in proportion to the value consigned by each.

12. How much did the first merchant of the last question gain or lose by the device of over-insuring his goods?

13. What would it cost a West End firm to insure its Paris "magazin" for 15500 francs at 3 francs per cent.?

14. A firm of cotton manufacturers in Manchester happens to have a clerk who has taken the trouble to learn Russian, and they send him as their manager of a new branch at Moscow. What premium must he pay to insure the offices there for 3580 roubles at 1.25 rouble per cent.?

15. It is possible to insure a consignment of cloth valued at £3685 from Southampton to Cape Town for £4 12s. 1d. Determine the rate per cent., to the nearest penny.

16. A quantity of goods is worth £8560, and the insurance-premium upon it is 5s. per cent. For how much must an insurance policy be taken out to cover both goods and premium?

17. What will it cost in English money to insure my wine vaults in Italy for 6200 lire at 3 lire per cent.?

18. A cargo of cotton goods (valued at £9560) is consigned from Manchester to Bermuda (where the value of the importation of these goods was in 1913-14 greater than that of any other goods imported), and it is insured against all risks with the British Government at £4 4s. per cent. Calculate, for the consignee, the amount of a policy to cover the value of the goods and the premium.

19. A merchant has coffee to the value of £1850 in store. What must he pay to insure his stock and the premium at the rate of 2s. 9d. per cent. ?

B. (6) Bankruptcy

258. In the course of your business career you may find, particularly at certain periods of the year, that the profits are not as high as at others, or, indeed, that the business is being conducted at a loss. If this continues for any length of time it may become serious, and you may find it impossible to pay your way. One of the most frequent causes of this state of affairs is injudicious, or perhaps unfortunate, buying.¹

For example, suppose the dried fruit market is slowly rising and you buy in rather largely, and immediately afterwards a slump occurs. You are compelled to sell at the current price, and so lose, it may be very heavily.

259. Sometimes it is impossible to recover from the loss sustained, and you may then fail to meet your just debts. If this be so, then one of your creditors will send in his account as usual, and if it be not met at one month he may ask for a three-months' bill, and upon your failing to meet that he may obtain judgment against you in a court of law—that is to say, he may have a notice served on you demanding payment within seven days. If you then fail to comply with the order of the Court, you have committed an act of bankruptcy,² and your creditor may call upon you to appear before the registrar of the Court where a Bankruptcy Petition³ has been lodged. (See Bill of Exchange, Plate XIII., p. 468, for "Bill.")

260. On appearing before the Court mentioned, the creditor

¹ See Thomas Hardy, *The Mayor of Casterbridge*.

² Provided the amount due by you is over £50. If, however, you owed £95, and had given the creditor security for £55, he could not proceed against you in this way for the "unsecured" part of the debt, which is only £40. If the "secured" part were £30, then he could get a receiving order on the ground that the "unsecured" part exceeded £50.

³ A bankruptcy petition has to bear a £5 stamp, and £5 must be deposited to cover the preliminary expenses.

will establish the fact that you are his debtor for an unsecured debt exceeding £50, whereupon the registrar, after having heard your views, will issue a Receiving Order¹ and will then become merely a trustee of the debtor's property on behalf of the creditors. The fact that a receiving order has been issued must be advertised in *The London Gazette* and also in a local paper, while the Board of Trade must be notified by the registrar. But the debtor is not yet a bankrupt. Some claims, such as those for rent, rates, taxes, and servants' wages, are called **Preferential Claims**, and must be paid in full, if possible, before any other claims are considered, while the landlord may distrain goods to recover rent due to him.

261. After you have prepared a statement of affairs, the first meeting of creditors is held, at which the possibility of coming to terms is considered, so as to avoid the extreme course of making you a bankrupt. It should be observed that if you could offer the legal minimum of 5s. in the pound the creditors would be wiser to accept it,² generally speaking, than to make you a bankrupt, for the proceedings cost a great deal and the legal expenses incurred constitute a **Preferential Claim**, while, from your standpoint, your credit is saved.

If, however, the case is pursued to the end and you are "adjudicated" a bankrupt, it is a criminal offence for you to obtain credit for over £20 unless you declare that you are an undischarged bankrupt, and you are prohibited from becoming a Member of Parliament or from taking up any municipal office.

262. EXAMPLE 1.—A debtor pays 6s. 8d. in the pound; what does a creditor receive for a debt of £3000 ?

On £1 the debtor pays 6s. 8d. ; ∴ on £3000 he pays £1000. So the creditor receives £1000 and loses £2000.

¹ The Receiving Order usually reads as follows (where John Wilson is your creditor, and you, Henry Jones, are the debtor) :

"On the petition of John Wilson, a creditor, filed the 10th day of March, and on reading the affidavit * of John Wilson and it appearing to the Court that the following act of bankruptcy has been committed, namely, that John Wilson having obtained final judgment against Henry Jones for £140 and costs on 8th February, and a bankruptcy notice having been duly served on him requiring him to pay the same, the said Henry Jones having failed to do so, a receiving order is hereby made against Henry Jones, and the Official Receiver is hereby constituted receiver of the estate."

² The creditors might refuse to agree to any arrangement if they felt it to be imperative that you should be made a bankrupt to prevent your trading any more in your own name. For example, if you had borrowed money from a money-lender and had not paid him, he would almost certainly make you a bankrupt ; or, if you had behaved discredibly, the same course might be followed by creditors in general.

* The affidavit is called "Proof of Debt" and requires 1s. stamp for debts over £2.

EXAMPLE 2.—A bankrupt's assets are £5000, and he can pay 12s. 6d. in the pound; what are his liabilities?

He pays 12s. 6d. on £1;

$$\therefore \text{ „ } \quad \text{£5000 on } \frac{\text{£5000} \times 20}{12 \cdot 5} = \text{£8000};$$

\therefore his liabilities are £8000.

EXAMPLES. LXVII.

1. If a bankrupt pays 3s. 6d. in the pound on a debt of £356, how much does the creditor actually receive?

2. If the assets of a bankrupt are £786 12s., and his liabilities £1368, what dividend can he pay?

3. What are a bankrupt's assets if he can pay 5s. 9d. in the pound on liabilities amounting to £1200?

4. If a bankrupt's assets amount to £538 15s., and he pays a dividend of 7s. 6d. in the pound, what are his liabilities?

5. What dividend can assets amounting to £5111 19s. 7d. pay on liabilities amounting to £8354 10s.?

6. One of my customers who owes me £358 10s. becomes a bankrupt, and pays 15s. 6d. in the pound. How much do I lose?

7. A bankrupt has four creditors to whom he owes respectively £300, £450, £560, and £80. If he pays $12\frac{1}{2}$ per cent. dividend, find how much he pays in the pound, and how much each of the creditors actually receives.

8. If a creditor receive from a bankrupt £269 7s. 6d. on a debt of £718 6s. 8d., what dividend does he pay?

9. A bankrupt's assets are £6375, what are his liabilities if he pays a dividend of 12s. 9d. in the pound?

10. How much would one of the creditors of the bankrupt of the last question receive on a debt of £350 10s.?

11. A bankrupt has four creditors, to the first three of whom he owes 3000 francs, 10000 francs, and 15500 francs. If his total liabilities are a quarter of a million francs and his assets 100000 francs, what amount of money will be distributed among his creditors other than the three mentioned above, and what dividend does he pay?

12. Three merchants are in partnership and they agree to bear all bad debts in the ratio of 1 : 3 : 5. If a debtor becomes a bankrupt and pays 12s. in the pound on a debt of £1055 5s., find the amount each loses.

13. A bankrupt finds he can pay 3s. 6d. in the pound on debts amounting to £8553 15s. 4d. What are his assets, and what would be the average loss to each of his fifty creditors?

14. The lawyer who conducts the case for a bankrupt charges $2\frac{1}{2}$ per cent. on the total assets, which are £800. What should creditors whose debts amount to £250 and £480 receive if the sum of the debtor's other liabilities amounts to £1610?

15. A bankrupt owes £7202 and he has assets valued at £2060 lls. He owes £80 for rent. What dividend can he pay?

16. A merchant has real property valued at 50000 dollars; goods valued at 125500 dollars; outstanding debts valued at 18500 dollars; and owes rent of 1000 dollars. The lawyer who takes up his case in bankruptcy charges 4500 dollars. If the debts amount to 250000 dollars, what dividend can be paid?

17. A bankrupt's cash in hand and at bank amounts to £350, his other property is valued at £300, and a creditor owes him £26, but is himself able to pay only 7s. 6d. in the pound. Allow legal charges 15 guineas, and find the liabilities if a dividend of 15s. 6d. is paid.

18. What assets will meet a dividend of 16s. 3d. on liabilities amounting to £7324?

19. What assets would be required to pay a dividend of 17s. 6d. on liabilities amounting to £5800, after deducting preferential claims as follows:

Legal expenses, £25; one year's rent, £90; six months' rates at 6s. 8d. in the pound on five-sixths of rental; income-tax, 1s. in the pound on £400; wages due, £80.

20. What dividend can be paid under the following circumstances:

Assets: Eighteen houses valued at £250 each; goods valued at £12500; plant valued at £8360; outstanding debts valued at £1250.

Liabilities: Preferential claims, £850; other claims, £30000.

Of the outstanding debts, one for £300 realises 12s. 6d. in the pound; one for £100, 8s. 4d. in the pound; one for £50, 5s. in the pound; the remainder producing the full amount.

21. A bankrupt's assets were declared to be £1093 10s., but the receiver ruled that an amount of £218 14s. must rank as a preferential claim. If the liabilities were £5832, what difference would the receiver's ruling make to the dividend?

22. Among a bankrupt's assets, which amount to £8500, is a debt for £1500 which is written off entirely as a bad debt, and a dividend of 12s. 8d. is declared. Find what his liabilities amounted to, and then determine by what amount the dividend can be increased if the bad debt referred to realises 18s. in the pound.

23. A bankrupt's liabilities amounted to £104000, and a dividend of 15s. was probable; but the landlord put in a preferential claim for a year's rent, and the dividend was finally declared to be 14s. 4½d. in the pound. What was the rental claimed, and to what did the remaining assets amount?

24. One of the creditors of a bankrupt learns that his liabilities are £58300 and his assets £24977 10s., and that a dividend of 8s. 6d. in the pound will be paid. On working this out he finds that the figures given do not agree with one another, and concludes that preferential claims have been allowed. To what did they amount?

C. Chain Rule

263. The so-called Chain Rule is really nothing more than Proportion disguised; but, since it is useful in exchange problems particularly, we shall deal with it.

The student should work Examples LXVIII. both by Proportion and by Chain Rule.

264. EXAMPLE 1.—If 1 mile = 1·6093 Kilometre, evaluate a yard in metres.

(i) BY PROPORTION—

$$\begin{aligned} 1 \text{ mi.} &= 1\cdot6093 \text{ Km.} \\ \therefore 1760 \text{ yds.} &= 1\cdot6093 \text{ Km.} \\ &= 1\cdot6093 \times 1000 \text{ m.} \\ \therefore 1 \text{ yd.} &= \frac{1\cdot6093 \times 1000}{1760} \text{ m.} \\ &= 0\cdot9144 \text{ m.} \end{aligned}$$

(ii) BY CHAIN RULE—

To work this question by Chain Rule we write it down thus:

$$\begin{aligned} 1760 \text{ yds. (NOT 1 mi.)} &= 1\cdot6093 \text{ Km.} \\ 1 \text{ Km.} &= 1000 \text{ m.} \\ x \text{ m.} &= 1 \text{ yd.} \end{aligned}$$

Where x is the number of metres in 1 yd.

Now, the value of x is, from part (i)—

$$\frac{1\cdot6093 \times 1000 \times 1}{1760 \times 1}$$

or, $x = \frac{\text{numbers on the side without the } x \text{ multiplied together}}{\text{numbers on the side with the } x \text{ multiplied together}}$,

and each number constitutes one link in the chain, while one link

is unknown. Hence we have the following (neglecting the numbers):

$$\begin{array}{l} \boxed{A \text{ yds.}} = \boxed{B \text{ Kms.}} \\ \boxed{C \text{ Kms.}} = \boxed{D \text{ ms.}} \\ \boxed{E \text{ ms.}} = \boxed{F \text{ yds.}} \end{array}$$

Where we pass from yards to Kilometres and then from Kilometres to metres, and from metres back to yards; and

$$E = \frac{B \times D \times F}{A \times C}$$

It is possible to show that the chain is right thus:

$$\text{ms.} = \frac{\cancel{\text{Kms.}} \times \cancel{\text{ms.}} \times \text{yds.}}{\cancel{\text{Kms.}} \times \cancel{\text{yds.}}}$$

and since, on the right, Kilometres and yards cancel, and we have metres = metres.

If we had found that

$$\text{ms.} = \frac{\cancel{\text{Kms.}} \times \cancel{\text{ms.}} \times \text{yds.}}{\cancel{\text{Kms.}} \times \cancel{\text{ms.}}}$$

then Kilometres and metres would cancel on the right, and leave metres equal to yards, which is impossible, and would show the chain to be wrong.

265. EXAMPLE 2.—If 1 gm. = 15·43235 grs., evaluate a Kilogram in pounds.

$$\begin{array}{l} \boxed{1 \text{ gm.}} = \boxed{15\cdot43235 \text{ grs.}} \\ \boxed{7000 \text{ grs.}} = \boxed{1 \text{ lb.}} \\ \boxed{x \text{ lb.}} = \boxed{1000 \text{ gms.}} \text{ (NOT 1 Kgm.)} \end{array}$$

$$\begin{aligned} \therefore x &= \frac{15\cdot43235 \text{ grs.} \times 1 \text{ lb.} \times 1000 \text{ gms.}}{7000 \text{ grs.} \times 1 \text{ gm.}} \\ &= 2\cdot2046 \text{ lb.} \end{aligned}$$

$$\therefore 2\cdot2 \text{ lb.} = 1000 \text{ gms.} = 1 \text{ Kgm.}$$

EXAMPLES. LXVIII.

1. What is the constant for converting English tons to metric tons, if 1 Kgm. = 2·2046213 lb. ?

2. Find, from the value of the Kilogram given in Question 1, the constant for converting grams to grains.

3. Express 250 English tons in metric tons, and 5 Kgm. in grains.

4. If 1 lb. Av. = 0·45359265 Kgm., find the constant for converting metric tons to English tons. Make out a nine-multiple table for this conversion, and thence express 15·86 metric tons and 3586 Kgm. in English tons.

5. Use the results of Question 4 to find how many Kilograms make 1 stone.

6. Using the result of Question 1, reduce 10 tons 2 cwt. 1 qr. to Kilograms.

7. If 1 foot = 3·047945 dm., show that 1 cubic foot contains 28·3 c.dm. nearly.

8. If 1 pint = 0·567932 litre, and 1 cubic foot = 6·231 gallons, show that 1 cubic foot contains 28·3 litres.

9. If 1 ounce Tr. = 3·11035 Dgm., and 1 lb. Av. = $14\frac{7}{12}$ oz. Tr., express 1 oz. Av. in grams and 10 lb. (Av.) in Kilograms.

10. If 1 gram = 15·43235 grains, and 7000 grains = 1 lb. Av., find the weight of 1 stone Av. and $3\frac{1}{2}$ stone of dead meat in Kilograms.

11. If £1 = 25·22 francs or 20·43 marks, express 1 franc in marks, and thence prepare a nine-multiple table for converting francs to marks, and determine the value of 5863 francs.

12. If 1 cubic foot = 28·32 c.dm., calculate approximately the constant multiplier for converting quarts to litres, and thence express 80 pecks in litres and 350 bushels in Hectolitres.

13. What is the constant multiplier for converting litres to quarts? Express 5 l. 6 dl. in pints.

(Questions 14 to 16 are obviously proportion sums, but they can be worked by the Chain Rule.)

14. Three salesmen, R, S, T, take money as follows: R takes £50 while S takes £45, and S takes £25 while T takes £100. How much will R take when T takes £150?

15. A milkman employs four men on particular rounds—the first sells 40 gallons and the second 28; the third sells 50 while the second sells 30; and the fourth sells 60 while the third sells 80. What does the first sell when the fourth sells 100 gallons?

16. Three plasterers are employed on a particular job; the

first can do in 8 hours what the second can do in 5 hours, and the third can do in 10 hours what the second can do in 15 hours. How long does the third need to do what the first can do in 16 hours?

17. If a United States dollar is worth 4s. 1·32d., and 1 franc 9·513d., calculate the amount that must be paid in Paris to settle an account for 562 dollars 85 cents.

18. A gold Krone (Denmark) is worth 1s. 1·5d., a rupee is worth 1s. 4d., and a Canadian dollar 4s. 1·33d. Settle the following accounts: 150 Kroner in rupees, 1000 rupees in dollars, 500 dollars in Kroner.

SECTION XVIII

PERCENTAGES, COMMISSION AND BROKERAGE,
PROFIT AND LOSS

A. Percentages

266. The real meaning of the word per cent. (L., *centum*) is per hundred, and we use 100 because of its great convenience in making comparisons. The following examples will illustrate the application of percentages:

EXAMPLE 1.—What is 15 % of £150?

$$\begin{aligned} 15 \% \text{ means } 15 \text{ per cent. or } \frac{15}{100} \\ \therefore 15 \% \text{ of } \pounds 150 = \frac{15}{100} \text{ of } 150 \\ = \pounds 22 \text{ } 10\text{s.} \end{aligned}$$

EXAMPLE 2.—A grocer buys rice which costs him £200. A quarter of it is spoiled by rats. What percentage does he lose?

$$\begin{aligned} \frac{1}{4} \text{ of the rice is obviously } \frac{25}{100} \\ \therefore \frac{1}{4} = 25 \% \end{aligned}$$

267. EXAMPLE 1.—The population of New Zealand increased from 3,425,160 in 1912 to 3,448,190 in 1913. Calculate the increase per cent. to two places.

$$\begin{aligned} \text{The populations were } \approx 3,425,000 \text{ and } 3,448,000. \\ \therefore \text{ the increase was } \approx 23000 \text{ on } 3,425,000 \\ \text{i.e. } 1 \text{ on } 150 \\ \text{or } \frac{2}{3} = 0\cdot66 \text{ on } 100. \end{aligned}$$

Increase on 3,425,160 was 23030

$$\begin{aligned} \therefore \text{ percentage increase was } \frac{23030 \times 100}{3,425,160} \\ = 0\cdot67, \text{ to two places.} \end{aligned}$$

EXAMPLE 2.—If $28\frac{1}{2}\%$ of a merchant's annual income is £171, what is his average monthly salary?

£28·5 is $28\frac{1}{2}\%$ of £100

$$\text{£1} \quad \text{,,} \quad \text{,,} \quad \text{£} \frac{100}{28\cdot5}$$

$$\therefore \text{£171} \quad \text{,,} \quad \text{,,} \quad \text{£} \frac{100 \times 171}{28\cdot5}$$

$$= \text{£600}$$

\therefore average monthly salary = £50.

EXAMPLE 3.—A motor costs £564 new, and is worth £376 at the end of the first year. What is the percentage depreciation?

Original value, £564.

Value at end of one year, £376.

The depreciation on £564 is £188

$$\therefore \quad \text{,,} \quad \text{,,} \quad \text{on £100 is } \text{£} \frac{188 \times 100}{564}$$

$$= \text{£33 } 6\text{s. } 8\text{d.}$$

\therefore the depreciation is $33\frac{1}{3}\%$.

EXAMPLE 4.—The mean maximum temperature for February is 42° and the minimum $35\cdot6^\circ$, and the corresponding figures for March are 52° and $38\cdot3^\circ$. By how much per cent. does the maximum exceed the minimum in the two cases, and by how much per cent. is the mean temperature for March above or below that of February?

February, max., 42° ; min., $35\cdot6^\circ$; diff. = $6\cdot4^\circ$

\therefore with min. $35\cdot6^\circ$, max. is $6\cdot4^\circ$ higher,

$$\text{or } \frac{64}{356} \times 100$$

$$= 17\cdot97\%$$

March in the same way gives $\frac{13\cdot7}{38\cdot3} \times 100$

$$= 35\cdot77\%$$

Mean temperature for February = $\frac{42 + 35\cdot6}{2} = 38\cdot8^\circ$

„ „ March = $\frac{52 + 38\cdot3}{2} = 45\cdot15^\circ$

\therefore „ „ March exceeds that for February by $6\cdot35^\circ$

∴ mean March temperature is higher than that of February

$$\begin{aligned} &\text{by } \frac{6.35}{38.8} \times 100 \\ &= 16.36 \%. \end{aligned}$$

EXAMPLE 5.—The population of the town increases by 3 % in one year, and that of another decreases by 1 % in the same time; also the population of the former was 100000, and that of the second 18 % more than this number. Calculate the difference in the populations at the end of the year.

$$\begin{aligned} \text{Original population, town (1)} &= 100000 \\ \text{'' '' (2)} &= \frac{118}{100} \text{ of } 100000 \\ &= 118000 \end{aligned}$$

$$\text{Increase in 1 year on (1)} = 3000$$

$$\text{Decrease in 1 '' (2)} = 1180$$

$$\therefore \text{Population at end of year for (1)} = 103000$$

$$\text{'' '' (2)} = 116820$$

$$\therefore \text{difference of population at end of year} = 13820.$$

EXAMPLE 6.—A piece of gold wire is drawn so that its diameter is 0.05 cm., and its length 15 cm., instead of being drawn 0.06 cm. in diameter and 20 cm. long as ordered. What percentage error is there in the volume of gold, to one place of decimals?

The student should note the method adopted here.

$$\begin{aligned} \text{Volume ordered} &= \pi \times (0.03)^2 \times 20 \text{ c.c.} \\ &= \pi \times 0.018 \text{ c.c.} \end{aligned}$$

$$\begin{aligned} \text{Volume received} &= \pi \times (0.025)^2 \times 15 \\ &= \pi \times 0.009375 \text{ c.c.} \end{aligned}$$

$$\begin{aligned} \text{Volume is too small by} &= \pi(0.018 - 0.009375) \\ &= \pi(0.008625) \end{aligned}$$

$$\begin{aligned} \text{Percentage error on volume ordered} &= \frac{\pi(0.008625)}{\pi(0.018)} \times 100 \\ &= \frac{0.8625}{0.018} \\ &= 47.9 \%. \end{aligned}$$

268. The student should observe that percentages may or may not involve time.

Simple and Compound Interest, the Discounting of Bills, etc., will be dependent on time, but Brokerage, Cash Discount, Rates, Taxes, Premiums, and the like, are largely independent of it, and yet the last three may be called periodic.

It is convenient to remember, for business purposes, that—

- $5\% = 1\text{s. in the pound, for } \frac{5}{100} \text{ of } \pounds 1 = 1\text{s. ;}$
 $2\frac{1}{2}\% = 6\text{d. in the pound ;}$
 and that $12\frac{1}{2}\% = 2\text{s. 6d. in the pound.}$

EXAMPLES. LXIX.

1. Express the following rates per cent. in fractional form :

- | | | | |
|------------------------|------------------------|----------|------------------------|
| (1) 25. | (2) 5. | (3) 10. | (4) 50. |
| (5) 20. | (6) 65. | (7) 72. | (8) 88. |
| (9) 43. | (10) $2\frac{1}{2}$. | (11) 3. | (12) $3\frac{1}{2}$. |
| (13) $4\frac{1}{2}$. | (14) $12\frac{1}{2}$. | (15) 16. | (16) $23\frac{1}{2}$. |
| (17) $33\frac{1}{3}$. | (18) 45. | (19) 28. | (20) $18\frac{1}{2}$. |

2. Reduce the following to percentages, to two places of decimals :

- | | | | |
|------------------------|------------------------|-----------------------|-------------------------|
| (1) $\frac{1}{5}$. | (2) $\frac{1}{2}$. | (3) $\frac{1}{4}$. | (4) $\frac{1}{8}$. |
| (5) $\frac{1}{10}$. | (6) $\frac{1}{20}$. | (7) $\frac{1}{25}$. | (8) $\frac{3}{5}$. |
| (9) $\frac{5}{8}$. | (10) $\frac{4}{9}$. | (11) $\frac{1}{8}$. | (12) $\frac{1}{3}$. |
| (13) $\frac{2}{25}$. | (14) $\frac{18}{25}$. | (15) $\frac{2}{3}$. | (16) $\frac{1}{11}$. |
| (17) $\frac{3}{200}$. | (18) $\frac{4}{75}$. | (19) $\frac{9}{80}$. | (20) $\frac{1}{1000}$. |

3. Write down the value of :

- (1) 5% of $\pounds 250$; of $\pounds 300$; of $\pounds 550$; of $\pounds 760$.
- (2) $2\frac{1}{2}\%$ of 10s. ; of 15s. ; of 80s. ; of $\pounds 5$.
- (3) 10% of $\pounds 450$; of $\pounds 800$ 10s. ; of $\pounds 775$.
- (4) $12\frac{1}{2}\%$ of $\pounds 8$ 8s. ; of $\pounds 9600$; of $\pounds 92$ 8s.
- (5) $8\frac{1}{2}\%$ of 12s. ; of 12 guineas ; of $\pounds 3$ 12s.

4. What is 5% of $\pounds 150$; $16\frac{2}{3}\%$ of 5 miles ; $7\frac{1}{4}\%$ of 180 acres ; $5\frac{1}{2}\%$ of 40 gallons ?

5. What is $6\frac{1}{4}\%$ of 1050 francs ; $3\frac{1}{2}\%$ of yen 1575 ; $3\frac{1}{2}\%$ of 350 dollars + $8\frac{1}{2}\%$ of 50 cents ; $12\frac{1}{2}\%$ of 786 metres ; $10\frac{1}{2}\%$ of 388 litres ?

6. What is $7\frac{1}{2}\%$ of 1 mile ; 8% of 150 cm. ; $12\frac{1}{2}\%$ of 10 sq. chs. ; 5% of 3 Hectares in ares ; 15% of 58 lire ; 20% of 25 tons 3 cwt. ?

7. If a man drinks one-eighth whisky and seven-eighths water, what percentage of his restorative draught is whisky ?

8. Show that $8\frac{1}{4}\%$ of $\pounds 8$ is the same as $4\frac{1}{8}\%$ of $\pounds 16$.

9. Of what amount is $5\frac{1}{2}\%$ the same as $10\frac{1}{2}\%$ of $\pounds 1100$?

10. What fraction of an acre is 0.01% of a square mile ?

11. What is 15% of 8 tons 3 cwt. 2 qrs. ?

12. $\pounds 31$ 5s. is $2\frac{1}{2}\%$ of a certain sum, what is that sum, to the nearest pound ?

13. Of what area is 10 acres $12\frac{1}{2}\%$?

14. If 15% of a clerk's salary is £45, what is that salary?

The list prices of a number of articles are given in Questions 15 to 24. Allow the percentage discount marked from each of them:

15. An occasional table, £3 10s.; 5% .

16. A bag of cocoa, £2 16s.; $2\frac{1}{2}\%$.

17. A bag of walnuts, £3 15s.; $7\frac{1}{2}\%$.

18. A fur coat, £8 8s.; $3\frac{1}{2}\%$.

19. Black wolf stole, £6 6s.; 10% .

20. Pearl necklace, 100 guineas; 15% .

21. Linen hamper, 28s. 6d.; 3% .

22. Field service greatcoat, £3 10s.; 5% .

23. Straw "boater," 4s. 6d.; $2\frac{1}{2}\%$.

24. Soft felt hat, 8s. 6d.; $4\frac{1}{2}\%$.

25. 35% of the area of a piece of land is 5 ac. 2 rds. 20 sq. po. Find the area of the land.

26. What is 28% of a piece of gold weighing 540.864 grams?

27. What percentage is 1 sq. in. of 1 sq. ft.?

28. Express the volume of a box 5 in. by 8 in. by 10 in. as a percentage of the volume of one 8 in. by 9 in. by 10 in.

29. What percentage is 1d. of £1?

30. £5 can be borrowed and repaid at the rate of 2s. 4d. a week for 52 weeks. What percentage is the amount paid for the loan of the amount borrowed?

31. A railway company has 8000 Km. of line open and it opens 85 Km. more. By how much per cent. has the length of line open been increased?

32. 5 tons is $3\frac{1}{2}\%$ of the load a crane will lift. What is the load?

33. The value of money orders issued in India in 1911-12 was £32,475,933, and in 1912-13, £34,854,327. Calculate the increase per cent. in value.

34. The United Kingdom exported goods to the value of £67,622,616, and France to the value of £1,452,674, to India in 1913. What percentage is the value of goods exported from France of that exported from the United Kingdom?

35. The value of the silk imported¹ into Russia through the European frontier increased from 2,211,000 roubles to 2,473,000 roubles for the first half of the years 1912 and 1913. Calculate the percentage increase in value.

¹ 2700 poods in both years.

36. During one year the Bank rate¹ was 4 %, 3½ %, 3 %, 4 %, on four different dates. Find the percentage fall or rise, in each of the three intervals, on the rate at the beginning of that interval, and determine the greatest percentage variation.

37. A piece of "Crown" size printing paper is 20 × 15 in., and a piece of "Royal," 25 × 20 in. What must be the width of a piece of paper 40 in. long so that its area may be as much per cent. greater than the "Royal" as the "Royal" is greater than the "Crown"?

38. If one is 10 ft. above the ground in a large open expanse of country he can see 4 miles; if he is 20 ft. he can see 5¼ miles. Find how far he can see when 35 ft. above the ground, if the radius of vision is as much per cent. above 5¼ miles as 5¼ is above 4 miles.

39. Last year 23655 tons of copper were produced in Queensland, and the year before 23120 tons. Calculate the percentage increase from one year to the next.

40. In the same Colony (Question 39) for the same years 626 tons and 359 tons of wolfram² were produced. Calculate the percentage decrease in the year.

41. In the year 1914 the coal production of the Donetz Basin (Russia) was 1,399,670,000 poods, and in 1913, 1,252,310,000 poods. Calculate the percentage increase in production from 1913 to 1914.

42. In January 1915, 2576 tons of rubber were produced in the Straits Settlements, and this weight was 118·12 % MORE THAN (not OF) the weight produced in January 1914. Calculate the latter weight.

43. The duty on spirits imported into Nigeria has been raised recently from 6s. 3d. to 7s. 6d. per imperial gallon. Calculate the percentage increase in the duty.

44. Last year the production of flax in Russia was 11½ poods per dessiatine (2·7 acres), and in the previous year it was 160·87 % of this weight per dessiatine. What was the production in that year?

45. The price of British wheat in the week ending 27th November was 54s. 2d., and for the corresponding week last year 41s. 11d. per bushel. Calculate the average monthly percentage change in price for the year given.

46. A particular kind of perfumery imported into the United

¹ See Part III.

² Wolfram is the heavy ore from which the metal tungsten is obtained. The latter is used, in one form, for fireproofing fabrics, as a dye and as a pigment, while the metal is used to harden steel.

States has to pay $48\frac{1}{2}$ % duty. An importer pays 500 dollars duty. What was the value of the importation?

47. The population of England and Wales was as follows :

(FROM *WHITAKER'S ALMANACK.*)

Year.	Population.
1811 . . .	10164256
1821 . . .	12000236
1901 . . .	32527843
1911 . . .	36070492

Calculate the increase per cent. in each decade, and draw some conclusions from Questions 47 to 50 and from their results.

48. The population of Scotland was 1,805,864 in 1811 and 4,760,904 in 1911. Calculate the average percentage increase per annum in the period given.

49. If the population of Ireland was 4,704,750 in 1891, 4,458,755 in 1901, and 4,390,219 in 1911, calculate the decrease per cent. in each decade, and state whether there is any indication that the decrease is becoming more or less marked.

50. From the following data find the difference between the percentage decennial increase in the population of England and Wales for the periods 1891-1901 and 1901-1911, tabulating the results :

Year.	Population of England and Wales.		
	Total.	Decennial Increase.	Percentage.
1891 . . .	29002525		
1901 . . .	32527853		
1911 . . .	36075269		

B. Commission and Brokerage

I. COMMISSION

269. Jacobs & Sons of Leeds (say) are large machinery manufacturers, and they wish to extend their business by opening up a market in South America. They therefore advertise for a man who has a practical knowledge of the trade and who can

speak Portuguese, and they tell him what they want and propose that they shall pay him just a nominal salary to cover his expenses perhaps, and then, let us say, 15 % on the value of all the machinery he sells for them. On accepting the post he becomes one of Messrs. Jacobs & Sons' travellers, and the amount he receives on his sales is called his **Commission**, and he himself might therefore be called a Traveller on Commission.

He then sets out for South America, furnished with catalogues and, if necessary, samples of steel, and sets about his business. If he sells £5000 worth of machinery he will get $\frac{15}{100}$ of £5000, or £750 commission.

270. Again, if we take an insurance company, the same thing happens, only it may have, and frequently does have, a representative in every town of any size, and it is the business of this **Agent**, as he is called, to get in touch with people and endeavour to get them to insure their houses, or furniture, or lives. Now suppose he gets a client to insure his house for £1000 and the premium is 24s., he will receive 15 % commission on the 24s., and if he induced his client to insure his life for £1000 he would get $2\frac{1}{2}$ % commission on the £1000 and then $2\frac{1}{2}$ % on every premium paid afterwards.

II. BROKERAGE

271. Mr. Whitefoot has received a large consignment of fruit from the West Indies, and he knows that he cannot transfer it to his stores and sell it quickly enough to prevent considerable loss through its becoming overripe. He therefore rings up Brown & Sons, who, he knows, undertake the sale of such cargoes, and instructs them to sell for him immediately, agreeing to pay them perhaps 5 % on the amount for which they sell the cargo. Brown & Sons are called **Brokers**, and the percentage they are paid is called **Brokerage**. The difference between a commission agent and a broker is simply this, that the former sells goods, samples of which he often carries with him, while the latter need not even see the things he is going to sell, and may dispose of them 20 miles or 2000 miles from where they are, but the purchaser will, of course, see what he is buying beforehand.

Huge sales of property, for example, are held at Tokenhouse Yard, London, although the *property* may be anywhere.

Two of the chief classes of brokers are Stock Brokers and Bill Brokers, who are **intermediaries** between the buyer and seller, and who meet at the Stock Exchange and the Royal Exchange

respectively. The Ship Brokers also meet at the latter place, while Corn Brokers assemble in Mark Lane, and Brokers, who deal with Eastern and Colonial products, in Mincing Lane. There are also Corn, Coal, and other Exchanges in most of our large towns.

272. A broker usually charges $\frac{1}{8}\%$, and this constitutes his source of income. Not infrequently he charges both buyer and seller, and so gets $\frac{1}{4}\%$ on the deal.

It is necessary to distinguish between the two methods of paying brokerage or commission. We may say that we will pay 5s. $\%$, or 5%. The former means 5 shillings on every £100, the latter £5 on every £100.

273. We now illustrate these points:

EXAMPLE 1.—If an agent is paid 10% on sales, what should he receive if he sells £25000 worth of goods?

$$\begin{aligned}\text{Commission} &= 10\% \text{ of } \pounds 25000 \\ &= \pounds 2500.\end{aligned}$$

EXAMPLE 2.—A commission agent is paid $2\frac{1}{2}\%$ on sales, and makes £300 a year. To what do his sales amount?

$$\begin{aligned}\text{He gets } \pounds 2\frac{1}{2} \text{ on } \pounds 100 \\ \text{'' '' } \pounds 1 \text{ '' } \pounds \frac{100}{2\frac{1}{2}} \\ \text{'' '' } \pounds 300 \text{ '' } \pounds \frac{100}{2\frac{1}{2}} \times 300 \\ &= \pounds 12000.\end{aligned}$$

EXAMPLE 3.—A broker sold a cargo for 2s. 6d. $\%$, and handed over £799 to the merchant. What was the value of the cargo, and what did the broker make?

With actual S.P., *i.e.* selling price, £100 the amount handed over would be £99 17s. 6d.;

\therefore the actual S.P., when £799 is handed over, is $\frac{799 \times 100}{99 \cdot 875}$
= £800; and the broker gets £1.

EXAMPLES. LXX.

1. An agent is paid $2\frac{1}{2}\%$ on his sales, which amount to £1000 per annum. What is his income?

2. A traveller's income is £500, and it is $8\frac{1}{2}\%$ of the value of the goods sold by him. What is that value?

3. If a commercial traveller sells 3586 francs' worth of silk

goods for his firm at Lyons, and receives 305 francs commission, at what rate per cent. is he paid, to one decimal place?

4. What should an agent receive in commission at the rate of 15 %, if his sales amount to 59863 dollars?

5. A commercial traveller receives $3\frac{1}{2}$ % on the value of the goods he sells, and his income is 75000 francs a year. What is the value of the goods sold?

6. An insurance company pays its agents $2\frac{1}{2}$ % on the value of the policies they secure. If an agent gets insurances to the value of £350, £760, £1050, and £800 in one year, what amount does he receive in commission?

7. If a broker is paid $\frac{1}{10}$ % on the value of the business done for his client, what should he get on 85640 marks?

8. A stock broker¹ charges 2s. 6d. % on the value of the stock sold by him. What amount must he sell to give him an income of £300 per annum?

9. An estate agent lets a flat for seven years at a rental of £58 10s. a year. He receives 5 % on the first year's rent and $2\frac{1}{2}$ % on that of each subsequent year for the term mentioned. What amount does he receive for his services?

10. A merchant purchases 36 small houses which are let at a weekly rent of 15s. 9d. each. An agent looks after the property, collects the rent for the owner, and receives $7\frac{1}{2}$ % on the gross annual income. Find the amount the agent receives per annum, presuming all the houses are occupied during the whole year.

11. If in the last question an average of 2 % of the houses were unoccupied during the whole year, find what the income would be both of the landlord and of the agent.

12. The agent for an insurance company does the following business in a year: (1) new life policies, £10000; (2) renewal premiums, £738 10s.; (3) fire insurance premiums, £300 15s. Calculate his commission at $2\frac{1}{2}$ % on (1) and (2), and 15 % on (3).

13. A firm paid £31919 as commission to its agents, at the rate of 4 %. What value of goods was sold?

14. A company pays its agent $5\frac{1}{2}$ %, and his account amounts to £268814 in a year. Upon what sum was this commission paid?

15. A firm pays brokerage on £5194 at the rate of 1s. 6d. %. What amount is paid in brokerage?

C. Profit and Loss

274. Wills & Wills are cloth workers who, having conducted their business with care, find at the close of the year, when all

¹ See page 483,

their expenses are paid, bad debts allowed for, and a certain amount set aside to allow for depreciation of goods, machinery, etc., that they have £3000 more than they had last year. They have made then £3000 Profit. If trade had been bad, or they had been careless, they might have been £500 worse off than they were last year, in which case there would have been a Loss of £500.

275. Suppose now that the merchants referred to spent £10000 this year and made £3000 profit, and £18000 last year and made £3600 profit, they would of course wish to compare the results in order to see whether the profit made on the amount spent was improving or not. To do this they would reckon the profit made in each year on £100, simply because that sum is convenient to work with.

Now, £3000 profit on £10000 spent is $\£ \frac{300}{10000} \times 100$ on £100 spent.

∴ the profit per cent. is £30 this year.

Also the profit per cent. last year was $\£ \frac{3600}{18000} \times 100$, or £20.

It is now easy to see that the profit has increased from £20 % last year to £30 % this year, a fact which would have been very much more difficult to see if we had not reduced the profits to a percentage.

Few things are more helpful than to observe the percentage profits over a number of years and construct a graph for the same (see Part III.).

276. In many trades the profit is calculated on the cost price, but in some, such as the tea trade, it is usual to calculate the profit on the **selling price**, not on the buying price, for this reason: taking the retail tea trade year in and year out, the retail price is kept fairly constant, 1s. 4d., 1s. 6d., 1s. 8d., etc., per lb.; but the wholesale price varies, and consequently the tea is blended so that when sold for, say, 2s. per lb. it will yield a profit of 15 % or 17½ %, as the case may be.

In America, too, the profit is reckoned on the selling price (S.P.), and there are very good reasons for doing this, for when once an article has been listed, say, at £10, its **selling price** then becomes well known, and discounts, commissions, etc., are usually allowed upon that price, while the cost price (C.P.) can only be known by referring to the Purchases Book (§ 171). Again, if a merchant sells to make 10 % on the *cost price*

and then subsequently deducts 10 % from the *selling price*, he loses money (see Example 3, § 277).

We shall always reckon profit on the C.P., unless otherwise stated.

277. EXAMPLE 1.—I buy a quantity of coal for £50 and sell it for £70; what is my profit per cent. ?

Coal is bought for £50 and sold for £70

∴ profit on £50 is £20

and " £100 is £40

∴ profit is 40 %.

EXAMPLE 2.—A gentlemen's outfitter marks pyjamas at 23s. a suit and makes 15 % on what he pays. Find the wholesale price per dozen suits.

We want the **BUYING** price, so we write—

He sells for £115 what he **BUYS** for £100

∴ " " 23s. " " $\frac{100}{115} \times 23s.$

∴ buying price = 20s. each, or 240s. per dozen.

EXAMPLE 3.—A merchant buys a canteen of cutlery for £20 and lists it for sale at an increase of 20 % on that price. He subsequently has it marked at 20 % below the selling price to clear. What is his profit or loss ?

(1) If he buys it for £100 he lists it at £120

∴ " " £20 " " $£20 \times \frac{120}{100} = £24.$

(2) If he lists it for £100 and reduces it to £80 to clear

∴ " " £24 " " $£24 \times \frac{80}{100} = £19 \text{ 4s.}$

∴ he buys it for £20 and sells it for £19 4s., and so loses 16s.

EXAMPLE 4.—Mark biscuits which cost 3s. per 5-lb. tin to gain 20 % in selling, and find the profit per pound.

We want selling price.

Biscuits bought for 100s. are sold for 120s.

∴ " " 3s. " " $\frac{120}{100} \times 3s. = 3.6s.$

∴ selling price is 3s. 7d. per 5-lb. tin.

C.P. of 5 lb. = 3s.

S.P. of 5 lb. = 3.6s.

∴ profit on 5 lb. = 0.6s. = 7.2d.

∴ profit per lb. = $\frac{7.2}{5} = 1.44d.$

= 1½d. nearly.

EXAMPLE 5.—A merchant made a certain profit last year

and finds that this year's profit is 10 % less than last year's. Find what loss he has sustained if the profit this year is £350.

We want LAST YEAR'S profit.

A profit of £90 this year means a profit £100 LAST YEAR

„ „ £1 „ „ „ £¹⁰⁰/₉₀ „

„ „ £350 „ „ „ £¹⁰/₉ × 350
= £388 17s. 9d.

∴ last year's profit was £388 17s. 9d.

∴ the loss is £38 17s. 9d.

EXAMPLES. LXXI.

Calculate the percentage gain or loss on the SELLING PRICE in each of the following transactions (Questions 1 to 10) :

Cost Price.	Selling Price.	Cost Price.	Selling Price.
1. £3 6s. 6d.	£3 10s.	6. £89 5s.	100 guineas.
2. £2 14s. 7d.	£2 16s.	7. £30 4s. 6d.	25 guineas.
3. £3 9s. 4½d.	£3 15s.	8. 4277·8 francs.	5860 francs.
4. £8 2s. 1½d.	£8 8s.	9. 13600 lire.	10000 lire.
5. £5 17s.	£6 10s.	10. 4389·6 dollars.	3720 dollars.

What percentage depreciation has taken place in the following cases (Questions 11 to 20) :

Article.	Cost Price.	Second-hand Selling Price.
11. A motor-cycle .	40 guineas.	£25.
12. A clock .	£5 15s. 6d.	£3 12s. 6d.
13. A garden hose .	£1 2s. 6d.	12s. 9d.
14. A gramophone .	£10 15s.	£5 5s.
15. A warship .	£980000.	£5800.
16. A cargo of timber	£8350.	£7480.
17. 10 tons of iron .	£18 15s.	£15 10s.
18. 50 gallons of oil	£15 12s.	£12 10s.
19. 75 Kgm. of sugar	75 francs.	68 francs.
20. 80 tins of salmon	12 dollars.	10 dollars 25 cents.

21. What would you gain per cent. by buying meat in Smithfield Market for 9s. 6d. a stone and selling it at 1s. 3d. per lb.?

22. A dozen pairs of ladies' hose cost 12s. 8d. ; what must they be sold at per pair to gain 15 % ?

23. If penholders cost half a guinea a gross, what percentage profit is made by selling them at 1d. each?

24. What is the wholesale cost of gentlemen's "boaters" if a S.P. of 4s. 6d. allows for a profit of $12\frac{1}{2}\%$ on the C.P.?

25. A grocer sells £150 worth of sugar at a profit of 5%, £180 worth of dried fruit at $7\frac{1}{2}\%$, and £350 worth of tea and coffee at 8%. What is his total profit, and what is his average profit per £100 received?

26. The profits on a business are 9750 dollars. One partner is to receive 950 dollars and then 10% of the remaining profits, while the other two are to have 40% and 50% respectively. By how much is the greatest amount received more than each of the other two?

27. A gain of 5% is made by selling apples for three a penny. Find the gain or loss per cent. by selling them at twenty-five for 6d.

28. Find the profit made by buying 3 tons 6 cwt. of butter at £5 14s. per cwt., and selling it at 1s. $3\frac{1}{2}$ d. per lb.

29. A merchant finds that his turnover for the year is £56500, and that his profit is 15.55% of that amount. Calculate his net profit if he pays 2s. 6d. in the pound income-tax upon his gross profit.

30. A silversmith has a perforated silver basket for which he has paid £10. If he reckons that 5% of the selling price must be absorbed in expenses, at what figure must he mark the article so as to make a clear profit of 15% on that price?

31. A farmer bought 50 cattle for £850. At what average price per head must he sell them to make a gross profit of $17\frac{1}{2}\%$?

32. Coffee can be bought wholesale at 84s. per cwt., and then has to pay duty at $1\frac{1}{2}$ d. per lb. If retailed at 1s. 3d. per lb., what percentage of the selling price is profit?

33. If a greengrocer, selling apples at three a penny, gains 5% on what they cost him, what will he gain per cent. if he sells five apples for 2d.?

34. What would be a merchant's profit per cent. on his turnover if the former is £1563 and the latter is made up of: Cost of goods, £5000; wages, 30% of the cost of goods and the profit?

EXAMPLES. LXXII.

Miscellaneous Questions

1. During the attempted construction of a Panama Canal by M. de Lesseps, the owners of some land, valued at 75000 francs, are said to have received 800000 francs for the freehold.

Presuming this to be true, calculate the percentage profit made by the vendors of the land.

2. The average width of the ordinary channel of the Nile is $3\frac{1}{2}$ miles, but when the inundation is at its height the channel is $20\frac{1}{2}$ miles wide. By how much per cent. does the inundation increase the width of the channel?

3. A barrel of wine contains 36 gallons; 15 are drawn off, and the barrel filled up with water. What is the percentage strength of the mixture now?

4. A greengrocer made £500 profit on his business this year, and finds that this amount is 12 % less than last year's profit. By how much does the profit this year differ from that of last year?

5. We find from our newspapers that South American chilled forequarters of beef sold at Smithfield at 3s. 10d. per stone, and English beef at 5s. 1d. per stone. What percentage profit does a butcher make by selling Argentine meat as English?

6. Our butcher is selling us beef at 1s. 1d. per lb. What percentage profit is he making when he bought it for 5s. 2d. a stone (Scotch long sides)?

7. Instead of taking 1 Kgm. as 2·2046 lb., a merchant takes it as 2·2 lb. What percentage error does he make, to three places of decimals, and what would be the total error made in converting 1 metric ton into pounds? (Give the answer in pounds.)

8. The foreign trade of Saffi (Morocco) amounted to £537823 in 1914, and £972432 in 1913. Calculate the percentage decrease in the year.¹

9. The cotton production of India is estimated at 17,674,000 cwt. for the present year, or 99·9 % of last year's production. How many tons (to the nearest 10 tons) were grown last year?

10. The wheat production of the southern hemisphere—Argentina, Chile, Australia, and New Zealand—is estimated at 134,234,000 cwt. for 1914–15, as compared with 126,246,000 cwt. for 1913–14. What will be the increase per cent. if the production is in accordance with the estimate?

11. 675·5 million Kgm. of coffee were exported from Brazil² in the year before last, and 724·8 million Kgm. last year. What was the percentage increase in the exportation in the year given?

¹ Decrease caused partly by export restrictions and partly by diminished area of cultivation and dearth of ploughing animals.

² Brazil exported about two-thirds of the world's production of coffee anterior to 1888, but in that year slavery was abolished in the country, and a consequent upheaval in the labour system followed. The smallest amount exported since 1900 has been 584 million Kilograms.

12. Mark coffee bought at £6 per cwt. so as to gain 8 %, and find the profit per pound?

13. A merchant has premises in Liverpool and also at Bordeaux. At the former he sells ladies' stockings at 2s. 6½d. per pair, and at the latter 3 fr. 30 c. per pair. By how much per cent. does the higher price exceed the lower, and which is higher?

14. In the early part of the present year the prices for a 4-lb. wheaten loaf were stated to be: New York, 11½d. to 1s. 5½d.; London, 8d.; Paris, 7½d. Find by how much per cent. the cost of a loaf in Paris was less than that in London, and by how much per cent. the **average** price of a loaf in New York exceeded that charged in London.

15. Flour cost 5½d. per 3½-lb. bag (retail) last year, and 9d. this year (1916). What is the percentage profit in the two cases if the wholesale prices were 4½d. and 7½d. respectively?

16. What percentage increase is 1d. per lb. on soap which cost 1 fr. 25 c. per Kgm.?

17. 85,050,300 acres out of 221,983,200 acres were under winter sowings in Russia last year. What percentage of the whole was thus under winter sowings?

18. Taking the data of the last question, 136,932,900 acres were under spring crops. What percentage was this?

19. The total yield of all grains in Russia last year was 55,167,000 tons, which was 23·8 % less than in the previous year. What was the grain yield of the previous year?

20. A signet ring costs a jeweller 17s. 6d. He marks it 25s., but ultimately disposes of it to a customer at 5 % less than the marked price. What is his gain per cent. on the amount he paid for it and on the selling price?

21. If a pair of antique candlesticks is bought for 15 guineas and sold by auction for £12 10s., what is the loss per cent. on the original cost and on the selling price?

22. In the ten years 1901–11 the rural population of the Maritime Provinces, Ontario and Quebec, decreased from 2,903,470 to 2,864,647. Determine the percentage decrease in population for the ten years given, and also the average annual percentage decrease.

23. A grocer sells sugar at 2¾d. per lb. and makes 2d. profit on every 7 lb. he sells. At what price per hundredweight did he buy the sugar?

24. The population of Japan on 31st December 1913 was 52,985,423, and on 31st December 1914, 53,596,858. What was the average increase per hundred inhabitants in the year given?

25. The price of everyday household commodities has gone up 60 % between 1899 and 1915. How much have we to pay now for what we could get for 15s. 9d. in 1899? (Answer to nearest penny.)

26. Our papers tell us that the Clyde shipbuilders claim that the purchasing power of a sovereign has gone down to 14s. 9d. What percentage drop has befallen the sovereign if this is true?

27. It is proposed to lease a particular area in Spain for the construction of a railway. The cost is estimated at 24,717,920 pesetas, and the Government guarantees (not more than) 5 % per annum interest. If the full 5 % is paid, what would this amount to in English money? (A silver peseta = 9·513d.)

28. If gas has gone up from 2s. 8d. to 3s. 2d. per thousand, and we burn, on the average, 950 cubic feet a week in our office, how much per cent. will the bill be higher this quarter than it was last, and what will be the actual amount extra?

29. If beef costs 6s. 6d. a stone at Smithfield Market, at what price per pound must it be sold so that the profit is 22 % on the selling price?

Hint.—Selling price - 22 % of selling price = cost price.

30. In Japan Proper the value of the production of the forests was yen 102,342,867 in 1912-13, and the output of chemical products of wood (charcoal, acetic acid, lime, pine black, pulp, camphor, and camphor oil) was valued at yen 26,047,873. What percentage of the total value was derived from the chemical products of wood?

31. A furniture dealer buys an antique sideboard for £28 6s. 8d., and marks it to gain his usual 15 % on the selling price. What is the selling price?

32. If books are sold to retail dealers at thirteen to the dozen and 25 % off the published price, what profit per cent. does a bookseller make in selling thirteen copies of a half-crown book for 2s. each?

33. In two successive years the United Kingdom exported to Norway motors, for petroleum, steam, etc., and transformers (electrical), to the value of 88400 and 108500 kronen respectively. Find the percentage increase from the first year to the second and its value in English money. (1 krone = 1s. 1½d.)

34. It is proposed to build 144 workmen's dwellings in one of the cities of the Netherlands at a cost of 340000 gulden. At what price must an English contractor be able to do the work in order to gain 15 % on the amount it costs him? (1 gold florin or gulden = 1s. 7·824d.)

35. The price of British wheat at Canterbury (Kent) rose from 30s. 7d. to 56s. 11d. per quarter in the year ending 6th February 1915. What is the percentage increase on the price at the beginning of the year?

36. In the previous question find the average monthly percentage increase in the price of British wheat for the period given.

37. The wholesale price of coal was 24s. 6d., the retail price 26s. 6d. a ton. What was the percentage profit both on the wholesale and on the retail price?

38. If the retail price of Canadian Cheddar cheese rose from £4 15s. per cwt. to 10½d. per lb. in a month, find the percentage increase in profit if the wholesale price was 8d. per lb. all the time.

39. A Japanese merchant dies worth yen 75600, and his son, who succeeds to his property, has to pay a succession duty of 5%; what is the amount of the duty in English money? (Yen 1 = 2s. 0½d.)

40. Taking a yen as 2s., what difference does this make to the succession duty in the last question?

41. A stock jobber¹ dies worth £350680, and estates between £200000 and £400000 pay an estate duty of 12% in the United Kingdom. Calculate the amount the Government receives (to the nearest pound).

42. The Deputy Postmaster-General of Melbourne invites tenders to supply (1) 22 miles of paper-insulated lead-covered cable, and (2) 100 automatic recording registers. A deposit of 2% on the first £500 and 1% above that amount must be made with each tender. An English firm quotes £1375 12s. for part of the contract, what deposit must be paid?

43. What deposit in English money would a French firm pay if it tendered for the same part of the contract as that referred to in Question 42, if it quoted the cost as 33756 francs?

44. Which tender is the higher, and by how much, in English money (Questions 42 and 43)?

45. The total ordinary revenue of Japan for the present year is estimated at yen 534,065,000, of which the monopolies in salt, camphor,² and tobacco are expected to produce, respectively, yen 8,323,300, 37300, and 45,791,000. What percentage of the total revenue is derived from each of these three sources?

¹ Page 483.

² The camphor produced in Japan Proper is mostly sold in the home market, while the Formosan product has a large market in Europe and in America.

46. The population of Chōsen (Korea) in 1913 was 15,164,066, and the average increase in the ensuing year was 2·27 per hundred inhabitants. Calculate the population in 1914.

47. It is estimated that an army of 1,300,000 men uses 687578 lb. of brass per day in the form of cartridges when on active service. If $5\frac{1}{2}\%$ of this metal is recoverable, what weight is lost per day per man?

48. The price of copper is £62 15s. per ton for cash, and £63 5s. at three months' credit. If the former is sold at a profit of 10% and the latter at $12\frac{1}{2}\%$, find the total profit made by the vendor on 6 tons of the former and 4 of the latter.

49. On entering into partnership four merchants agree that the first shall have £200, the second £100 and 5% of the remaining profits, the third £80 and 30% of the profits remaining after the first two have been paid and the third has received his £80, while the fourth shall have the residue. If the profits are 25% of the capital, which is £12000, calculate the amount each partner receives. (Check the result.)

50. The price of tea goes up 3% and the consumption goes down 2%. By what percentage is the original amount spent on tea increased or diminished?

51. The revenue derived from the Excise duties in the United Kingdom amounted to 38 million pounds last year. If the consumption increases so that the revenue is $38\frac{1}{4}$ million pounds, by what percentage may the duty be diminished so that there may be no loss to the State on last year's figures (to two places of decimals)?

52. Tea valued at 2s. 6d. per lb. is mixed with an inferior sort at 1s. per lb. in the ratio of 2 lb. of the former to 6 lb. of the latter. At what price per pound must the mixture be sold to gain 10%?

53. 34,224,700 Kgm. of zinc ore were dug in Austria in 1913, a decrease of 1·3% in quantity on the 1912 production. How many Kilograms of zinc ore were produced in 1912?

54. The value of the ore referred to in the last question was 2,073,820 kronen in 1913, a decrease of 28·2% in value compared with 1912. Find the value of the ore in 1912.

55. Taking the result of the last two questions, find the value of 1 Kgm. of ore in each of the years given (to two significant figures), and the percentage decrease in the value of 1 Kgm. in the second year given.

56. In the year 1912-13 the Government of India spent £3,301,928 on irrigation and received £1,109,289. What percentage return did the Government receive on the money spent?

57. In 1903-4, 48000 chests of opium were sold for export, and the average price per chest was 1462 rupees. In 1912-13 the figures were 17890 chests at 2784 rupees each. Calculate the percentage decrease in the quantity sold, and the percentage rise in the price per chest. Comment upon the figures given in this question and upon the results obtained.

58. The paid-up capital of a company is £585000, and the dividend declared is $3\frac{1}{2}\%$ per annum. What is the amount of the dividend?

59. If there are 3000 shareholders in the company of the last question and the payments to each are the same, what would a shareholder receive in a year by investing his dividend at $4\frac{1}{2}\%$ per annum?

60. A railway company in the United Kingdom paid compensation in a year as follows: (1) To passengers, £4037 9s. 7d.; (2) to workmen, £9318 18s. 9d.; (3) for damage and loss of goods, £19785 5s. 7d. What percentage of the whole compensation paid fell under each of the three heads (1), (2), (3)?

61. The owner of a cotton mill has a house for which he paid £575 and which he lets at a rental of £45 per annum. The cost of repairs averages £6 a year, and, in the course of ten years, he has had it empty in all three quarters (of a year, of course). What has been his average percentage return per annum?

62. If the Norwegian Government allows a preference of $12\frac{1}{2}\%$ on Norwegian manufactures, what amount would be allowed on domestic manufactures introduced into a contract and valued at £5658 16s. 8d.?

63. We find from our newspapers that a sovereign was worth 25·35 francs on a particular day and 25·45 the next day. Calculate the percentage change in value.

(Look in your newspapers to-day and to-morrow and find the value of £1 in francs, and compare with the figures given.)

64. The traffic receipts of a railway company were £5,250,433 8s. 6d., and £250157 7s. was spent on the renewal and maintenance of locomotives. What percentage of the traffic receipts was spent in this way?

65. If the rates paid by the company referred to in the previous question were £263999 6s. 2d., find what percentage this amount was of the total traffic receipts.

66. In 1903, 42·05 men per thousand in the British Army in India were lost through sickness, death, or invaliding, and 11·34 per thousand in 1912. By what percentage of the 1903 figure has the loss diminished on the average in each year?

67. The returns of a railway company show the season ticket receipts to have been: First class, £103104 9s. 5d.; total receipts, £292941 6s. 8d. What percentage of the total receipts was derived from the second and third classes taken together?

68. If, in the last question, the second class receipts were £62912 7s. 10d., find what percentage of the total was derived from third class season ticket-holders.

69. The tolls received on a canal in England amounted to £256 7s. in a year, and the cost of maintenance was 48·6 % of this amount. Find the cost of maintenance, and hence the profit.

70. The working expenses of a steamship company were £277306 5s. 9d., and the cost of fuel £66182 1s. What percentage of the expenses is due to the cost of fuel?

71. If the cost of stores, lubricants, and water (see Question 70) had been 4 % of the working expenses, how much would the company have expended on this item?

72. A company owning and working a number of docks, harbours, and wharves finds its income is £376157 2s., and that 2 % of this has to be spent on dredging. What amount is spent in this way?

73. If in the previous question 12 % of the income is spent on "maintenance," what is the amount so spent?

74. An electric lighting company supplies power as follows: (1) For traction, 750100 units, producing £2827 8s. 2d.; (2) for power, 95130 units, producing £626 9s. 5d.; (3) for lighting, 688500 units, producing £4011 10s. 3d. With a view to the next question, find the cost per thousand units in parts (1), (2), and (3).

75. Employ the result of Question 74 to find by how much per cent. the highest charge per thousand units exceeds the lowest.

76. Taking the result of Question 74, find by how much per cent. the second largest charge per thousand units exceeds the lowest. Comment upon the charges made.

SECTION XIX

DOUBLE ENTRY IN ACCOUNTS

278. Before proceeding to this section the student must revise thoroughly §§ 171–182.

In § 171 we saw that William Towney bought cloth from John Nelson, so that the former *bought* goods while the latter *sold* them; it is clear then that the transaction involved **two items**—(1) receiving cloth, (2) selling it, and it is easy to see that this is true for all commercial transactions. Hence every firm

will make two entries for each transaction, and this is the fundamental principle of **Double-entry Book-keeping**.

279. Double-entry book-keeping is NOT DOUBLE THE WORK OF SINGLE ENTRY, for a number of items, such as discounts (§ 181, note), can be entered into the Ledger as *one* item.

By a **Ledger**¹ we mean a book into which all the items from the **Subsidiary Books** are posted, and one which enables the counting-house manager to determine the financial position of the firm and the condition of each separate account.

Never put any item into the ledger except it has first appeared in one of the subsidiary books, and always put in the proper Ledger column the number of the page of the Subsidiary Book upon which the item can be found.

280. There are three kinds of accounts—(1) Personal Accounts, which we shall denote by (P); (2) Real Accounts, consisting of the Cash Accounts, Bank Accounts, Machinery, Plant, and Property Accounts, marked (R); and (3) Nominal Accounts, which include all accounts concerned with the profits and losses of the business, marked (N).

All N Accounts are therefore Profit and Loss Accounts.

281. We shall now proceed as follows :

I. Explain how to post very simple items into the Ledger, presuming that we have taken them from the Subsidiary Books.

II. Post into the Ledger direct from those books.

I.

The student *must*, if he wishes to learn book-keeping, take a piece of properly ruled Ledger paper and put down *item by item* for himself as we proceed, and *not* rely upon the model Ledger which we have put at the end of this exercise so that the student may not consult it until he has completed his work.

282. EXAMPLE 1.—John Brown begins business with Cash, £50; he buys a horse for £20, and sells it for £30. How does he stand ?

¹ In a large firm there is a room set apart for keeping the Ledgers, and is called a Counting-House. There is a Ledger clerk and often two or three assistants on each Ledger, which contains (*e.g.*) the names of customers who have Credit Accounts and which begin with A or B or C, etc. Thus there may be a large number of Ledgers. If then a customer comes in and wants credit, the assistant may phone up to the "E Ledger" and ask if that credit may be allowed. The desk at which the clerks sit is separated off by a glazed partition from other desks, hence we hear of "A Alley" or "R Alley," that is, the place where the A or R Ledger clerk reigns supreme. Over and above the Ledger clerk is the Counting-House manager.

ITEM 1.—Jan. 1. John Brown begins business with Cash, £50 ; ∴ J. B.'s capital is £50, so we open a Personal Ledger Account, "John Brown: Capital Account," and have to decide whether the £50 is a *Dr.* or *Cr.* entry, and we *always* look at it from the point of view of "the business." J. B. puts £50 into the **business**, ∴ the latter owes J. B. £50 ; ∴ J. B.'s account is one of its creditors ; ∴ the £50 is a credit entry, "Jan. 1. By Cash, £50."

If the business owes a person money we credit his account, but if he owes the firm money we debit his account.

Now, the cashier receives that £50 ; ∴ he makes a *Dr.* entry in his Cash Account¹ (§ 178): "To John Brown, £50," and thus completes the double entry.

ITEM 2.—Jan. 2. He buys a horse for £20, and presumably pays for it in cash, so we open a Horse Account (Nominal Account), and that is *Dr.* to the business for the value of the horse, hence we make a *Dr.* entry, "Jan. 4. To Cash, £20," and since the cashier has paid that money out he enters, "Jan. 4. By horse, £20," in the Cash Account, and thus completes the double entry.

ITEM 3.—Jan. 5. He sells the horse for £30, so we credit the Horse Account (N), "Jan. 5. By Cash, £30," and write "Jan. 5. To Horse, £30," in the Cash Account, since the cashier receives £30 cash, and thus complete the double entry.

283. In order to see whether our entries are **probably** correct we add up the *Dr.* and *Cr.* totals and see whether they agree—that is to say, we make a TRIAL BALANCE, from which we see that the *Dr.* and *Cr.* totals are £100.

TRIAL BALANCE.

	Totals.					
	<i>Dr.</i>			<i>Cr.</i>		
	£	s.	d.	£	s.	d.
John Brown, Capital Account				50	0	0
" " Cash Account	80	0	0	20	0	0
" " Horse Account	20	0	0	30	0	0
	100	0	0	100	0	0

¹ The student may get confused as to Cash Account or Bank Account and Cash Book. By CASH ACCOUNT we mean the account as it appears in the CASH COLUMNS of the CASH BOOK, and by BANK ACCOUNT the account as it appears in the BANK COLUMNS of the CASH BOOK.

In practice, accountants usually take the **BALANCES** of the various accounts and find whether the total *Dr.* Balances equal the total *Cr.* Balances, but we must clearly understand what a Balance is.

If the *Dr.* side of the Cash Account is heavier than the *Cr.* side we have cash in hand (£ 179), or we have a Debit Balance, so that **THE BALANCE IS THE DIFFERENCE BETWEEN THE AMOUNTS ON THE TWO SIDES, AND IS ALWAYS BROUGHT DOWN ON THE HEAVIER SIDE, EXCEPT IN NOMINAL ACCOUNTS.**¹ Hence we have: Balance of Capital Account is £50 on the *Cr.* side, of the Cash Account £60 on the *Dr.* side, and of the Horse Account £10 on the *Dr.* side, whence the usual form of Trial Balance:

TRIAL BALANCE.

	Balances.	
	<i>Dr.</i>	<i>Cr.</i>
	£ s. d.	£ s. d.
John Brown, Capital Account		50 0 0
" " Cash Account	60 0 0	
" " Horse Account		10 0 0
	60 0 0	60 0 0

again suggesting that our work is correct (see § 288).

(If the student finds his work wrong he may compare with the model at this point.)

284. Now if we look at the Horse Account we shall see that it is the only one upon which profit or loss could be made in this case, but if J. B. had bought a cow, or paid wages as well, we should have had other accounts which could well involve, in one way or another, profit and loss. All such accounts are Nominal Accounts, and therefore **ALL NOMINAL ACCOUNTS INVOLVE PROFIT OR LOSS.**

Again, if J. B. makes a profit, he increases his capital, for he has more money to go on with, and in this case he made £10 profit, which is shown as a *Cr.* balance in the Horse Account, hence **a credit balance in a Nominal Account means a profit, or, more simply, if the *Cr.* side of a Nominal Account is the heavier, the balance shows the profit,**² and since the profit

¹ See §§ 285 and 286.

² If the student remembers this he will have no further trouble with nominal accounts, for a *Dr.* balance clearly means a loss.

increases the Capital Account we ought to close all **NOMINAL ACCOUNTS** and *transfer* their balances to the Capital Account, instead of bringing them down and leaving them ready for the next trading period.

285. Instead of transferring all nominal balances directly to the Capital Account, we draw up one account called a **Profit and Loss Account** (P. and L. Account) and *transfer all Nominal Account balances to that account*, balance it, transfer its balance to the Capital Account, and by working in this way we are able (1) to see all the items contributing to profit or loss in *one* account, the P. and L. Account, (2) to transfer *one* balance and one only to the Capital Account, (3) to see in a moment from that account the net profit or loss.

We now total and balance the Cash Accounts (R) by writing "Jan. 6. By balance c/d, £60," total the account, and then carry down the balance to the heavier (*Dr.*) side, and **learn that we have cash in hand, £60**, which can be used for future transactions.

Now balance the Horse Account (N) or, as we may call it, the P. and L. Account (N), and **learn that since the Cr. side is heavier there is a profit**, which we put on the *Cr.* side of Capital Account, and then balance the latter and so find the new capital, £60, with which to continue business.

286. One step more has to be taken. We have closed the Horse Account or P. and L. Account, and with it all Nominal Accounts, however many there may be; the Capital and Cash Accounts remain, and the former tells us that the business owes J. B. £60, while the latter gives us the comforting information that we have just £60 in hand to pay Mr. Brown the amount due to him. The Liabilities are £60 but the Assets are £60 too, so that the firm is solvent. We represent this all-important fact in a Balance Sheet thus:

BALANCE SHEET, JANUARY 6, 191--.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
John Brown, Capital Account . . .	60	0	0	Cash Account . . .	60	0	0

(The student can now compare his Ledger with the model, if his Trial Balance or Balance Sheet is wrong.)

287. In speaking of the Trial Balance (§ 283) we said that the agreement of the Balance totals "suggested" that the

work was correct, but the books are NOT necessarily right because the Trial Balance is correct, for—

1. ALL the transactions may not have been recorded, while a fictitious entry might have been inserted, and yet the Trial Balance would still appear correct if equal amounts had been left out from or inserted upon EACH side.

2. Entries might be made in wrong accounts but on the right sides.

3. The clerk who makes out the Trial Balance might have had inaccurate entries handed to him by other clerks.

On the other hand, the Trial Balance does indicate that the accounts are tolerably accurate, and it also gives a very conveniently arranged summary as to the condition of outstanding accounts.

288. MODEL LEDGER ¹ (I).

(The *Dr.* and *Cr.* items composing the double entry of any one transaction are in similar type.)

<i>Dr.</i>		JOHN BROWN: CAPITAL ACCOUNT (P).			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
Jan. 6.	To Balance c/d	60	0	0	Jan. 1.	By Cash (i.e. the amount J. B. put into the business).	50	0	0
					Jan. 6.	By Balance (profit from Horse or P. and L. Account)	10	0	0
		60	0	0	Jan. 6.	By Balance b/d (new capital to continue business with)	60	0	0
							60	0	0

<i>Dr.</i>		CASH ACCOUNT (R).			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
Jan. 1.	To John Brown	50	0	0	Jan. 4.	By Horse	20	0	0
Jan. 5.	To Horse	30	0	0	Jan. 6.	By Balance c/d	60	0	0
		80	0	0			60	0	0
Jan. 6.	To Balance b/d (Cash in hand)	60	0	0					

(as it would appear in the cash columns of the Cash Book).

<i>Dr.</i>		HORSE ACCOUNT (N).			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
Jan. 4.	To Cash	20	0	0	Jan. 5.	By Cash	30	0	0
Jan. 6.	To Balance (Profit carried to Capital Account, <i>Cr.</i> side)	10	0	0					
		30	0	0			30	0	0

¹ We omit the folio numbers here (see § 281, I).

EXAMPLES. LXXIII. (a)

1. What good purposes does a Ledger serve?
2. What is the fundamental reason for Double-entry Book-keeping? Why is it not twice the work of Single Entry?
3. What kinds of accounts are there? Classify: Capital Account, Cash Account, Bank Account, Horse Account, Sheep Account, Ink Account, Silk Account.

Post into the Ledger the following entries presumed to be taken from the Subsidiary Books, take out a Trial Balance and a Balance Sheet (Questions 4 to 6).

4. J. Tree opens business, July 1, Cash in hand, £30; he buys a cart for £5, July 8, and sells it for £8, July 15.
5. T. Brown begins business, April 1, Cash in hand, £40; he buys cloth for £8 and sells it for £16 on April 12.
6. E. Wilson begins business, May 3, Cash in hand, £60; he buys woollens, £30, and sells them for £35 on May 10.

7. Is the balance of an account on the heavier or lighter side?
8. If there were a loss, which side of the P. and L. Account would be the heavier?

9. What does (1) a *Cr.* balance, (2) a *Dr.* balance in the Capital Account mean?

10. T. Hill puts £50 into the business and draws out £60. Show the Capital Account supposing that there are no other items.

11. Why is the balance of a Nominal Account carried to the Capital Account?

12. In our Silks Account we have £20 *Dr.*, £30 *Cr.* What does that mean? On which side does the balance fall? What do you do with it? Is it a gain or a loss?

13. In our Cash Account we have "*Dr.* Jan. 1. To satins, £40"; "*Cr.* Jan. 8. By Cash, £60," and all the satin is sold. How do we stand?

14. T. Wills' Capital Account shows a debit balance, £10; what does this mean?

15. J. Brown opens business, Jan. 1, with £400; on Jan. 8 he buys iron goods for £200, and on Jan. 15 sells them for £150. Prepare the Ledger Accounts, Trial Balance and Balance Sheet, and comment on the position, explaining the meaning of all the balances.

II.

289. In the following exercise we shall again presume that we have taken the entries from the Subsidiary Books and shall also keep the Cash and Bank Accounts separate, although they

would appear in the Cash Book in the ordinary way—in other words, in everyday business the **Cash Book includes two Ledger Accounts**, namely, Cash Account and Bank Account, but we separate them here to emphasise the principles of posting into the Ledger.

290. EXAMPLE 2.—Henry Wills began business with: Cash in hand, £100; Cash in Bank, £100; he purchases boots for £90 and sells them for £135, pays £5 in wages and £1 in rent. Draw up the Ledger Accounts and Balance Sheet.

The student will please write down the items in HIS Ledger as before.

ITEM 1.—Cash in hand, £100; ∴ the cashier on receiving the money enters on the Debit side of the Cash Account, “To H. Wills’ Capital Account, £100,” and we credit Henry Wills’ Capital Account, “By Cash, £100,” as in Example 1.

ITEM 2.—Cash in Bank, £100, which is also H. W.’s capital; so we open a Bank Account (R), and since the Bank receives the money it is debtor to the firm for the amount, so we have in the Bank Account a *Dr.* entry, “To H. W.’s Capital Account, £100,” and the corresponding *Cr.* entry in H. W.’s Capital Account, “By Bank, £100,” thereby showing that the Bank owes H. W. that amount, and completing the double entry.

ITEM 3.—He purchases¹ boots for £90; ∴ we open a Ledger Account and call it “Purchases Account (N),” which is now *Dr.* to the business for £90, while the cashier records the payment in his Cash Account, “By Purchases, £90,” and so completes the double entry.

ITEM 4.—He sells the boots for £135; ∴ we open a Sales Account (N); the cashier receives £135 and enters in the Cash Account, “To Sales, £135”; and since the Sales Account has parted with the goods, as it were, we credit that account and enter in it, “By Cash, £135,” and so complete the double entry.

ITEM 5.—Pays wages by cash; so we open a Wages Account (N) and make a debit entry (“Debit losses, Credit gains,” the wages are a “loss” to the business), “To Cash, £5,” and the *Cr.* entry in the Cash Account, “By Wages, £5,” completes the double entry.

ITEM 6.—He pays rent, £1; ∴ we open a Rent Account (N) and make the *Dr.* entry “To Cash, £1”; and then the *Cr.* entry

¹ In all purchases or sales if you decide upon which side of the Cash Book the CASH ENTRY must fall (receipts *Dr.*, payments *Cr.*), then the second entry MUST fall on the OPPOSITE side of the particular Nominal Account concerned.

in the Cash Account, "By Rent, £1," again completes the double entry.

The student should have made his own ledger entries and should continue to do each item for himself and NOT rely upon our models.

291. We now proceed to make out a TRIAL BALANCE, and first of all jot down the balances in order thus :

Capital Account: *Cr.* side heavier, ∴ there is a *CR.* BALANCE WHICH AMOUNTS TO £200.¹

Cash Account: *Dr.* side heavier, ∴ there is a *Dr.* BALANCE, ∴ there is cash in hand WHICH AMOUNTS TO £139.

Bank Account: *Dr.* Side heavier, ∴ there is Cash at Bank amounting to £100.

Purchases Account, Wages Account, Rent Account: *Dr.* balances of £90, £5, and £1 respectively ; **Sales Account:** *Cr.* balance, £135.

TRIAL BALANCE.

	Balances.					
	<i>Dr.</i>			<i>Cr.</i>		
	£	s.	d.	£	s.	d.
Capital Account (P)				200	0	0
Cash Account (R)	139	0	0			
Bank Account (R)	100	0	0			
Purchases Account (N)	90	0	0			
Wages Account (N)	5	0	0			
Rent Account (N)	1	0	0			
Sales Account (N)				135	0	0
	335	0	0	335	0	0

From the above we conclude that our Ledger is **probably** correct. (The student will now draw up a Trial Balance, using the totals.)

292. We now (1) balance the Nominal Accounts ; (2) transfer their balances to the P. and L. Account ; (3) balance the P. and L. Account and find the profit or loss ; (4) transfer that balance to the Capital Account.

Taking the Purchases Account we write on the *Cr.* side, "Jan. 31. By balance carried forward to P. and L. Account £90," or more shortly, "Jan. 31. By P. and L. Account, £90,"

¹ The balance as it appears in the model Ledger is £239 ; that is because we have there transferred the net profit to Capital Account, but are asking you to make the Trial Balance before doing that. There will be no difficulty, however, if you have done as we asked you to do on p. 414, § 281, I.

and then transfer that to the *Dr.* side of the P. and L. Account, for the Purchases Account has a debit balance as the *Dr.* side is the heavier. Treating all the Nominal Accounts similarly, we make out and balance the P. and L. Account thus :

PROFIT AND LOSS ACCOUNT, JANUARY 31, 191- ¹											
<i>Dr.</i>					<i>Cr.</i>						
	£	s.	d.		£	s.	d.		£	s.	d.
To Purchase of Boots	90	0	0	By Sales of Boots	135	0	0				
„ Wages	5	0	0								
„ Rent	7	0	0								
„ Net profit carried to Capital Account	39	0	0								
	<u>135</u>	<u>0</u>	<u>0</u>		<u>135</u>	<u>0</u>	<u>0</u>				

We now transfer the net profit to the Capital Account, balance it and the two Real Accounts, and then make out the Balance Sheet. Be very careful NOT to touch the Nominal Accounts again now, for they have ALL been included in the P. and L. Account and so transferred to the Capital Account, which therefore includes them all and represents them on the Balance Sheet :

293. BALANCE SHEET, JANUARY 31, 191-.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
John Brown: Capital Account	239	0	0	Cash in hand	139	0	0
	<u>239</u>	<u>0</u>	<u>0</u>	Cash in Bank	100	0	0
					<u>239</u>	<u>0</u>	<u>0</u>

which proves that our books are correct.

294. MODEL LEDGER (II).

Dr. HENRY WILLS: CAPITAL ACCOUNT (P). Cr.											
	£	s.	d.		£	s.	d.		£	s.	d.
Jan. 21 To Balance c/d	239	0	0	Jan. 1. By Cash	100	0	0				
				„ 1. By Bank	100	0	0				
				„ 31. By net profit from P. and L. a/c	39	0	0				
	<u>239</u>	<u>0</u>	<u>0</u>		<u>239</u>	<u>0</u>	<u>0</u>				
				Feb. 1. To Balance b/d	239	0	0				

¹ Here again the variations in type serve to connect the items with the corresponding entries in the Model Ledger.

EXAMPLES. LXXIII. (b)

1. To what extent can we rely upon a Trial Balance?
2. What items are entered (a) in the P. and L. Account, (b) in the Balance Sheet?
3. Where would you expect to find : (a) a net loss ; (b) a net gain ; (c) the amount of capital for the ensuing month ; (d) whether J. Lee owed us money or we owed him ; (e) what wages had been paid in the month ; (f) what cash there was in hand ; and (g) in the Bank ?

Post into the Ledger, make out the Trial Balance and Balance Sheet, decide the net profit or loss, and the amount of capital for the next month (Questions 4 to 6) :

4. Henry James began business, Jan. 1, with £300 cash in hand ; he bought some bicycles for £75 on Jan. 10, and sold them for £100 on Jan. 18 ; paid wages, £10 ; and rent, £2, Jan. 30.

5. T. Nett began business, June 1, with £180 in hand ; he bought furniture for £75, sold it for £100 on June 18 ; paid wages, June 29, £15, and rates, £5, on June 30.

6. Wm. Johns has cash in hand, July 1, £100 ; in Bank, £500 ; he bought 10 loads of timber for £60 each, sold 8 for £80 each on July 15, and 2 for £50 each on July 28. He paid cartage, £2, and his gas bill, £3.

III.

295. There is one Subsidiary Book, **The Journal**, which must be considered in addition to those referred to in §§ 171 to 182.

The **JOURNAL** was originally the **ONLY** book of first entry, and the early Italians used it for every transaction prior to posting to the Ledger ; but now other books serve for sales, purchases, cash, Bank, and discount items, and **THE JOURNAL INCLUDES THE FOLLOWING ENTRIES ONLY :**

1. The opening entries (§ 297).
2. Such entries as the purchase of machinery, plant, etc., which are not for sale and so do not appear in Purchases or Sales Books.
3. The closing entries (§ 307).

In the following exercise we trace the operations through all the Subsidiary Books and then post into the Ledger and complete the Balance Sheet.

296. EXAMPLE 3.—Record the following transactions of Henry James in the Subsidiary Books, post to Ledger, take out a Trial Balance, prepare a Profit and Loss Account and Balance Sheet.

He began business, Jan. 1, with cash in hand, £10; in Bank, £700; goods on hand, £50. A. Bell owed him £40; J. Hudson owed him £30; he owed E. Brown £28. The transactions were:

ITEM 1.—	Jan. 1.	Sold A. Bell: Silks . . .	£10	
		Satins . . .	. 15	
			£25	
	„ 2.	„ 2. Paid E. Brown: Cheque . . .	£27	
		He allowed Discount . . .	1	
			£28	
	„ 3.	„ 4. Received cash from J. Hud- son on account . . .	£20	
	„ 4.	„ 7. Purchased from E. Brown: Silks . . .	100	
		Satins . . .	50	
			£150	
	„ 5.	„ 9. Received cash from A. Bell, which amount was ac- cepted in full settlement of his account . . .	£50	
	„ 6.	„ 11. Paid cash into Bank . . .	75	
	„ 7.	„ 12. Paid sundry expenses by cash	4	
	„ 8.	„ 15. Henry James withdraws from business by cheque.	100	
	„ 9.	„ 16. Paid E. Brown & Co. by cheque on account. . .	75	
	„ 10.	„ 27. Cash sales during month paid into Bank . . .	150	
	„ 11.	„ 28. Paid salaries by cheque . . .	10	
	„ 12.	„ 31. Stock in hand	100	

THE JOURNAL—OPENING ENTRIES

297. (1) Henry James had been conducting his business prior to Jan. 1, and the Journal entries are made to ascertain what capital he has **on that date**, but his capital is the excess of his assets over his liabilities; ∴ we find, from the data given, (1) his assets, (2) his liabilities, subtract, and so arrive at his capital.

(Note that no transaction that takes place after Jan. 1 enters into this matter at all. We want the capital on Jan. 1.)

The student will make out the Journal.

298.

THE JOURNAL.

10.

Opening Entries.		Ledger Folio.						
HENRY JAMES.								
<i>Assets—</i>			£	s.	d.	£	s.	d.
1	Cash in hand	8	10	0	0			
2	Cash in Bank	8	700	0	0			
3	Value of goods on hand . .	15	50	0	0			
4	A. Bell's (debt)	15	40	0	0			
5	J. Hudson's (debt)	15	30	0	0			
<i>Liabilities—</i>								
6	To E. Brown	15				28	0	0
7	To Henry James' net capital					802	0	0
			830 0 0			830 0 0		

Items 1 and 2 should be carried forward at once to the Cash Book, *Dr.* side, Cash and Bank columns respectively:

"Jan. 1. To Balance brought forward, £10" (Cash column), and "£700" (Bank column).

The others will be posted into the Ledger later on (§ 303).

299. (2) It is now necessary to take the **business transactions** during the month and **enter each of them into the appropriate book of first entry**; to avoid mistakes they **MUST** always be taken in order, just as they stand.

The student will now rule up pages for Purchases, Sales, and Cash Books, and make the following entries:

- ITEM 1. SALES BOOK ENTRY as shown.
- " 2. CASH BOOK ENTRY, *Cr.* side, Bank column, "Jan. 2. By E. Brown, £27"; Discount is a *gain*, and ∴ a *Cr.* entry; Discount column, £1.
- " 3. CASH BOOK ENTRY, CASH column, *Dr.* side, as it is **CASH RECD.**, "Jan. 4. To J. Hudson, £20."
- " 4. PURCHASES BOOK ENTRY as shown.
- " 5. CASH BOOK ENTRY, Cash column, *Dr.* side, "Jan. 9. To A. Bell, £50, *which amount is accepted in full settlement of his account,*" but he owed £40 on Dec. 31 last, and received goods valued £25 on Jan. 1, ∴ he owed £65, and since he pays only £50, he had received £15 as a discount, which is a **LOSS** to Henry James and ∴ a *Dr.* entry in the **DISCOUNT COLUMN** of his Cash Book.

- ITEM 6. CASH BOOK ENTRY, BANK COLUMN, *Dr.* entry, "Jan. 11. To Cash, £75," and since this amount is also received by the Bank and the cashier records such a fact, we must write in the *Cr.* side, Cash column, "Jan. 11. By Bank, £75."
- „ 7. CASH BOOK ENTRY, a payment, and ∴ a *Cr.* entry in Cash column, "Jan. 12. By sundry expenses, £4."
- „ 8. CASH BOOK ENTRY, BANK COLUMN, and being a payment from the firm's funds it is a *Cr.* entry, "Jan. 15. By Henry James, drawings, £100."
- „ 9. CASH BOOK ENTRY, BANK COLUMN, and a *Cr.* entry, as it is a payment, "Jan. 16. By E. Brown, £75."
- „ 10. CASH BOOK ENTRY, BANK COLUMN, being a payment to the Bank Account, it is a *Dr.* entry, "Jan. 27. To sales, £150."
- „ 11. CASH BOOK ENTRY, BANK COLUMN, *Cr.* side, "Jan. 28. By salaries, £10."
- „ 12. JOURNAL ENTRY just as 3, § 298, but see § 307.

Now compare your records in the Subsidiary Books with the models given and see whether they agree.

300.

THE PURCHASES BOOK.

5.

Number of Invoice.	Date.	Particulars.	Ledger Folio.	Details.			Totals.		
				£	s.	d.	£	s.	d.
51	191- Jan. 7.	E. Brown— Silks . . . Satins . . .	15	£	s.	d.	£	s.	d.
				100	0	0	150	0	0
				50	0	0	150	0	0
				150	0	0	150	0	0

THE SALES BOOK.

6.

Number of Invoice.	Date.	Particulars.	Ledger Folio.	Details.			Totals.		
				£	s.	d.	£	s.	d.
60	191- Jan. 1.	A. Bell— Silks . . . Satins . . .	15	£	s.	d.	£	s.	d.
				10	0	0	25	0	0
				15	0	0	25	0	0
				25	0	0	25	0	0

302. It is now necessary to post—1. From the Journal, and 2, from the other Subsidiary Books into the Ledger, and we emphasise two points :

1. We shall NOT open Cash and Bank Accounts in the Ledger, but regard the Cash Book as a Ledger Account which will, at the end of the month, tell us at once our cash in hand, cash in Bank, and the amount of discount allowed to us and by us.

2. The student MUST now take some sheets of paper ruled as a Ledger, and make the entries upon them item by item as we proceed, **ignoring our model** until he has finished, and THEN compare his record with that in the book. We cannot make too much of this point.

303. 1. Posting the opening entries from the Journal into the Ledger (of which the Cash Book forms a part).

Journal Items 1 and 2 have already been dealt with (§ 298), and since it is usual to open the Capital Account first we take Item 7 and open H. J.'s Capital Account with a *Cr.* entry: "Jan. 1. By Balance, £802" (*i.e.* By Balance due to H. J. from the business).

Next, taking Item 3, we open a STOCK ACCOUNT with a *Dr.* entry: "Jan. 1. To Balance from December, £50." This is a *Dr.* entry, since we regard the Stock Account as a *Dr.* to the business, and the stock-keeper is **responsible** to the business for that value.

Items 4 and 5 are similarly entered to the *Dr.* side of A. Bell's and J. Hudson's Accounts.

Item 6 is a *Cr.* entry in E. Brown's Account: "Jan. 1. By Balance, £28," for we owe him that amount and he is therefore one of our creditors.

304. 2. Posting from Purchases and Sales¹ Books into the Ledger.

1. Open Purchases and Sales Accounts in the Ledger.
2. Open accounts for **every** person named in those accounts.
3. It is NOT necessary to enter every item from the Purchases and Sales Books into the Purchases and Sales Ledger Accounts, but to enter the monthly totals, provided that
4. The **separate** items are entered in the various accounts opened under 2 (above), for if we have bought goods valued at £100, £200, £300, and £400 from A, B, C, and D, and we **credit**

¹ Note that we are posting from H. J.'s Purchases Book, which contains details of HIS purchases FROM other people who are therefore his CREDITORS.

each of their accounts with the goods sent by them, then the total credit amounts will be £1000, and if we debit the **Purchases Account** with that total we have, to all intents and purposes, completed the double entry but without doing twice the work of single entry.

(a) POSTING FROM PURCHASES BOOK

Since E. Brown is one of H. J.'s creditors, we make a credit entry in E. B.'s Account: "Jan. 7. By goods, £150"; and since the total for the month is, in this case, £150 also, we make a *Dr.* entry in the Purchases Account: "Jan. 31. To total for the month, £150," thus completing the double entry.

This transaction leads us to the following rule: "**The accounts of all persons whose names appear in the Purchases Book must be credited with the respective amounts and the Purchases Account debited with the total of them.**"

(b) POSTING FROM THE SALES BOOK

Since A. Bell is one of H. J.'s debtors, we write on the *Dr.* side of A. B.'s Account: "Jan 1. To goods, £25"; and then on the *Cr.* side of the Sales Account write: "Jan 1. By total for the month, £25," thus completing the double entry.

From this we have the rule: "**The accounts of all persons whose names appear in the Sales Book must be debited with the respective amounts and the Sales Account credited with the total.**"

305. 3. Posting from the Cash Book¹ into the Ledger.

I. Taking the *Dr.* side first, item by item, we see that one entry of each has been made in the Cash Book and that one more has to be made, **unless it has already been done.**

(1) This was entered in the Cash Book from the Journal (§ 298), and at the same time the remaining Journal entries were posted to the Ledger, but, since the net capital was also credited to H. J.'s Capital Account, the two items, "Cash in hand, £10," and "Bank, £700," were clearly included in that posting, for the £802 net capital = £10 + £700 + £92 (the difference between Assets 3, 4, 5 (£120), and Liabilities 6 (£28)). Hence the net capital entry, "Jan 1. By balance, £802," completes the double entry of Cash, £10, and Bank, £700, and also includes balance of Assets 3, 4, and 5 against Liability 6.

¹ The numbers (1), (2), etc., in this section refer to the corresponding small numbers, (1), (2), etc., in § 298.

(2) J. Hudson's Account: *Cr.* entry, "Jan. 4. By Cash, £20," completes the double entry.

(3) A. Bell's Account: *Cr.* entry, "Jan. 9. By Cash, £50," and also "Jan. 9. By Discount, £15," where the former completes the Cash Book entry and the latter is completed, together with all other discounts on the *Dr.* side of the Cash Book, by entering the TOTAL discounts in the Discount Account later (see (6) and (13) below).

(4) "Jan. 11. To Cash (paid into Bank), £75," has its corresponding double entry already made on the *Cr.* side of the Cash Book, "Jan. 11. By Bank, £75" (Bank received Cash, ∴ Cash column), so that we make NO FURTHER LEDGER ENTRY.

(5) Sales Account, *Cr.* entry: "Jan. 27. By Bank, £150," thus completing the double entry.

(6) Open Discounts Account (N), *Dr.* entry: "Jan. 31. To Total discounts allowed, £15" (the corresponding *Cr.* entry will be found in A. Bell's Account).

II. Taking the *Cr.* side, item by item:

(7) E. Brown's Account: "Jan. 2. To Bank, £27," *Dr.* entry, and also "Jan. 2. To Discount, £1." All discount entries are completed by carrying the TOTALS to the Discounts Account.

(8) "Jan. 11. By Bank, £75," has been completed under "Jan. 11. To Cash, £75," on *Dr.* side of Cash Book, and so need not appear any more in the Ledger (see (4) above).

(9) Open Sundry Expenses Account and make Debit entry: "Jan. 12. To Cash, £4."

(10) Henry James' Capital Account, Debit entry (for H. J. has withdrawn £100 of his capital): "Jan. 15. To Bank (Drawings), £100."

(11) E. Brown's Account, Debit entry: "Jan. 16. To Bank, £75."

(12) Salaries Account, Debit entry: "Jan. 28. To Bank, £10."

(13) Discounts Account, Credit entry: "Jan. 31. By Discounts received, £1."

(Note that this appeared as a *Dr.* entry in E. Brown's Account.)

TRIAL BALANCE

306. We take the balances, leaving the totals to the student to check.

H. J.'s Capital Account, *Cr.* balance, £702. Stock Account, *Dr.* balance, £50. A. Bell's Account, *nil.* J. Hudson's Account,

Dr. balance, £10. *E. Brown's Account, Cr.* balance, £75. Purchases Account, *Dr.* balance, £150. Sales Account, *Cr.* balance, £175. Sundry Expenses Account, *Dr.* balance, £4. Salaries Account, *Dr.* balance, £10. Discounts Account, *Dr.* balance, £14. Cash Book—Cash Account, *Dr.* balance, £1. Bank Account, *Dr.* balance, £713.

TRIAL BALANCE.

		Balances.					
		<i>Dr.</i>		<i>Cr.</i>			
		£	s.	d.	£	s.	d.
HENRY JAMES' Capital	15 ¹				702	0	0
Stock	15	50	0	0			
A. Bell	15	—	—	—			
J. Hudson	15	10	0	0			
E. Brown	15				75	0	0
Purchases	16	150	0	0			
Sales	16				175	0	0
Sundry Expenses	16	4	0	0			
Salaries	16	10	0	0			
Discounts	16	14	0	0			
(Cash-Book) Cash	8	1	0	0			
(") Bank	8	713	0	0			
		952	0	0	952	0	0

showing that the books are probably correct.

307. We may *now* balance the Personal Accounts and Nominal Accounts, and then make the

CLOSING ENTRIES IN THE JOURNAL,

which embody all our Profits and Losses, and therefore deal with NOMINAL ACCOUNTS only, and prepare for the P. and L. Account.

1. Take the balances of the Nominal Accounts from the Trial Balance.
2. Transfer the balances through the Journal to the P. and L. Account.
3. And then make out the P. and L. Account.
4. Determine the net gain or loss to be transferred to Capital Account.

¹ The numbers give the pages in the Ledger on which these entries are posted.

JOURNAL (CLOSING ENTRIES).

Jan. 31		£	s.	d.	£	s.	d.
	PROFIT AND LOSS ACCOUNT, <i>Dr.</i> ¹	18	228	0 0			
	To Stock at beginning	10			50	0 0	
	„ Purchases	16			150	0 0	
	„ Salaries	16			10	0 0	
	„ Sundry Expenses	16			4	0 0	
	„ Discounts	16			14	0 0	
	SALES, <i>Dr.</i>	16	175	0 0			
	Stock at the end of period	15	100	0 0			
	To P. and L. Account, <i>Cr.</i>	18			275	0 0	
	P. AND L. ACCOUNT, <i>Dr.</i> ²	18	47	0 0			
	To Capital Account	15			47	0 0	

whence we see at once that the net profit is £47.

308. Let us now make out our P. and L. Account from the closing entries in the Journal :

18.

PROFIT AND LOSS ACCOUNT					
<i>Dr.</i>	FOR THE MONTH ENDING JANUARY 31, 191-.		<i>Cr.</i>		
	£	s. d.	£ s. d.		
To Stock at beginning of month	50	0 0	By Sales	175	0 0
„ Purchases	150	0 0	„ Stock at end of the month	100	0 0
„ Salaries	10	0 0			
„ Sundry Expenses	4	0 0			
„ Discount	14	0 0			
„ Net Profit carried to Capital Account	47	0 0			
	<u>275</u>	<u>0 0</u>		<u>275</u>	<u>0 0</u>

In the above account the “Stock at the end of the month, £100,” has to be debited now to the Stock Account to show that on Feb. 1 we have £100 worth of goods in hand, while the net profit is carried to the *Cr.* side of the Capital Account, thus completing the double entry of the only two items in the Account for which it has not been completed.

309. Finally, we come to the **Balance Sheet**, which, as before, will include all the Assets and Liabilities of the firm and will NOT include the accounts dealt with under Profit and Loss — that

¹ £228 = total of entries immediately below.

² The difference between £275 and £228,

is to say, no Nominal Accounts are entered into the Balance Sheet.

Hence we have—

CAPITAL ACCOUNT, £749, as a Liability, for the business owes that amount to the capitalist, Henry James.

CASH, £1: Asset.

BANK, £713: Asset.

STOCK ON HAND, £100: Asset.

A. BELL owes nothing to us, nor do we owe him anything.

J. HUDSON owes us £10: Asset.

E. BROWN is one of our creditors to whom we owe £75: Liability.

The other accounts are nominal, but the student should be very careful to include Cash in hand and in Bank from the Cash Book.

BALANCE SHEET, JANUARY 31, 19—.

Liabilities.		Assets.	
HENRY JAMES—		Stock	£100
Capital . . .	£802	J. Hudson	10
Less drawings . . .	100	Cash	1
	<u>702</u>	Bank	713
Add Profit . . .	47		
	<u>£749</u>		
E. Brown & Co.	75		
	<u>£824</u>		<u>£824</u>

(We hope that the student has taken our advice and has made a complete set of Ledger Accounts, which he can now compare with the following model.)

310. MODEL LEDGER (III).

15.

Dr.				HENRY JAMES' CAPITAL ACCOUNT (P).				Cr.			
Jan. 15.	To Bank drawings	8 ¹	£ 100 0 0	Jan. 1.	By Balance	10	£ 802 0 0				
" 31.	" Balance c/d (Capital for next month)		749 0 0	" 31.	" Net Profit from P. and L. a/c	18	47 0 0				
			<u>849 0 0</u>				<u>849 0 0</u>				
				Feb. 1.	By Balance b/d (Capital for February)		749 0 0				

¹ The numbers refer to pages in Subsidiary Books

<i>Dr.</i>		STOCK ACCOUNT. ¹				<i>Cr.</i>					
Jan. 1.	To Balance (from December) . .	10	£	s.	d.	Jan. 31.	To Balance c/d to P. and L. a/c .	18	£	s.	d.
			50	0	0				50	0	0
„ 31.	To Balance from P. and L. a/c (value of stock in Hand)	18	100	0	0						

<i>Dr.</i>		A. BELL (P).				<i>Cr.</i>					
Jan. 1.	To Balance (from December) . .	10	£	s.	d.	Jan. 9.	By Cash	8	£	s.	d.
			40	0	0	„ 9.	„ Discount . .	8	15	0	0
„ 1.	To Goods	6	25	0	0				65	0	0
			65	0	0						

<i>Dr.</i>		J. HUDSON (P).				<i>Cr.</i>					
Jan. 1.	To Balance (from December) . .	10	£	s.	d.	Jan. 4.	By Cash	8	£	s.	d.
			30	0	0	„ 31.	By Balance c/d .		20	0	0
			30	0	0				10	0	0
Feb. 1.	To Balance b/d . .		10	0	0				30	0	0

<i>Dr.</i>		E. BROWN (P).				<i>Cr.</i>					
Jan. 2.	To Bank	8	£	s.	d.	Jan. 1.	By Balance (from December) . .	10	£	s.	d.
„ 2.	„ Discount . . .	8	1	0	0	„ 7.	By Goods	5	28	0	0
„ 16.	„ Bank	8	75	0	0				150	0	0
„ 31.	„ Balance c/d . .		75	0	0				178	0	0
			178	0	0	Feb. 1.	By Balance b/d . .		75	0	0

16.

<i>Dr.</i>		PURCHASES ACCOUNT (N).				<i>Cr.</i>					
Jan. 31.	To Total for month	5	£	s.	d.	Jan. 31.	By Balance c/d to P. and L. a/c .	18	£	s.	d.
			150	0	0				150	0	0

¹ When stock is stored in a warehouse, at the end of a period, we regard the Stock Account as a Real Account, but when the Stock Account relates to goods at the beginning of a period of working, as here, we shall regard it as a Nominal Account, and hence its balance goes to P. and L. Account.

Dr.		SALES ACCOUNT (N).				Cr.					
Jan. 31.	To Balance c/d to P. and L. a/c . . .	18	£	s.	d.	Jan. 31.	By Total for the month . . .	6	£	s.	d.
			175	0	0	„ 17.	By Bank . . .	8	25	0	0
			<u>175</u>	<u>0</u>	<u>0</u>				<u>175</u>	<u>0</u>	<u>0</u>

Dr.		SUNDRY EXPENSES ACCOUNT (N).				Cr.					
Jan. 12.	To Cash	8	£	s.	d.	Jan. 31.	By Balance c/d to P. and L. a/c . . .	18	£	s.	d.
			4	0	0				4	0	0
			<u>4</u>	<u>0</u>	<u>0</u>				<u>4</u>	<u>0</u>	<u>0</u>

Dr.		SALARIES ACCOUNT (N).				Cr.					
Jan. 28.	To Bank	8	£	s.	d.	Jan. 31.	By Balance c/d to P. and L. a/c . . .	15	£	s.	d.
			10	0	0				10	0	0
			<u>10</u>	<u>0</u>	<u>0</u>				<u>10</u>	<u>0</u>	<u>0</u>

Dr.		DISCOUNT ACCOUNT (N).				Cr.					
Jan. 31.	To Total Discounts allowed	8	£	s.	d.	Jan. 31.	By Total Discounts received	8	£	s.	d.
			15	0	0	„ 31.	By Balance c/d to P. and L. a/c . . .	18	14	0	0
			<u>15</u>	<u>0</u>	<u>0</u>				<u>15</u>	<u>0</u>	<u>0</u>

311. The order of procedure in Book-keeping is—

1. Opening entries made in Journal.
2. Entries made in Subsidiary Books.
3. Subsidiary Books closed at end of month.
4. Entries in Subsidiary Books posted to Ledger.
5. Trial Balance.
6. Closing entries made in Journal.
7. Nominal and Real Accounts balanced.
8. P. and L. Account prepared.
9. Capital and Personal Accounts balanced.
10. Balance Sheet prepared.
11. CONCLUSIONS DRAWN.

312. In posting such an item as “H. James returned to us goods valued at £5; we sent him a credit note,” enter in our Returns Inwards Book as usual and then open Ledger Accounts for H. James and “Returns Inwards.” Credit the former, “By

Returns, £5," and debit the latter, "To Total, £—" —that is, the total amount for the month. In a similar way treat "We returned goods to R. Tall, £10," only use the Returns Outwards Book.

EXAMPLES. LXXIII. (c)

1. What purpose does the Journal serve?
 2. Write a short essay on the use of the Subsidiary Books.
 3. If John Bell owes us £20 at the close of the month, on which side of his account does the balance fall?
 4. We have overdrawn our Bank Account by £100; how does the Cash Book show this?
 5. There is a *Dr.* balance in our Discounts Account. What does it mean?
 6. We have "Stock valued at £100" on hand on June 1. In what accounts will that appear in our June Ledger Accounts, and where shall we put the amount for July 1?
 7. Give, in order, the data necessary for completing a set of accounts from the Subsidiary Book entries to the Balance Sheet.
 8. What is the use of a P. and L. Account?
- Journalise the following and find the net capital (Questions 9 to 11):
9. T. Williams has on Jan. 1, cash in hand, £50; goods valued £100; T. Jones owes him £60; and he owes R. Brown £50.
 10. On Jan. 1, 19—, John Smith had cash in hand, £5 10s.; cash at Bank, £60 10s.; goods on hand, £125; and William Alton owed him £7. He owed to Arthur Roberts £27 10s.
 11. H. Thomas has cash in hand, £50; in Bank, £70; £100 due from T. Nell; and £60 due from R. Brown; stock valued £500; he owes T. Felling £70, and P. Roberts £100.
 12. Post from Wm. Towney's Purchases Book, § 171 (latter part), into the Ledger.
 13. Post into the Ledger from Walter Raleigh's (a) Purchases and (b) Sales Books, § 173 and § 174.
 14. Take Wm. Towney's Returns Outwards Book, open in his Ledger a Returns Outwards Account and an account for John Nelson, and post from § 177 into the Ledger.
Post into the Ledger Questions 15 to 17:
 15. The Cash Book entries in § 178.
 16. The Cash Book entries in § 180.
 17. The Cash Book entries in § 181.
 18. Post into the proper Ledger Accounts: "Jan. 10. Paid for furniture and fittings by cheque £200." "Jan. 12. Lent

Tom Brown £50." "Paid £100 in full settlement of H. Jago's account for £150."

19. Prepare a Trial Balance from the following Ledger balances: Cash, *Dr.*, £40; John Smith, *Dr.*, £10 15s.; capital, *Cr.*, £41 8s.; F. Clarkson, *Dr.*, £4 4s. 6d.; T. C. Jackson, *Cr.*, £10 10s.; R. T. Nicholls, *Dr.*, £5 6s. 6d.; R. S. James, *Cr.*, £6 8s.; F. H. Somerset, *Cr.*, £12; goods, *Dr.*, £10; and explain what the effect on a Trial Balance is (a) if an entry for £10 is posted to the *Dr.* instead of to the *Cr.* side of an account, and (b) if an amount of £1 is posted in error as 1s., but on the correct side.

20. The following is a statement of a trader's Credit Sales and Credit Purchases and Returns (Inward and Outwards). You are required to enter the transactions in the proper books of original entry and post to the Ledger Accounts: Feb. 3, 191-, bought from F. Grace, 2 doz. pocket knives at 4s. 6d. each; Feb. 3, sold to J. Abel, 1 doz. photo frames at 1s. each; Feb. 3, sold to J. Shrewsbury, 6 doz. dessert knives at 20s. per doz., less 5% trade discount; Feb. 3, received from B. Briggs, 1 case of carvers, 25s., returned damaged; Feb. 4, bought from G. Mead, 2 doz. silver photo frames at 5s. 6d. each, less 10% trade discount; Feb. 4, returned to N. Hurst, 1 doz. pairs of scissors at 18s. per doz., being the wrong size; Feb. 5, sold to W. Humphreys, $\frac{1}{2}$ doz. razors at 3s. each, and charged him carriage on same, 6d.; Feb. 5, sold to L. Townsend, 2 cases of fish knives and forks at £2 per case; Feb. 5, returned to F. Grace, $\frac{1}{2}$ doz. pocket knives at 4s. 6d. each, being of poor quality; Feb. 6, bought from B. Lilley, 2 doz. glass match-stands, silver-mounted, at 6s. each; Feb. 6, J. Abel returned $\frac{1}{2}$ doz. photo frames at 1s. each, not ordered; Feb. 7, sold to J. Hearne, 3 doz. pocket knives at 30s. per doz., less 5% trade discount; Feb. 7, sold to V. Gunn, $\frac{1}{2}$ doz. glass match-stands, silver mounted, at 8s. 3d. each; Feb. 8, bought from L. Spooner, 6 cases of fish knives and forks at £3 per case, less 10% trade discount.

21. Enter the following transactions into the Ledger: Feb. 1, 191-, Charles Dugmore began business with cash amounting to £120; Feb. 3, bought goods from R. Russell, £75 6s. 8d.; Feb. 5, bought goods for cash, £22 3s. 4d.; Feb. 6, sold goods to F. Shepherd, £21 2s. 6d.; Feb. 8, paid R. Russell on account, £20; Feb. 10, sold goods for cash, £30; Feb. 15, bought goods from C. Oliver, £10 12s. 5d.; Feb. 25, received cash from F. Shepherd, £20, and allowed him discount, £1 2s. 6d.; Feb. 28, paid trade expenses, £4 10s. 6d. Balance your Ledger and prepare a Trial Balance (both of totals and balances), also the P. and L. Account and Balance Sheet, valuing the final stock at £90.

22. Enter the following transactions in the Subsidiary Books

and then post to the Ledger Accounts: Feb. 1, 191-, John Thomas had a capital in cash of £100; Feb. 3, bought goods from R. Taylor, £40; Feb. 4, sold goods to F. Peters, £25; Feb. 8, sold goods to C. Griffin, £10; Feb. 9, paid R. Taylor on account, £20; Feb. 12, received cash from F. Peters, £25; Feb. 15, bought goods for cash, £16 8s. 6d.; Feb. 17, sold goods to C. Griffin, £11 10s.; Feb. 20, sold goods for cash, £5 5s.; Feb. 27, sold goods to C. Griffin, £5 10s.; Feb. 28, received cash from C. Griffin, £20, and allowed him discount, £1 10s. Balance the accounts in your Ledger and prepare a Trial Balance.

23. Make out a P. and L. Account and Balance Sheet for the accounts of Question 22, valuing the stock at £40 10s. 6d.

24. On December 1, 191-, Richard Morton's books showed the following balances: Assets—Cash at Bank, £85 17s. 6d.; stock of goods, £127 15s. 3d.; owing by W. Watson, £36 6s. 3d. Liabilities—Owing to C. Hobson, £31 6s. 3d.; owing to F. Fletcher, £18 12s. 9d.; capital, £200. Enter the above, and the transactions for the month, which follow, in the proper books, post to Ledger Accounts, and prepare a Trial Balance, as on December 31, 191-.

	£	s.	d.	£	s.	d.
Dec. 2. Paid cheque to F. Fletcher	18	3	0			
Discount	0	9	9			
	-----			18	12	9
„ 4. Sold goods to W. Watson				10	11	0
„ 7. Sold goods to D. Denison				46	11	8
„ 11. Received cash from W. Watson (on account)				15	0	0
„ 12. Paid cash to Bank				10	0	0
„ 12. Paid sundry expenses in cash				3	10	0
„ 14. Bought goods of C. Hobson				23	16	7
„ 16. Sold goods to D. Denison				6	13	0
„ 18. Withdrew from Bank for office cash				5	0	0
„ 19. Received cheque from W. Watson and paid same to Bank				20	8	0
„ 19. Allowed W. Watson discount				0	18	3
„ 24. R. Morton withdrew cash for private purposes				4	0	0
„ 29. Bought goods of F. Fletcher				33	13	3
„ 30. Sold goods for cash				7	10	0
„ 31. Paid in cash, sundry expenses				5	12	6

Prepare a P. and L. Account for the above transactions, valuing the stock at £151 11s. 7d.

25. On June 1, 191-, the books of P. Walker showed the following balances: Assets—Goods on hand, £97 10s.; cash in hand, £14; cash at Bank, £89; J. Smithson, £31 13s. 4d.; W. Clarkson, £18 10s. Liabilities—L. Thompson, £15 13s. 4d.; P. Walker's Capital Account, £235. Record the above and the following transactions in the proper books, post to Ledger Accounts, take out a Trial Balance and P. and L. Account, and determine the net profit, if the residual stock be worth £152 11s. 9d.

191-.	£	s.	d.	£	s.	d.
June 2. Received cash from J. Smithson	31	0	0			
And allowed him discount	0	13	4			
	-----			31	13	4
„ 4. Sold goods to W. Clarkson				25	10	0
„ 7. Paid into Bank				35	0	0
„ 10. Bought goods from L. Thompson				37	10	0
„ 15. Paid rates by cheque				4	15	0
„ 19. Received cash from W. Clarkson and paid it into Bank	17	15	0			
Allowed him discount	0	15	0			
	-----			18	10	0
„ 22. Bought goods from L. Thompson				12	15	0
„ 26. Paid L. Thompson by cheque He allowing me discount	50	10	0			
	2	13	4			
	-----			53	3	4
„ 28. Sold goods for cash				7	10	0
„ 30. Paid trade expenses for the month in cash				12	0	0
P. Walker drew cheque for private purposes				15	0	0

26. On March 1, 191-, Charles Henry Smithson commenced business as a grocer with £1000 capital, of which £950 was paid into his Banking Account, and £50 retained as cash in hand for business purposes. His transactions for the month were as follows: March 1, 191-. Purchased goods at J. Robinson & Son's auction mart, and paid cheque, £731 5s.; also bought office furniture and fittings for which he paid cash, £38. March 9. Sold to Mrs. B. Vero, goods, £7 5s. March 13. Purchased from Lipton's Ltd., tea, £28 10s. March 15. Purchased from J. G. Cooper, sugar, £13 5s. March 16. Paid Lipton's Ltd. a cheque

in full settlement of account, £27. March 18. Goods bought at J. Robinson's auction mart and paid cash, £10. March 19. Sold to Mrs. A. Harker, goods, £3 3s. March 25. Received from Mrs. B. Vero, cash, £7; and allowed her discount, 5s. March 29. Cash sales for month, £152; paid shop assistants' wages for month (cash), £5 6s.; paid rent for month (cheque), £5; paid trade expenses for month (cash), £9 10s.; paid into Bank, £102 5s. Enter the above items in the proper books, post to Ledger Accounts, and prepare a Trial Balance. From the foregoing, make out P. and L. Account and Balance Sheet, on March 31, 191-, taking the value of the stock on that date at £659 3s.

27. In Question 26 determine (1) what traders owe Smithson money; (2) to whom he owes money and the amounts; (3) the capital for April; (4) the net profit; (5) his cash in hand and at Bank. Is "capital" an asset or a liability of a business?

28. Dec. 1, 191-. A cycle dealer begins business with a capital of £120, of which he pays £100 into the bank. Dec. 3. He buys ten cycles from the Roman Cycle Co. at £6 5s. each, and pays by cheque. Dec. 4. He sells two cycles at £8 10s. each, and receives cash for the amount. Dec. 6. He buys three cycles on credit from Harrison & Co. for £18. Dec. 10. He sells on credit two of the Roman cycles at £8 7s. 6d. each, and one of the Harrison cycles at £8 5s. to John Thomas; he pays various expenses in cash, £5 5s. Make the necessary entries in the Ledger to record these transactions; prepare a P. and L. Account, Capital Account, and Balance Sheet, as on 10th December. Value the unsold cycles at cost price.

29. The following is the Manufacturing Account of the X.Y.Z. Co. Ltd., which has a capital of £40000: Dec. 31, 191-. Cost of materials, £8165; wages (including superintendence), £6284; power, £1000; wear and tear of machinery, £526; establishment charges, £742; value of materials unused, £1717. By sales, 10000 machines at £2 2s., £21000. You are required—(a) To find the profit; (b) the rate of profit per cent. on the cost price of each machine; (c) the rate of profit per cent. on the turnover; (d) the rate of profit per cent. on the capital.

30. John Cunningham acquired a restaurant business on Jan. 1, 191-. He paid into the Bank £600. His transactions were as follows: Jan. 6. Takings during week, £94 11s. 2d. Jan. 8. Paid into Bank, £60. Jan. 13. Takings during week, £99 10s. 4d. Jan. 15. Paid into Bank, £40; received accounts as under—J. Brown & Co., meat, £59 16s. 2d; W. Thomas, fish, game, etc., £18 17s. 3d.; R. Green, bread, etc., £7 9s. 4d.; H. Gowe Ltd., vegetables, etc., £6 18s. 3d.; R. Joker, minerals, etc., £16 17s. 4d. Jan. 20.

Takings during week, £100 15s. 8d. Jan. 24. Provisions, etc., paid for in cash during three weeks, £140 18s. 2d. ; paid following accounts by cheque—J. Brown & Co. (receiving discount, £2 19s. 2d.), £56 17s. ; H. Gowe Ltd. (receiving discount, 8s. 3d.), £6 10s. ; W. Thomas (receiving discount, 18s. 3d.), £17 19s. ; R. Green (receiving discount, 9s. 4d.), £7. Jan. 27. Paid rent in cash, £10 ; wages and sundry expenses, three weeks, £18 18s. 11d. On January 31 the value of the stock in hand was £50. Enter in proper books and post to Ledgers, debiting and crediting appropriate accounts, and prepare Trial Balance, P. and L. Account, and Balance Sheet.

31. John Howe, Albert Cole, and Andrew Barker were in partnership as wholesale fruiterers, etc., John Howe putting £360 in the business, Albert Cole £240, and Andrew Barker £120, which was paid into the Bank. Their transactions were: Aug. 2. Bought from Willingham & Co. Ltd., fruit, £126 17s. 4d. Aug. 3. Bought from John Upwell, potatoes, £59 16s. Aug. 6. Sold and received cash for fruit, £132 14s. ; sold and received cash for potatoes, £65 4s. ; paid carriage in cash, £1 2s. 7d. ; paid wages, etc., in cash, £3 17s. 6d. Aug. 8. Paid Bank, £180 ; bought J. Allen & Co., asparagus, £32 6s. 8d. Aug. 10. Paid J. Allen (receiving discount, £1 12s. 8d.), £30 14s. Aug. 11. Bought J. Coe, tomatoes, £38 16s. Aug. 12. Sold W. Almond, asparagus, £22 6s. ; sold W. Skimp, tomatoes, £43 7s. ; sold J. Turner, asparagus, £14 6s. 8d. Aug. 20. Paid carriage two weeks by cheque, £1 19s. 7d. ; paid wages, etc., two weeks by cheque, £7 15s. ; paid Willingham & Co. Ltd., by cheque (discount, £6 1s. 4d.), £120 16s. ; paid J. Upwell, by cheque (discount, £2), £57 16s. Aug. 27. Paid wages, etc., by cheque, £4 2s. 3d. ; paid carriage by cheque, 16s. 8d. Aug. 31. Paid rent and taxes for month by cheque, £5. Enter in proper books and post to Ledger, debiting and crediting appropriate accounts, and prepare Trial Balance. From the foregoing, make out P. and L. Account and Balance Sheet, dividing the profits or losses according to the capital invested.

32. John Miller commenced business, as a draper, on July 3, 191-, with £250 at the Bank, £3 cash in hand, and stock £300. The stock had not yet been paid for, having been obtained on credit as follows: J. Beale & Co., £110 ; F. Hall & Sons, £60 ; Thomas Fisher, £90 ; and Hugh Jones Ltd., £40. J. Miller also possessed furniture, fixtures, and fittings valued at £70. Open John Miller's Ledger with these items, and post, *through the Subsidiary Books*, to it, his transactions during the first week of July (as follows): July 3, 191-. Paid cash for stamps, 5s., and

stationery, 6s. 8d.; purchased from J. Beale & Co., 120 yards of flannelette at 4s. 3d. per dozen yards, on credit. July 4. Purchased from F. Hall & Sons 600 yards of shirting (240 yards at 8s. 3d. per dozen yards, and 360 yards at 10s. 9d. per dozen yards), on credit. July 5. Bought for cash, brown paper and string, 15s.; banked cash sales for July 3 and 4, £27 10s. July 6. Banked cash sales for July 5, £16 5s.; paid by cheque, J. Beale & Co., £30 on account; paid by cheque, Hugh Jones' account (less $2\frac{1}{2}\%$ discount). July 7. Paid by cash, carriage, 13s. 6d. July 8. Sold to Miss H. Hayman, on credit, 10 yards of sheeting at 1s. 5d. per yard, 1 dozen reels of assorted cottons for 2s. 3d., 2 pairs of lace curtains at 16s. 11d. per pair; received credit note from F. Hall & Sons for 8 yards of shirting at 10s. 9d. per dozen yards, which were damaged in transit and returned to Hall on the 8th inst.; banked cash sales for July 6 and 7, £32 15s.; drew and cashed cheque for £10, and paid wages, £7 5s. Balance the Ledger Accounts, taking the value of the stock at £261 8s. 7d., extract a "Trial Balance" as on July 8, 191-, and prepare P. and L. Account and Balance Sheet.

33. The following was the Balance Sheet of Henry Coulthard, a waste rubber merchant, as on December 31, 191-:—

<i>Dr.</i>	BALANCE SHEET.		<i>Cr.</i>	
	£	s. d.		
To Henry Coulthard's Capital Account	361	0 0	By machinery, fixtures, and fittings	120 0 0
„ Sundry Creditors:—			„ Debtors:—	
F. Nelson	£96	0 0	A. Coats	£72 0 0
G. Harrod	48	0 0	S. Wilcox	24 0 0
T. Arnold	24	0 0	B. Vickers	8 0 0
	168	0 0		104 0 0
„ Bank overdraft	6	0 0	„ Stock in hand	226 0 0
	£535	0 0	„ Cash in hand	15 0 0
	£535	0 0		£535 0 0

You are required to open the accounts in Henry Coulthard's Ledger which are necessary to record the above; and to post thereto, through the proper books of original entry, the following transactions: Jan. 1, 191-. Purchased, on credit, from T. Arnold, $\frac{1}{2}$ ton of motor inner tubes at £26 per ton; received cheque (which was paid into the Bank) from A. Coats for £70, and allowed him the balance of his account as discount; sold, for cash, 5 cwt. of ground rubber at £1 17s. 4d. per cwt. Jan. 2. Sold, on credit, to B. Vickers, 1 ton of cab tyres at 40s. per cwt.;

sold, for cash, $\frac{1}{2}$ ton of ground rubber at £23 2s. per ton. Jan. 3. Paid T. Arnold, by cheque, the amount of his account as on December 31, 191-, less 10 % discount; sold, on credit, to S. Wilcox, 2 tons of bus tyres at £42 per ton, and received cheque from him for the amount of his account as on December 31, 191-, less 5 % discount; drew cheque for £5 for private purposes. Jan. 4. B. Vickers returned, as unsuitable, $\frac{1}{2}$ cwt. of the rubber invoiced to him on the 2nd inst.; sent him a credit note for same; sold, for cash, 6 cwt. of inner tubes at 38s. 6d. per cwt. Jan. 5. Paid in cash, wages, £10 16s. 4d. (including insurance stamps); paid G. Harrod cheque for £18 on account; purchased, on credit, from F. Nelson, 2 tons of cab tyres at £41 10s. per ton, including charge for bags; paid cash for sundry trade expenses, £9 12s. 4d. Jan. 6. Purchased a weighing-machine for £12 from H. Jackson, and paid him by cheque; returned to F. Nelson 40 empty bags, and received credit note from him for 6s. 8d.; paid into Bank from cash, £21 9s. Balance the accounts, bring down the balances, take out a Trial Balance as on January 6, 191-, and prepare P. and L. Account and Balance Sheet, valuing the stock at £381 11s. 6d.

SECTION XX

INTEREST

A. Simple Interest

313. A friend of mine tells me that he has been offered a £300 house for £200, and that it is a very good bargain, but he finds himself unable to spare more than £100, and asks me to lend him the other £100, promising to pay me 4 % per annum for the loan. I lend him the £100, and he pays me £4 for the privilege of using my money for one year.

The £4 is called the **Interest** on the loan.

314. Again, if you were a dealer in fruit and had an unexpected offer of a cargo for a very low figure, you would borrow £300 to effect the purchase, and pay, say, 3s. or 5s. for the loan for a week or ten days.

Now the point to notice is this, that by obtaining a loan of £300 you are able—(1) To purchase the fruit cheaply; (2) to sell it, perhaps, for £340; while the total extra cost to you has been but a few shillings by way of interest, but there would be behind you, as well, an honourable commercial standing of your own building up.

The cases we have illustrated are such as occur day after day, and even every hour of the day, in the great commercial centres of the world.

315. It would be a simple matter for a well-known City merchant to borrow money, and the student should understand that the loan would be negotiated through a broker or a banker and NOT obtained from a "money-lender." In many cases, however, security for the loan would be given, and it might take the form of (1) a promissory note (Plate XIV., p. 470), (2) a bill of exchange (Plate XIII., p. 468), (3) a mortgage deed on real property, (4) a life policy or a bill of lading, etc. (See Plate in Part III.)

316. The sum of money borrowed or lent is called the **Principal**, and **Principal + Interest = Amount**.

The word **Amount** is used somewhat ambiguously, and the student should take care to note the senses in which it is used. We might say, for example: "**A sum of money which amounts to £100 is invested at 4 % for 5 years. To what will it amount?**" The word is used in the first case in its ordinary colloquial sense, but in the second case it means

Principal + Interest.

£100 invested for one year at 4 % per annum earns £4 interest; ∴ the amount of £100 in one year at 4 % per annum is £104.

It is also very necessary to notice the time for which a rate is quoted, for 5 % per month is a very different rate from 5 % per annum.

317. In the method of borrowing and of paying interest which we have described, you will see that we borrow £300, pay the interest due, and then return the principal at the end of the period for which we have borrowed it. Such a method of obtaining money is known as borrowing (or lending) at **Simple Interest**; another method, described on page 454, is known as borrowing at **Compound Interest**.

We shall always reckon interest to the nearest penny.

318. Simple Interest is most often used in transactions involving a number of days less than one year. Bankers, for instance, allow Simple Interest on deposits and "throw out" the interest every six months or twelve months, but if a client leaves that interest in the Bank for two or three years, as he may do, then the total amount due to him is the Simple Interest on the deposits for two or three years. In the same way, if a merchant invests £100 with the Corporation of a town and receives the interest half-yearly, if he wishes to know the total amount so received in ten years, he must employ Simple Interest to find it

out. We therefore include some questions involving a period of time greater than one year.

319. The following examples illustrate the application of Simple Interest :

EXAMPLE 1.—What interest must be paid for a loan of £200 for 7 days at 5 % per annum (p.a.) ?

$$\begin{aligned} \text{Interest on } \pounds 100 \text{ for 365 days at } 5 \% \text{ p.a.} &= \pounds 5 \\ \text{'' '' } \pounds 200 \text{ '' '' '' ''} &= \pounds \frac{200 \times 5}{100} \\ \therefore \text{'' '' '' '' } 7 \text{ '' ''} &= \pounds \frac{200 \times 5}{100} \times \frac{7}{365} \\ &= 3\text{s. } 10\text{d.} \end{aligned}$$

Hence, Interest (S.I.) = Principal (P) \times rate per cent. (R) \times time (T) \div 100, or, S.I. = $\frac{P}{100} \times R \times T$.

EXAMPLE 2.—Find the Simple Interest on £348 15s. 8d. for 2 years at $2\frac{1}{2}$ % p.a.

$$\begin{aligned} \text{Here we have S.I.} &= \pounds \frac{348 \cdot 7833}{100} \times 2 \cdot 5 \times 2 \\ &= \pounds 3 \cdot 487833 \times 2 \cdot 5 \times 2 \\ &= \pounds 17 \text{ 8s. } 9\text{d.} \end{aligned}$$

EXAMPLE 3.—To what will £1385 17s. 4d. amount if lent from 1st January to 15th June at 4 % p.a. Simple Interest ?

Note that £1385 17s. 4d. is the principal, NOT the amount.

$$\begin{aligned} \text{S.I.} &= \pounds \frac{1385 \cdot 8666}{100} \times 4 \times \frac{165}{365} \\ &= \pounds 25 \text{ 0s. } 1\text{d.} \\ \therefore \text{amount} &= \pounds 1385 \text{ 17s. } 4\text{d.} + \pounds 25 \text{ 0s. } 1\text{d.} \\ &= \pounds 1410 \text{ 17s. } 5\text{d.} \end{aligned}$$

320. EXAMPLE 1.—In what time will the interest on £325 15s. 6d. amount to £81 8s. $10\frac{1}{2}$ d. at $5\frac{1}{2}$ % p.a. ?

Decimalising, we have

£16·28875 is the interest on £325·775 at 5 % p.a. for 1 year

$$\begin{aligned} \pounds 1 \quad \text{''} \quad \text{''} \quad \text{''} \quad \text{''} & \quad \frac{1}{16 \cdot 28875} \text{ yr.} \\ \therefore \pounds 81 \cdot 4435 \quad \text{''} \quad \text{''} \quad \text{''} \quad \text{''} & \quad \frac{81 \cdot 4435}{16 \cdot 28875} \text{ yrs.} \\ & = 5 \text{ years.} \end{aligned}$$

EXAMPLE 2.—At what rate per cent. per annum will £760 10s. amount to £897 7s. 10d. if invested for 3 years?

$$\begin{aligned}\text{Interest} &= \text{£}897\ 7\text{s.}\ 10\text{d.} - \text{£}760\ 10\text{s.} \\ &= \text{£}136\ 17\text{s.}\ 10\text{d.} \\ &= \text{£}136\ 89.\end{aligned}$$

£22·815 is interest on £760·5 for 3 years at 1 % p.a.

$$\begin{array}{rcccc} \text{£}1 & & & & \frac{1}{22\cdot815} \% \text{ p.a.} \\ & \text{''} & \text{''} & \text{''} & \\ \therefore \text{£}136\cdot89 & & & & \frac{136\ 89}{22\cdot815} \text{''} \\ & & & & = 6 \% \text{ p.a.} \end{array}$$

321. In each of the examples we have given above the working has been more or less protracted. **Simple Interest tables** allow of much shorter working. Let us find the interest on £1 for 1 day at 1% p.a.

$$\begin{aligned}\text{Interest} &= \text{£} \frac{1}{100} \times 1 \times \frac{1}{365} \\ &= \frac{0\cdot01}{365} \\ &= \text{£}0\ 00002739726.\end{aligned}$$

We now compile a very easy table:

TABLE OF SIMPLE INTEREST ON £1 AT 1 % FOR 1 TO 9 DAYS.

Days.	£
1	0·00002739726
2	0·00005479452
3	0·00008219178
4	0·00010958904
5	0·00013698630
6	0·00016438356
7	0·00019178082
8	0·00021917808
9	0·00024657534

The student will now see that having once gone to the trouble of making this table the Simple Interest on *any* amount for *any* time at *any* rate can be found readily and simply. Hence the value of Simple Interest tables.

EXAMPLE 1.—Find, from the table, the interest on £1000 for 30 days at 5 % p.a.

We work at length :

Interest on £1	for one day at 1 %	= £0·00002739726
" £1000	" " "	= £0·02739726
" £1000	for 30 days at 1 %	= £0·8219178
" " "	" " " 5 %	= £4·109589
		= £4·1096
		= £4 2s. 2d.

EXAMPLE 2.—What is the interest on £240 12s. 6d. for 96 days at $3\frac{1}{2}$ % p.a. ?

Principal =	£240·625	
Interest on £1	at 1 % for 90 days	= £0·0024657534
" " " "	" " " " 6 "	= £0·00016438356
∴ " " " "	" " " " 96 "	= <u>£0·00263013696</u>
∴ " £1	at 3 % " 96 "	= £0·00789041088
" " $\frac{1}{2}$ %	" 96 "	= £0·00131506848
∴ " " $3\frac{1}{2}$ %	" 96 "	= <u>£0·00920547936</u>

∴ Interest on £240·625 = £240·625 × 0·00920547936, which, by contracted multiplication = £2 4s. 4d., to the nearest penny.

322. EXAMPLE 1.—The Post Office Savings Bank pays $2\frac{1}{2}$ % p.a. on every complete £1 standing to the credit of the depositor for one complete calendar month—that is, $\frac{1}{2}$ d. per £1 per month. Find the interest due on the following, up to December 31. December 31, Amount in Bank, £25 ; January 10, Withdrawal, £5 ; February 27, Deposit, £10 ; June 18, Deposit, £15 ; August 20, Withdrawal, £10 ; November 30, Deposit, £15.

The amounts standing to the depositor's credit and the interest due are :

January	£25 - £5 = £20 ;	Interest, 10d.
February	£20	" 10d.
March, April, May, June	£30	" 60d.
July	£45	" 22d.
August, September, }	£35	" 70d.
October, November }	£50	" 25d.
December	£50	" 25d.
	Total interest, 197d., or 16s. 5d.	

EXAMPLE 2.—A Bank pays interest at $2\frac{1}{2}$ % p.a. on minimum monthly balances. Calculate the interest due on 1st July from the following : March 31, Cash in Bank, £300 ; April 10, Deposit, £50 ; April 18, Withdrawal, £30 ; May 2, Deposit, £100 ; May 31, Deposit, £40 ; June 15, Withdrawal, £600.

Minimum amount in the Bank during April was £300; during May, £320; during June, £180;

∴ interest is due on £300 + £320 + £180 at $2\frac{1}{2}\%$ for 1 month, and amounts to $£8\cdot00 \times 2\cdot5 \times \frac{1}{12} = £1\ 13s. 4d.$

EXAMPLE 3.—A merchant owes £1000 on 1st November for goods received, pays £500 on that date, and also £200 on 10th November, £100 on 6th December, and the balance on 30th December. If he has to pay 5% p.a. on the amount overdue, find the interest charged.

£200 is 9 days overdue, or £1800 is 1 day overdue

£100 is 35 " " £3500 is 1 " "

£200 is 59 " " £11800 is 1 " "

∴ the interest due is equal to the interest on £17100 for 1 day at 5% p.a.

Interest on £1 for 1 day at 5% = £0·0001369863;

∴ " £17100 " " = £2 6s. 10d.

EXAMPLES. LXXIV.

Find, to the nearest penny, the Simple Interest as required (in Questions 1 to 12 using the method of Example 2, § 319):

1. £100 for 6 days at 5% p.a.
2. £150 for 15 days at 5% p.a.
3. £180 for 50 days at 4% p.a.
4. £230 for 25 days at 3% p.a.
5. £355 for 4 months at $2\frac{1}{2}\%$ p.a.
6. £658 for 8 months at $4\frac{1}{2}\%$ p.a.
7. £856 16s. for 2 years at 4% p.a.
8. £834 15s. 6d. for 3 years at $4\frac{1}{2}\%$ p.a.
9. £517 14s. for 95 days at $4\frac{1}{4}\%$ p.a.
10. £139 14s. 6d. for 228 days at $3\frac{3}{4}\%$ p.a.
11. £575 16s. for 135 days at $2\frac{3}{4}\%$ p.a.
12. £516 for 60 days at $4\frac{1}{4}\%$ p.a.

In Questions 13 to 22 use the table, § 321:

13. £100 for 6 days at 2% p.a.
14. £100 for 50 days at 2% p.a.
15. £200 for 8 days at 3% p.a.
16. £250 for 25 days at 5% p.a.
17. £350 for 12 days at 4% p.a.
18. £400 for 35 days at $\frac{1}{2}\%$ p.a.
19. £460 for 146 days at $1\frac{1}{2}\%$ p.a.
20. £520 for 154 days at $1\frac{1}{8}\%$ p.a.
21. £630 15s. for 270 days at $2\frac{1}{8}\%$ p.a.
22. £1250 16s. 8d. for 300 days at $3\frac{1}{8}\%$ p.a.

23. Confirm the results of Questions 1 to 12 by using the Simple Interest table (§ 321) and of Questions 13 to 22 by the method of Example 2, § 319.

24. To what does the principal in Questions 10 to 12 and 20 to 22 amount?

25. If 500 guineas be invested at $4\frac{1}{2}\%$ p.a. Simple Interest, to what will the interest amount if allowed to remain for $3\frac{1}{2}$ years?

26. Upon what amount is £11 5s. the Simple Interest for 10 months at $3\frac{3}{4}\%$ p.a.?

27. A clerk insures his life and may pay a premium of £10 10s. p.a., or he may add $2\frac{1}{2}\%$ to this amount and pay half of it every 6 months, or he may add 5% and pay one-quarter quarterly. What interest would he pay every 6 months and every quarter?

In what time will the following take place (Questions 28 to 33):

28. £517 14s. amount to £523 8s. 6d. at $4\frac{1}{4}\%$ p.a.?

29. £856 16s. produce £68 10s. 11d. interest at 4% p.a.?

30. £575 16s. produce £5 17s. 2d. interest at $2\frac{3}{4}\%$ p.a.?

31. £139 14s. 6d. amount to £143 at $3\frac{3}{4}\%$ p.a.?

32. £630 15s. amount to £640 13s. 4d. at $2\frac{1}{8}\%$ p.a.?

33. £1250 16s. 8d. produce £10 19s. 4d. at $3\frac{1}{8}\%$ p.a.?

What rate per cent. p.a. must be charged (Questions 34 to 39) so that—

34. £2 2s. may be interest on £153 6s. for 100 days?

35. £76 13s. may amount to £80 7s. in 200 days?

36. The interest on £536 16s. for 6 months may be £20 2s. 7d.?

37. The amount of £275 10s. may be £285 0s. 10d. in 4 months?

38. £250 16s. may amount to £258 6s. 6d. in 9 months?

39. £2 16s. 8d. may be the interest on £229 19s. for 90 days?

40. An insurance company receives £205600 in premium income up to 30th June in one year. If that amount be invested at $3\frac{1}{2}\%$ for the rest of the year, what profit will the company have made?

41. Given that the interest on £100 for 1 day at 4% is £0.0109589, make a table showing the interest at that rate for 1, 2, 3, up to 9 days. Use the table to find the interest on £200 for 271 days, to the nearest penny.

42. A merchant agrees to pay a bill for £119 10s. 9d. on 10th

January, but is unable to do so until 10th April. If interest is reckoned at $4\frac{1}{4}$ % p.a., calculate the amount due on 10th April.

43. If we lend £1238 to the Corporation of Lipworth on the security of the rates, and interest is payable half-yearly on 31st March and 30th September at the rate of $3\frac{1}{4}$ % p.a., calculate the amount due each half-year.

44. In 1910-12 the Japanese Government raised an internal loan¹ of yen 276,220,000 at 4 %. Of this amount yen 45,434,000 has been redeemed. How much interest per annum has still to be paid? (Answer in pounds.)

45. A grocer finds he has £1500 which he can lend, so he puts £350 out at $3\frac{1}{2}$ % p.a. for 6 months, £400 at $5\frac{1}{4}$ % p.a. for 4 months, and the remainder at $4\frac{1}{2}$ % p.a. for 8 months. What amount does he receive in interest?

46. What income-tax would the grocer of the last question pay on the interest received at ls. 3d. in the pound, and what did he pay on the original £1500 of earned income at 10d. in the pound?

47. A banker lends £550 from 12th June 1915 to 18th January 1916² at 5 % p.a. What interest does he receive?

48. What interest should be paid for a loan of £1000 from 25th November 1915 to 21st March 1916 at 4 % p.a.?

49. For how much can I borrow 50000 dollars at $4\frac{1}{2}$ % p.a. from 25th December 1915 to 25th March 1916?

Questions 50 to 54 relate to the Post Office Savings Bank.³ (See Example 1, § 322.)

50. I deposit £30 on 31st December, and draw out the whole on 1st March; what interest have I earned?

51. What interest is due on £36 deposited 15th January and drawn out 15th March?

52. If £48 is deposited on 25th February and the whole withdrawn on 8th December, what is the amount so withdrawn, including interest?

53. What interest should the Savings Bank pay on the following account: £26 deposited 28th February; £12 deposited

¹ An Internal Loan is raised if and when a Government, e.g. the Swiss Government, asks the inhabitants of the country (Switzerland) to subscribe it. A Foreign Loan is one which is raised by appealing to foreign bankers and nations.

² Look out for leap years in questions such as these (§ 216).

³ If £1 is put in on 30th or 31st January and remains in till 28th February no interest is paid. If it remains till the morning of 1st March, interest is paid. Deposited 16th January, drawn out 15th February, no interest paid. Deposited 28th February, drawn out 1st April, interest is paid.

18th March; £5 withdrawn 20th April, if the interest is paid up to and including 31st December of the current year?

54. Make up the interest on the following Bank Book statement:

Deposits.	Withdrawals.
January 20, £15.	...
February 8, £16. ¹	March 5, £18.
April 15, £8.	May 10, £15.
June 21, £16.	July 5, £10.
August 30, £3.	...
September 20, £1.	...
December 30, £3.	...

55. If the capital of a marine insurance company be yen 10,300,000, and interest is paid at $4\frac{3}{4}\%$ p.a. to the 5860 shareholders, what is the average amount each one receives per annum?

56. A Bank has 55,356,500 francs out on loan, and the average rate of interest earned is $4\frac{1}{4}\%$ p.a.; what is the income of the Bank every quinquennium?

57. A company places £58654 12s. 6d. on deposit at Bank as the result of one year's working. If interest is paid at the rate of $5\frac{1}{2}\%$ p.a., what is the total amount the company will have to its credit in 9 months?

58. It is proposed to construct some drainage works in Spain at a cost of 1,060,630 pesetas. Calculate the interest upon this amount for 3 years at $4\frac{1}{2}\%$, and express the result in English money.

59. A merchant dies worth £750350 personalty on 20th January 1914, and the estate duty is at the rate of 14%, but his executors do not pay the duty till 30th June and are charged 3% p.a. interest by the Government. What is the total amount paid into the coffers of the State?

60. What should I receive quarterly upon £1000 15s. 6d. invested at 10% p.a.?

61. Calculate the Simple Interest on 10560 francs invested at 3% p.a. if it accumulates for 5 years.

62. An American banker has had 25580 dollars out at $3\frac{1}{2}\%$ p.a. for $4\frac{1}{4}$ years. What amount can he then draw out without touching his original deposit?

63. Calculate the interest I have to pay on a loan of a quarter of a million pesetas for 9 months at $5\frac{1}{2}\%$ p.a.

¹ Not more than £50 can be deposited in any year, but if £70 has been withdrawn in any one year in one sum, all of it may be replaced regardless of the £50 limit. During the war the "limit" could be exceeded.

64. A clerk borrows £500 from a money-lender for $2\frac{1}{2}$ years at 3 % per month. He takes the arrangement to be 3 % per annum. How much does he pay for his inexperience?

65. Jonah Macpherson's bankers pay 3 % on the minimum monthly balance. How much interest should Mr. Macpherson receive at the close of the year (31st Dec.) if his account is as follows:

December 31, £1000.

Deposits.	Withdrawals.
January 8, £500.	February 18, £50.
March 10, £600.	...
April 18, £350.	May 20, £400.
September 21, £1000.	...
November 5, £800.	...

66. Calculate the interest due on the following when the books are made up at the close of the year:

Deposit, 200000 dollars.	
Rate on December 31	2½ % p.a.
„ March 15	2¾ % „
„ June 25	3½ % „
„ August 20	3 % „
„ November 30	4 % „

which continues to the end of the year.

67. £1000 is deposited by a merchant on 31st December when the rate of interest is $2\frac{1}{2}$ % p.a.; on 1st June the rate becomes 3 % p.a.; what amount stands to his credit at the close of the year?

68. A clerk agrees to purchase premises valued at £800 on the understanding that he pays 20 % in cash and the remainder in ten equal instalments at intervals of 6 months, together with interest at the rate of 5 % p.a. on the amount outstanding at the beginning of each 6 months. Find the total amount that he pays, and the time it takes him to clear his debt.

(Note.—He pays 6 months' interest on all but 20 % at the time when he pays that 20 %, and in 6 months' time 5 % on all but 20 % and the first instalment.)

69. At what rate per cent. per annum would the clerk of the previous question have had to borrow enough money to pay the £800 in cash so that it might be as cheap as paying by instalments?

B. Compound Interest

323. Compound Interest, the second means by which money may be borrowed or lent, will probably be made clear by the following illustrations :

We have worked our business all the year and have made £1000 profit. We deposit this sum at the Bank and are paid 4 % p.a. upon it. At the end of the year the amount standing to our credit at 4 % will be £1000 (Principal) + £40 (Interest) = £1040.

Let us suppose¹ that we have no occasion to draw this out, and that we leave it in the Bank and receive interest not only on the £1000 but also on the £40—then will the £1000 give us another £40 interest, and the £40 interest for the first year produces, as you will have learnt, £1 12s. ; so that we have :

£	s.	d.	
1000	0	0	= Original principal.
→40	0	0	= Interest for first year.
1040	0	0	= Principal for second year.
40	0	0	= Interest on £1000 for second year.
1	12	0	= Interest on £40 for second year.

↑

Making a total of £1081 12s. at the end of the second year.

Money lent in this way is said to be lent at **Compound Interest**.

324. Another way in which Compound Interest enters into commercial enterprises is in connection with life insurance calculations, where a bonus is paid on the value of the policy at the end of either three or five years, and then at the end of the next period the bonus is paid both on the value of the policy and on the previous bonus, so that we may say that the policy is earning money at Compound Interest.

So also an insurance company, in calculating the amount to be charged in premiums, allows for the fact that the amount paid in any year can be invested at Compound Interest for twenty or thirty years, and so the "Premium Income" earns money (§ 249—§ 256). See also Part III.

325. Again, suppose that £5000 has been collected to build a memorial hall, and it is undesirable to make any further public

¹ See § 318. The Post Office pays Compound Interest, but Banks in general "throw out" the interest periodically.

appeal although another £300 is required. All that it is necessary to do is to deposit the £5000 in a bank at 4 % p.a., and at the end of a year it will be worth £5200, while if it be left a little longer it will, at Compound Interest, give the sum required automatically.

326. EXAMPLE 1.—What is the Compound Interest on £200 invested for 3 years at 5 % p.a. ?

In Compound Interest sums we shall decimalise the shillings and pence, and reconvert to money at the end of the sum.

$$\begin{array}{rcl}
 \text{£}200 & = & \text{Principal for first year.} \\
 \text{10} & = & \text{Interest for first year, i.e. } \text{£} \frac{200}{100} \times 5. \\
 \hline
 \therefore \text{£}210 & = & \text{Principal for second year.} \\
 \text{10}\cdot\text{5} & = & \text{Interest for second year, i.e. } \text{£}2\cdot10 \times 5. \\
 \hline
 \text{£}220\cdot\text{5} & = & \text{Principal for third year.} \\
 \text{11}\cdot\text{025} & = & \text{Interest for third year, i.e. } \text{£}2\cdot205 \times 5. \\
 \hline
 \text{£}231\cdot\text{525} & = & \text{Principal for fourth year.}
 \end{array}$$

\therefore in three years £200 amounts to £231·525.

$$\begin{aligned}
 \therefore \text{interest required} &= \text{£}231\cdot\text{525} - \text{£}200 \\
 &= \text{£}31 \text{ 10s. 6d.}
 \end{aligned}$$

Simple Interest for same period = £30.

EXAMPLE 2.—Find the Compound Interest on £754 15s. 8d. invested for $2\frac{1}{2}$ years at 5 % p.a.

$$\begin{array}{rcl}
 \text{£}754\cdot\text{7833} & = & \text{Principal for first year.} \\
 \text{37}\cdot\text{7392} & = & \text{Interest for first year.} \\
 \hline
 \text{£}792\cdot\text{5225} & = & \text{Principal for second year.} \\
 \text{39}\cdot\text{6261} & = & \text{Interest for second year.} \\
 \hline
 \text{£}832\cdot\text{1486} & = & \text{Principal for third year.} \\
 \text{20}\cdot\text{8037} & = & \text{Interest for half-year, i.e. } \frac{8\cdot321486}{2} \times 5. \\
 \hline
 \text{£}852\cdot\text{9523} & &
 \end{array}$$

$$\begin{aligned}
 \text{Compound Interest} &= \text{£}852\cdot\text{9523} - \text{£}754\cdot\text{7833} \\
 &= \text{£}98\cdot\text{1690} \\
 &= \text{£}98 \text{ 3s. 5d., to the nearest penny.}
 \end{aligned}$$

EXAMPLE 3.—If £386 12s. 6d. be invested at 6 % p.a. for

2 years, calculate the sum to which the principal will amount at Compound Interest payable *half-yearly*.

$$\begin{aligned}
 & 6\% \text{ p.a.} = 3\% \text{ per half-year.} \\
 \underline{\pounds 386\cdot 625} & = \text{Principal for first half-year.} \\
 11\cdot 5988 & = \text{Interest for first half-year.} \\
 \underline{\pounds 398\cdot 2238} & = \text{Principal for second half-year.} \\
 11\cdot 9467 & = \text{Interest for second half-year.} \\
 \underline{\pounds 410\cdot 1705} & = \text{Principal for third half-year.} \\
 12\cdot 3051 & = \text{Interest for third half-year.} \\
 \underline{\pounds 422\cdot 4756} & = \text{Principal for fourth half-year.} \\
 12\cdot 6743 & = \text{Interest for fourth half-year.} \\
 \underline{\pounds 435\cdot 1499} & = \text{Principal for fifth half-year, i.e. principal} \\
 & \text{at beginning of third year.} \\
 \therefore \text{the amount required is } & \pounds 435\cdot 1499 \\
 & = \pounds 435 \text{ 3s., to the nearest penny.}
 \end{aligned}$$

327. It is possible to find the Compound Interest on any sum of money by reference to Compound Interest Tables and by the application of logarithms. These methods are described in Part III.

EXAMPLES. LXXV.

(To be regarded as Compound Interest sums except where otherwise stated.)

1. What is the Compound Interest on $\pounds 150$ for 2 years at 3 % p.a.?
2. Find the Compound Interest on $\pounds 175$ for 3 years at 2 % p.a.
3. To what sum does the Compound Interest on $\pounds 240$ for 2 years at 4 % p.a. amount?
4. Find the Compound Interest on $\pounds 350$ for 3 years at 4 % p.a.
5. What is the Compound Interest on $\pounds 550$ for 4 years at 2 % p.a.?
6. Find the Compound Interest on $\pounds 460$ for 2 years at $2\frac{1}{2}\%$ p.a.
7. If a banker invested $\pounds 750$ at 3 % p.a. for 4 years, how much interest would he receive at Compound Interest?
8. How much more did the banker of the last question receive than if he had invested at Simple Interest?
9. What is the Compound Interest on $\pounds 350$ 10s. invested for 2 years at 3 % p.a.?
10. How much interest would a stockbroker receive on investing $\pounds 430$ 15s. for 3 years at 4 % p.a.?

11. What interest would be derived from £364 12s. 9d. invested at $2\frac{1}{2}$ % p.a. for 2 years?

12. To what does £350 5s. 8d. amount if invested for $2\frac{1}{2}$ years at $3\frac{1}{2}$ % p.a.?

13. What is the Compound Interest on 50000 francs invested for $2\frac{1}{2}$ years at $3\frac{1}{4}$ % p.a.?

14. Calculate the Compound Interest on £738 10s. 9d. for $3\frac{1}{4}$ years at 2 % p.a., and find by how much it exceeds the Simple Interest.

15. What shall I receive in interest at the end of 4 years from 50560 dollars invested at $3\frac{1}{2}$ % p.a.?

16. Find the Compound Interest which an Italian merchant who invests 50000 lire for $2\frac{1}{2}$ years at $3\frac{1}{4}$ % p.a. will receive at the end of the period named.

17. Find the Compound Interest on £375 18s. 9d. invested for 2 years at 4 % p.a., payable half-yearly. By how much does the Compound Interest exceed the Simple Interest?

18. Determine the amount due at the end of 18 months on £156 12s. placed out at Compound Interest at 4 % p.a., payable quarterly.

19. What will be the amount of £274 13s. 6d., at 3 % p.a., payable half-yearly, in $2\frac{1}{2}$ years?

20. Find the difference between the Compound Interest on £355 15s. 3d., invested for 2 years at 12 % p.a., payable quarterly, and the same rate payable annually.

21. If a grocer, who had £5000 capital in his business, made a profit of $5\frac{1}{2}$ % on his capital in a year's working, and he invested one-fifth of that profit for 3 years at 3 % p.a. Compound Interest, to what would the money invested amount?

22. A dealer in antiques has a picture worth £1000, and he reckons that its value increases 20 % every 3 years. Calculate its value at the end of 12 years.

23. If the dealer of the last question had sold the picture at the end of 9 years, what profit would he have made if his cost price were £750?

24. A fish buyer of Newfoundland invests 10000 dollars in Montreal at 4 % p.a. and 55000 francs in Lyons at 3 % p.a. Find which investment has brought him in the greater income at the end of $2\frac{1}{2}$ years, and the difference between the incomes in dollars. (1 (Newfoundland) dollar = 4s. 2d.; 1 franc = 9·513d.)

SECTION XXI

DISCOUNT

328. Merchants very often prefer to be paid "cash on delivery" rather than to allow credit; in business, therefore, you would be prepared to accept from one of your debtors a little less than the actual amount due so that you might get the money at once, rather than wait a month or so for the full amount.

This is true for two reasons:

I. If you have the money it is no longer in the smallest degree uncertain, while if it is to be paid in the future there is more or less risk.

II. If you have the money you can use it, probably to very great advantage (see Interest, § 314).

Suppose, then, that a debtor owes you £500, payable in one month, you might accept £498 and allow him £2 in return for his immediate payment. This allowance, whenever and however made, is called a DISCOUNT, and the chief reason why merchants allow discount is to get "cash down."

We shall divide the subject into three parts:

A. Cash Discount.

B. Trade Discount.

C. Banker's, or Commercial Discount, and True Discount.

A. Cash Discount

I. RETAIL

329. A person goes into a house furnisher's shop and buys £100 worth of furniture, but does not wish to pay cash down. The retailer, however, wants cash, and so offers him a 5 % cash discount—that is to say, he offers to accept £95 *cash* instead of £100 on *credit*.

Such a discount is called a CASH DISCOUNT.

330. Again, a tailor will often allow $2\frac{1}{2}$ % cash discount, a pianoforte dealer as much as 50 %, and very frequently we see on dairymen's carts, " $2\frac{1}{2}$ % cash discount on weekly (or monthly) accounts."

II. WHOLESALE

331. The wholesale merchant allows the retailer a cash discount if his account is settled in a stated time, which is usually a month after delivery, and, in London, accounts between whole

sale and retail dealers are usually settled on the 10th of the month. A wholesale invoice usually states the conditions under which a cash discount is allowed.¹

332. EXAMPLE 1.—A tailor allows his customers 5 % for cash, calculate the cash price of a suit of clothes priced £3 3s.

Cash discount = 5 % of £3 3s. = 3·15s. = 3s. 2d., *i.e.* 3s.
 ∴ cash price = £3.

EXAMPLE 2.—A dairyman allows a cash discount of $2\frac{1}{2}$ % on monthly accounts. If the actual amount paid be £2 10s., what was the gross amount of the account?

A net amount of £97 $\frac{1}{2}$ would mean a gross amount of £100

∴	"	"	£1	"	"	$\frac{£100}{97\frac{1}{2}}$
∴	"	"	£2·5	"	"	$\frac{£100 \times 25}{97\cdot5}$

= £2 11s. 3d.

EXAMPLE 3.—What cash discount does a grocer allow if he receives 18s. 4d. on an account for 18s. 9d. ?

Cash discount on 18s. 9d. is 5d.

" " 1s. " $\frac{5}{18\cdot75}$ pence

" " 100s. " $\frac{500}{18\cdot75 \times 12}$ shillings

∴ " " is $\frac{500}{18\cdot75 \times 12}$ % = 2·22 %.

EXAMPLES. LXXVI.

1. Explain what is meant by cash discount, and show what purpose it serves in commerce.

Allow the cash discount named on the amounts quoted in Questions 2 to 13, giving the answers to the nearest penny :

- | | |
|--|--|
| <p>2. 5 % on £8 15s. 6d.
 3. 6 % on £12 14s. 8d.
 4. 10 % on £3 12s. 4d.
 5. $12\frac{1}{2}$ % on £1 4s.
 6. $7\frac{1}{2}$ % on 19s. 6d.
 7. 15 % on £25 12s. 8d.</p> | <p>8. 18 % on £100 15s. 8d.
 9. 20 % on 100 guineas.
 10. 25 % on £15 14s. 9d.
 11. $33\frac{1}{3}$ % on £48 19s. 6d.
 12. 24 % on £84 15s. 1d.
 13. 22 % on 12s. 9d.</p> |
|--|--|

¹ See Examples XXXVIII., Questions 9, 10, 19, 23.

Calculate the gross amount of invoices when the net amount and the cash discount rate are as follows (Questions 14 to 25):

Net Amount.	Rate of Discount.	Net Amount.	Rate of Discount.
14. 15s. 8d.	$2\frac{1}{2}\%$	20. £1 1s.	$12\frac{1}{2}\%$
15. £1 12s. 4d.	3%	21. 18s. 9½d.	$7\frac{1}{2}\%$
16. £3 15s. 6d.	$1\frac{1}{2}\%$	22. £21 15s. 9d.	15%
17. £8 6s. 9d.	5%	23. £82 12s. 10d.	18%
18. £11 19s. 5d.	6%	24. £84	20%
19. £3 5s. 1d.	10%	25. £32 13s.	$33\frac{1}{3}\%$

26. A clerk pays 15s. 6d. for a pair of boots, and has been allowed 5%. What was the original price?

27. If a carpet is offered at £10 10s. and $2\frac{1}{2}\%$ allowed for cash, find the cash price of the carpet.

28. I am offering a number of clocks at the popular figure of 2s. 6d., with a cash discount of 2d. in the shilling. What did I pay per dozen if I gain 15% (a) on my cost price; (b) on my selling price?

29. A sports supply firm advertises cowhide cricket bags at a cash discount of 10%. If a cricketer pays 24s. for his bag, what was it marked?

30. My butcher's account amounts to 15s. 9d. and he professes to have allowed me $2\frac{1}{2}\%$. What is the gross amount?

31. A Strand auctioneer offers a plaster representation of the "Venus of Milo" for £25, declaring that he has allowed a cash discount of 20%. What might have been the value of the goddess?

32. A bookseller obtains for you the latest *Statistical Abstract of the British Self-Governing Dominions*,¹ etc., for 1s. 8d. It is published at 2s. What discount per cent. does he allow?

33. Some jewellers in London have been holding sales, "because the premises are about to be pulled down," for upwards of five years, and have been offering $12\frac{1}{2}\%$ off marked prices. What should one pay for the following articles: (1) an engagement ring marked 10s. 6d.; (2) a gold hunter watch priced £5 5s.; (3) a bracelet, £4 14s. 6d.; (4) a pair of silver-backed hair brushes, 45s.? (Give the prices to the nearest shilling in favour of the jeweller.)

34. From the data given make out a carefully ruled statement, putting prices for the figures given, which are either pints, pounds, or, in the case of eggs, dozens. Reckon 4d. qt. for milk;

¹ This book is full of information. Get it.

6d. qt., nursery milk; 1s. 6d. lb., cream; 1s. 4d. lb., fresh butter; 1s. 6d. lb., Dorset butter; 1s. 6d. doz., eggs; 1s. doz., cooking eggs.

Week ending..... 19..... £ s. d.

Amount brought forward								—	—	—
	Sun.	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.			
Milk	5	4	6	5	6	8	4			
Nursery milk	4	3	4	4	4	4	4			
Cream	1	—	—	1	—	—	1			
Fresh butter	1	2	1	1½	2	1	1			
Dorset butter	1	—	2	—	—	1	—			
New laid-eggs	1	½	—	1	1	—	1			
Cooking eggs	1	2	—	2	—	2	—			
Cash discount, 2½ %										
Total								£		

35. Allow the cash discount quoted in the following list of articles which are to be included in an invoice. Charge for the casks, etc., as NOT having been returned (supply names, etc.): Jan. 12, 8 5-gall. drums lamp oil, 4s. 6d. per drum; 3 casks (40 galls.) lamp oil, 37s. 1d. each; 3 10-gall. casks linseed oil, 3s. 6d. per gall.; 2 8-gall. drums linseed (boiled), 3s. 6d. per gall.; 3 galls. machine oil, 1s. 10d. per gall.; 8½ galls. gas-engine oil, 2s. 6d. per gall.; 12 2-gall. tins motor spirit, 3s. each; 5 galls. Bosphorus air-cooled motor-oil, 3s. 6d. per gall.; 12 galls. Colza (French) oil, 3s. 3d. per gall.; 6 14-lb. tins deep chrome paint, 3½d. per lb. Casks, 1s. each; drums, 7s. 6d.; tins, 6d. each; all jars contained in rest of order, 5s. 6d. Carriage, 2d. per gallon or per 14 lb. Cash discount, 7½ %.

36. Make out an invoice for the following, allowing the cash discount quoted (supply names): 15 lb. butter @ 1s. 3d.; 10 lb. Irish salt @ 1s. 2d.; 12 lb. margarine @ 6½d.; 12½ lb. English Cheddar @ 11d.; 6½ lb. English Stilton @ 1s. 2d.; 8 lb. lard @ 8½d.; pail of American lard, 28 lb., @ 7½d.; gammon, 13 lb

@ 10d. ; prime quarter side, 11 lb. @ 1s. $0\frac{1}{2}$ d. ; 6 galantines chicken and ham, 1s. $10\frac{1}{2}$ d. each ; 3 galantines turkey and tongue, 1s. $10\frac{1}{2}$ d. each. 8 packages charged 6d. each ; rail charges, 12s. 6d. ; cash discount, 5 %.

37. A retailer's cost price is to his marked selling price as 8 : 15. He allows a cash discount to a customer such that cost price is to the actual selling price as 6 : 11. At what rate per cent. does he allow a cash discount ?

B. Trade Discount

333. A wholesale dealer in silver, silver-plate, etc., issues a price list, which costs him perhaps £5000 to produce, and instead of charging the retailer the actual prices quoted he allows him a discount (for reasons given below), which may vary from 20 % to 50 %, while in some trades it is as low as 10 % or as high as 75 %.

The discount that the wholesale dealer allows the retailer off the list price is called a Trade Discount.

334. If now the manufacturer raises his prices obviously the price list might be thrown out entirely, and the wholesale house might have to issue a new one. Clearly enough this is a very costly matter, and to avoid the expense the prices stand as they are, but a smaller trade discount is allowed.

Thus, if a particular kind of watch were listed at £10, and a trade discount of 25 % were allowed, then the retailer would pay £7 10s. for it. If the manufacturer raised his price, either (1) the £10 would have to be altered to, say, £12, and the watch would then cost £9 ; or (2) the wholesale dealer could allow 10 % trade discount instead of 25 % on the list price of £10, and the watch would then cost £9, but the LIST PRICE would remain as before.

Thus trade discount is a means whereby the wholesale dealer can adjust the price charged to the retailer so as to meet any fluctuations of the market of the manufacturer, and thus save the cost of producing a new price list.

If the student were to take up almost any price list issued in the last five years he would find a slip enclosed saying that the trade discount had been reduced from, say, 25 % to 10 % because of increased cost of production or of raw material—wood, wool, cotton, etc.

335. EXAMPLE 1.—Messrs. Webb & Co., house furnishers,

have a suite listed at 30 guineas and allow 20 % trade discount. What does the retailer pay for it ?

$$\begin{aligned} 20 \% \text{ on } 30 \text{ guineas} &= \frac{20}{100} \text{ of } £31.5 \\ &= £6.3 \\ \therefore \text{retailer pays } &£31.5 - £6.3 \\ &= £25.2 \\ &= £25 \text{ 4s.} \end{aligned}$$

EXAMPLE 2.—A retail dried-fruit merchant buys at a trade discount of $12\frac{1}{2}\%$. What is the list price of a consignment of currants for which he pays £18 10s. ?

$$\begin{aligned} \text{Retail price, } £87\frac{1}{2}, &\text{ gives list price } £100 \\ \text{,, ,, } £1, &\text{ ,, ,, } £\frac{100}{87.5} \\ \text{,, ,, } £18.5, &\text{ ,, ,, } £\frac{100 \times 15}{87.5} \\ &= £21 \text{ 2s. 10d.} \end{aligned}$$

EXAMPLE 3.—If the list price of a motor-car is 128 guineas, and the retail dealer obtains the same for 102 guineas, find the trade discount.

$$\begin{aligned} \text{The retail price is } &\frac{102}{128} \text{ of the wholesale price} \\ \therefore \text{the ,, ,, } &\frac{102}{128} \text{ of } 100 \% \text{ ,, ,,} \\ &= 79.7 \% ; \\ \therefore \text{the retail price is } &79.7 \% \text{ of the wholesale price ;} \\ \therefore \text{the trade discount is } &20.3 \% \text{, i.e. } 20 \% . \end{aligned}$$

EXAMPLE 4.—Brooks & Co. manufacture crystal glass vases which they list at £60 per dozen, and allow the wholesale trade a trade discount of 20 %. The cost of manufacture advances 5 %; at what rate must they allow a trade discount to avoid altering the list price ?

First list price is £60 per dozen.

First price to wholesale dealer is £60, less 20 % of £60, or £48.

Second list price ought to be £60 + 5 % of £60, or £63.

Hence the price the wholesale dealer pays must bear to £63 the same ratio that £48 bears to £60 ;

$$\therefore \text{price paid by wholesale dealer} = £\frac{48}{60} \times 63 = £50 \text{ 8s. ;}$$

and all that remains is to find what rate of discount is allowed on £60 to give £50 8s.

Discount on £60 = £9 12s.

$$\therefore \quad \therefore \quad \text{£100} = \text{£} \frac{100 \times 9.6}{60} = \text{£16}$$

\(\therefore\) trade discount is reduced to 16 %.

EXAMPLES. LXXVII.

1. Explain the use of trade discount in commercial operations, and distinguish it from cash discount. Could both be allowed on any transaction? Does trade discount apply to the retail as well as to the wholesale trade?

Find the retailer's cost price from the following wholesale list prices and the given trade discount rate (Questions 2 to 11):

Wholesale List Price.	Trade Discount.	Wholesale List Price.	Trade Discount.
2. £5 . . .	20 %.	7. £25 14s. 9d. . .	33 $\frac{1}{3}$ %.
3. £7 10s. . .	18 %.	8. £158 13s. 9d. . .	40 %.
4. £8 15s. . .	12 $\frac{1}{2}$ %.	9. £459 17s. 6d. . .	45 %.
5. £10 10s. . .	50 %.	10. £100 16s. 8d. . .	62 %.
6. £18 15s. 8d. . .	25 %.	11. £280 12s. 6d. . .	68 %.

What was the wholesale list price of the following articles, the retailer's cost price and trade discount being given (Questions 12 to 21):

Goods.	Retailer's Cost Price.	Trade Discount.
12. Turkey carpet	£7 13s.	12 $\frac{1}{2}$ %?
13. Works of Dickens	£4	20 %?
14. Cases of raisins	£5 5s.	50 %?
15. Coal and coke	£14 1s. 9d.	25 %?
16. Silks	£252 18s. 7 $\frac{1}{2}$ d.	45 %?
17. Motor accessories	£89 16s.	68 %?
18. Account books	£6 3s.	18 %?
19. Insulated cable	£63 9s. 6d.	40 %?
20. Linens	£38 6s. 4d.	62 %?
21. Stationery	£17 3s. 2d.	33 $\frac{1}{3}$ %?

What trade discount has been allowed in each of the following cases :

List Price.	Cost to Retailer.
22. £1	15s. ?
23. £3 10s.	£1 11s. 6d. ?
24. £5 15s. 4d.	£4 6s. 6d. ?
25. £16 14s. 3d.	£11 2s. 10d. ?
26. £43 8s. 8d.	£38 ?
27. £100 16s. 8d.	£38 6s. 4d. ?
28. £18 15s. 8d.	£14 1s. 9d. ?
29. £158 13s. 9d.	£63 9s. 6d. ?
30. £280 12s. 6d.	£89 16s. ?
31. £459 17s. 6d.	£252 18s. 7½d. ?

32. The list price of a watch is £15 15s. ; the trade discount 10 % . What does the retailer pay ?

33. The list price of a case of fish servers is 35s., and 12½ % is allowed ; find the price to the retailer.

34. The price of 7-lb. jars of jam per dozen is £1 1s., and 5 % is allowed. Find the net price per jar.

35. Gas fittings are listed at 33½ % above the price the retailer has to pay. What does a pair of ornamental brackets listed at 18s. 6d. cost him ?

36. Boots listed at 17s. 6d. a pair are sold at 11s. 8d. What percentage is the retailer allowed off the list price ?

37. A draper pays 36s. each for ladies' serge costumes, and has been allowed 24 % off the list price. Calculate the latter.

38. What is the retail price per dozen of books listed at £9 a gross and sold at 30 % trade discount ?

39. At what price must each book of the last question be sold to the public in order that the retailer may make 10 % profit on the selling price ?

40. What is the trade discount if the retailer pays £15 15s. for a marble statuette listed at £52 10s. ?

41. What is the list price per dozen of walking-sticks sold to the retailer at a discount of 20 % for 25s. per dozen ?

42. A wholesale draper allows 15 % off his list prices, and a retail dealer pays 2s. 1½d. per dozen yards of calico. What is the list price per dozen yards ?

43. If the list price of coffee per cwt. be £4 4s. and the retailer pays £3 19s. 10d., what is the trade discount ?

44. The retail price of a cask of motor oil is £7 11s. 1d., and the trade discount 7½ % off the list price. What is the list price ?

45. Complete the following invoice, allowing trade discount $12\frac{1}{2}\%$ (items 2 and 3 are net):

		05 HOLT STREET, LEEDS,			
		September 30, 19—.			
'Phone : 006A.					
Telegrams : HALTING, LEEDS.					
R. N. GRAHAM, Esq.					
<i>Bought of</i> ADAM SMITH & Co.					
CABINETMAKERS.					
	<i>List Price</i>	Subject to Discount.		Net.	
	£ s. d.	£	s.	d.	£ s. d.
Three Mozart music cabinets (mahogany)	4 0 0				
Six fourfold brocaded screens .	3 10 0				
Five Duchess threefold screens, glass panels	4 12 6				
Three 3 ft. 6 in. china cabinets, finished in mahogany, lined silk	8 19 6				
Eight mahogany palm stands .	0 15 9				
	$12\frac{1}{2}\%$				

46. Make out an invoice for the following, allowing 20 % trade discount, choosing your own names for buyer and seller, etc. : 6 lawn mowers @ 26s. 9d ; 9 garden rollers, 24 by 27, weight 4 cwt. 2 qrs., @ 45s. 9d. ; 1 dozen lawn seats with arms, @ 5s. 3d. (net) ; 3 improved rainproof shelters @ 41s. ; 1 dozen rustic tables, elm, 15 in. diameter, @ 6s. (net) ; 3 dozen strong chairs in genuine Willesden canvas @ 3s. 6d. Receipt this account.

47. Taking the two invoices (pages 461 and 462) make them out, allowing trade discounts of 25 % and 30 % respectively, and also cash discounts of 5 % and $2\frac{1}{2}\%$ respectively, and receipt them.

48. A wholesale merchant lists wine at 500s. a barrel of 110 gallons, and allows a trade discount of 15 %. The retail dealer charges 20 % more than his cost price per gallon, but finds in the

end that he has 2 gallons of bilge in the bottom of the cask which are useless. What is his actual percentage profit?

49. The wholesale list price of shellac is to the retailer's cost price as 3 : 1 $\frac{1}{4}$. What is the trade discount?

C. Banker's (or Commercial) and True Discount

336. We have already explained that a **merchant** will allow one of his customers a discount for cash, but it very often happens that the **customer** will not pay cash, even though a discount is offered him, and this may be (1) because he has not the cash by him; or (2) because he can use the money himself and make more out of it than the discount the merchant offers him.

337. In point of fact, the interests of the merchant and customer are very often opposed to one another: the former wants the money at once and offers a discount as a bait; the latter wants to keep the money for a month or two and use it himself, so that whether he accepts the discount or not will depend on whether he can make more by keeping his money and using it himself. If he can, he will not accept the discount.

The length of time that credit is allowed depends on the character of the trade concerned, and may vary from a few days to 3 months, 90 days or even more. In any case, a merchant will not generally let a customer have credit for any length of time without some written statement to the effect that the money is owing.

338. Let us illustrate the matter thus. Sir John Falstaff is a merchant to whom Messrs. Quickly, of Eastcheap, have sold wine to the value of £1000, payable in 3 months. They will not, however, accept his *word* that he will pay, but prepare an **Inland Bill of Exchange**,¹ which must be properly stamped.² It will appear as shown in Plate XIII. (p. 468).

339. There are now several points to be noted:

1. A "Bill" is a contraction for a "Bill of Exchange," and **has nothing whatever to do with an Invoice.**

2. Instead of the bill being made payable in 3 months it might have been due 6 months, etc., after date, or "at sight," in which case Sir John would have been obliged to pay when it was presented to him for payment; this also applies to bills "on demand."

¹ Blank Bills of Exchange can be purchased from Law Stationers.

² The value of the stamp on a Bill of Exchange depends on the amount for which it is drawn and on the time before it is due; it ranges from 1d. for amounts under £5 to 1s. for £100, and so on. (See *Whitaker's Almanack*, "Bills of Exchange, Stamp on.")

3. Since Messrs. Quickly drew the bill they are the DRAWERS, while Sir John is the DRAWEE, and he has to pay. When he writes ACCEPTED across it he becomes the ACCEPTOR, and until he has done so the bill is of no value. *The student will now write the name "John Falstaff" across Plate XIII. just below the red ink "London, E.C.," and thus "accept" the bill as if he were the acceptor.* If the money is paid to Messrs. Quickly (or their agents) they are the PAYEES.

4. The bill was drawn on 10th March and is due on 13th June, which is 3 months and 3 days after date.¹ These 3 days, called DAYS OF GRACE, are allowed in Canada as well as in the United Kingdom. In the United States the period varies, but days of grace are not allowed on inland bills² in other countries.

Days of grace are not allowed on bills drawn "at sight" or "on demand," for they must be met when they are presented. The student is referred to Part III. for a facsimile of some Foreign Bills of Exchange.

340. So far then, Sir John, not wishing to pay cash, has given a definite promise to pay £1000 into the Bank on 13th June, hoping to use the money to great advantage in the meantime. If Messrs. Quickly had liked they could have obtained Sir John's promise in the form of a properly stamped Promissory Note³ which would have been similar to Plate XIV. (p. 470).

341. The student should notice that bills are far more largely used than Promissory Notes. If an acquaintance asked you for a loan of £20 for a few months you would get him to sign a Promissory Note and not saddle him with a bill; or, if you wanted to borrow a little money from your life insurance company on the security of a life policy, they would ask you to deposit the latter with them, and sign a Promissory Note to give them the necessary protection.

342. Messrs. Quickly now hold Sir John's bill and he uses his money to the best of his ability. But *they* too want cash badly, and so they try to sell the bill (just as you might, in

¹ Bills due on Sunday are payable on the previous Saturday, and those due on Bank Holidays the day after.

² Foreign Bills of Exchange are drawn in London and are payable abroad, or *vice versa*. It is necessary to draft such a bill "at sight," or "on demand," as in the case of an inland bill, or at 30, 60, or "90 days' sight," which means that it must be honoured 30, 60, or 90 days after it has been accepted and not after it has been DRAWN. The necessity of this is obvious, for a creditor in South Africa cannot "accept" a bill drawn in London until the mail arrives and he catches "sight" of it, whereupon he "accepts" it and meets it in due course.

³ For value of stamp necessary see *Whitaker's Almanack*.

another place, sell bread or flour), and so get cash at once instead of waiting 3 months.

Messrs. Quickly, therefore, take the bill to a bill-broker¹ who looks it down and says to himself that Sir John Falstaff, whom he knows, is "good" for the amount,² and then he offers, say, £980 for the bill. Clearly enough he will not offer £1000, for he may have to wait 3 months for his money, but he will offer rather less; in other words, the broker will DISCOUNT THE BILL, pay over the cash, and then either keep the bill till it MATURES, that is, becomes due, on 13th June, or sell it to some one else for £982 and so make a profit. If he keeps it he will send it to the Bank and receive the money or have it paid into his account on the "due date" (13th June).

343. We might just summarise our proceedings to this point.

Sir John Falstaff owes Messrs. Quickly £1000. He will not pay cash. He "accepts" a 3 months' bill drawn by Messrs. Quickly. They want cash and so sell the bill to the bill-broker for £980. The broker keeps it till it matures and then receives the £1000, or he sells it to some one else for £982, £983, £990, as the case may be, and so makes a profit.

As a matter of fact, an enormous amount of business is done every week at the Royal Exchange in simply buying and selling bills.

344. We must notice, however, that the broker might refuse to buy the bill under the following circumstances:

1. If bills were very plentiful, or he had already bought a good many.
2. If Sir John Falstaff were not a well-known merchant.

The RATE at which he will discount the bill, and consequently the amount Messrs. Quickly will receive, will depend (among other things, which we shall deal with in their proper place) on

1. Whether money is plentiful or not. If it is, the broker will be disposed to give a little more than if it is not.
2. Whether the Bank rate is high or low (Part III.).
3. Whether the acceptor's name is good, bad, or indifferent.

A broker might have three or four £1000 bills, and yet might offer £985, £990, £750, or £700 for them, respectively, because the first two are accepted by well-known men, and the others bear names not so creditable in the financial sense.

¹ Some of the great bankers are bill-brokers as well as bankers.

² See *Merchant of Venice*, Act I. Sc. 3, ll. 10-12, "Antonio is a 'good' man."

345. When the broker has decided to buy the bill and settled the *Rate* at which he will discount it, he must calculate the **AMOUNT** of the discount, which is always reckoned to the nearest penny, and which will depend

1. On the amount for which the bill is drawn ;
2. On the time that it has to run before its due-date ;

for the greater the amount of the bill the greater will be the discount, **so also will it be greater the longer the time it has to run.**

(The student should try to explain the last statement in his own words, for it involves the fundamental principle of discount.)

This is the question :

What discount must be allowed on a bill of £1000, dated 10th March at 3 months, and discounted on 14th April at 4 % ?

The bill is due on 13th June (*not* 10th June).

The bill is discounted on 5th April.

∴ The bill is discounted 60 days before it is due.

The question reduces itself to this :

What is the simple interest on £1000 for 60 days at 4 % ?

$$\text{Interest} = 10 \cdot 00 \times \frac{60}{365} \times 4$$

$$= \text{£}6 \text{ 11s. 6d., to the nearest penny.}$$

∴ the discount = £6 11s. 6d.

∴ the cash paid = £1000 - £6 11s. 6d.

= £993 8s. 6d., which is called the *present worth* of the bill, or better, the *discounted value* of the bill.

346. We have here found the discount just as it is found every day by bankers and by bill-brokers, and so it is called the **Banker's or Commercial Discount** (it might just as well be called the bill-broker's discount), and it **equals the interest on the bill at a specified rate for the time between the date of discounting and the date of maturity.**

Hence—

Bill - Banker's discount = Discounted value or present worth.

347. In point of fact a bill for £100 due 6 months hence may

be worth £98 to-day, and it is obvious that in discounting it to-day we **should** allow the discount on to-day's value, £98, but bankers allow the discount on the £100 and thus save the trouble of finding the present value.

The discount on £98 would be called the **True Discount**, and that on the £100 the **Banker's Discount**. The latter is ALWAYS used in commercial practice, and is ALWAYS greater than the former, but the illogical nature of the procedure is compensated for by the brevity of the work involved.

348. If the broker had had any doubt whatever about Sir John's solvency he would have refused to negotiate the bill, unless it was "backed"—that is to say, the holder would have to take it to a banker, or to a merchant whose reputation was sufficiently high to be accepted by the broker, and ask him to sign his name, Lionel B. Josh, on the back; then if Sir John failed to pay, Mr. Lionel B. Josh would have to do so. If he did not, then the holder of the bill could put the bailiff into his house and sell his goods or, following the money-lenders' custom, could make him a bankrupt¹ and so obtain at least a part of the amount due.

It is a safe rule scrupulously to abstain from backing bills for any one.

349. It is most important to note that, in reckoning interest or discount, only one day of the two extreme ones is counted, e.g. 4th to 11th February is 7, not 8 days. 14th February to 10th March is 14 days in February and 10 in March, 24 in all—that is to say, a simple subtraction sum enables one to find the number of days that a bill has to run. The "table of days" (see p. 474) will be found useful, although most office diaries give the number of days to the end of the year, and so serve the same purpose as the table. In a leap year *add one* to each number after 28th February, that is to say, after the 59th day.

350. EXAMPLE 1.—Find the banker's discount on a bill for £580 drawn on 4th February in London on a merchant in America at 93 days and discounted at $2\frac{1}{2}\%$ on 19th March.

$$\begin{aligned}
 &\text{February 4 to March 19} = 43 \text{ days (ordinary year)} \\
 &\text{Bill due 93 days after date} = 93 \quad \text{,,} \\
 &\text{Discounted before maturity by 50} \quad \text{,,} \\
 \therefore \text{banker's discount} &= £5\cdot8 \times \frac{50}{365} \times 2\cdot5 \\
 &= £1 \text{ 19s. 9d., to the nearest penny.} \\
 &\text{}^1 \text{ § 258 to § 262.}
 \end{aligned}$$

EXAMPLE 2.—Discount in Paris, on 21st September, a bill for 10000 francs at 4 % p.a. due 30th November.

In France days of grace are NOT reckoned.

Bill is due 30th November

„ „ discounted 21st September

Difference = 70 days.

What is then the S.I. on 10000 francs for 70 days at 4 %?

$$\begin{aligned} \text{S.I. or banker's discount} &= \text{£}100 \times \frac{70}{365} \times 4 \\ &= 76\cdot7 \text{ francs.} \end{aligned}$$

EXAMPLE 3.—Upon what amount would a bill-broker allow a discount of £50 6s. 8d. at $3\frac{1}{2}$ % p.a. if the bill matured in 73 days, including days of grace?

On £100 due 365 days hence the discount is £3 5s.

On £100 due 73 days hence the discount is $\text{£} \frac{73}{365}$ of 3·5 = £0·7

∴ on £100 ÷ 0·7 due 73 days hence the discount is £1

∴ on $\frac{100}{0\cdot7} \times \text{£}50 \text{ 6s. 8d.}$ due in 73 days, the discount is £50 6s. 8d.

∴ sum required = $\text{£} \frac{100}{0\cdot7} \times 50\cdot3333 = \text{£}7190 \text{ 9s. 6d.}$

∴ discounted value is £7190 9s. 6d. less £50 6s. 8d., or £7140 2s. 10d.

EXAMPLE 4.—A 3-months' bill is discounted at 4 % p.a. To what rate of interest is this equivalent?

The broker would deduct £4 on a 12-months' bill for £100 at 4 % p.a.

∴ he deducts £1 from a 3-months' bill for £100 at 4 % p.a.

∴ the broker receives £1 as the interest on £99 for 3 months, and we want to know how much he would receive on £100 for 12 months, that is, the rate % p.a.

Since he gets £1 on £99 for 3 months

“ $\text{£} \frac{1}{99} \times 100$ on £100 for 3 months

or, $\text{£} \frac{100}{99} \times 4$ on £100 for 1 year.

∴ Interest p.a. on £100 = 4·04

∴ Rate % p.a. = 4·04.

EXAMPLE 5.—A merchant purchases a motor-car valued £405, and agrees to settle the account in 7 months' time. At

the end of a month he finds he can pay. What amount should he offer (reckoning $2\frac{1}{2}\%$) if he is to lose nothing by paying?

1. Taking true discount.

Time account has to run = 6 months.

Interest on £100 for 6 months at $2\frac{1}{2}\%$ = £1·25.

∴ if bill were £101·25 the discounted value would be £100.

If bill were £1 the discounted value would be $\frac{100}{101\cdot25}$

Since bill is £405 the discounted value is $\frac{100 \times 405}{101\cdot25}$
= £400,

and so the true discount is £5.

2. Taking commercial discount.

Interest on £405 for 6 months at $2\frac{1}{2}\%$ p.a.

= £4·05 × 1·25

= £5·063

= £5 ls. 3d., to the nearest penny,

and the difference of 1s. 3d. is not worth the extra work, nor would any one bother about it.

EXAMPLE 6.—The difference between the banker's and true discount on a bill due in 6 months is 4s. If the discount rate be 4% p.a., calculate the amount of the bill.

1. True discount.

£100 now is worth £102 in 6 months at 4% p.a.

∴ a bill of £102 due 6 months hence is worth £100 now.

∴ „ £100 „ „ $\frac{100}{102}$ of £100 „
= £98·0392 „

∴ the true discount is £100 - £98·0392 = 1·9608.

2. Banker's discount.

The banker's discount on £100, due 6 months' hence at 4% p.a., is £2.

∴ If the bill be £100 the difference between banker's discount and true discount is £2 - £1·9608 or £0·0392; hence the amount of a bill upon which the difference is 4s., or £0·2, is

$$\frac{£100 \times 0\cdot2}{0\cdot0392} = £510 \text{ 4s. 1d.}$$

This can be PROVED by finding the banker's discount and the true discount on £510 4s. 1d., and showing that the difference is 4s.

TABLE OF DAYS.

	Jan	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.	1	32	60	91	121	152	182	213	244	274	305	335
2.	2	33	61	92	122	153	183	214	245	275	306	336
3.	3	34	62	93	123	154	184	215	246	276	307	337
4.	4	35	63	94	124	155	185	216	247	277	308	338
5.	5	36	64	95	125	156	186	217	248	278	309	339
6.	6	37	65	96	126	157	187	218	249	279	310	340
7.	7	38	66	97	127	158	188	219	250	280	311	341
8.	8	39	67	98	128	159	189	220	251	281	312	342
9.	9	40	68	99	129	160	190	221	252	282	313	343
10.	10	41	69	100	130	161	191	222	253	283	314	344
11.	11	42	70	101	131	162	192	223	254	284	315	345
12.	12	43	71	102	132	163	193	224	255	285	316	346
13.	13	44	72	103	133	164	194	225	256	286	317	347
14.	14	45	73	104	134	165	195	226	257	287	318	348
15.	15	46	74	105	135	166	196	227	258	288	319	349
16.	16	47	75	106	136	167	197	228	259	289	320	350
17.	17	48	76	107	137	168	198	229	260	290	321	351
18.	18	49	77	108	138	169	199	230	261	291	322	352
19.	19	50	78	109	139	170	200	231	262	292	323	353
20.	20	51	79	110	140	171	201	232	263	293	324	354
21.	21	52	80	111	141	172	202	233	264	294	325	355
22.	22	53	81	112	142	173	203	234	265	295	326	356
23.	23	54	82	113	143	174	204	235	266	296	327	357
24.	24	55	83	114	144	175	205	236	267	297	328	358
25.	25	56	84	115	145	176	206	237	268	298	329	359
26.	26	57	85	116	146	177	207	238	269	299	330	360
27.	27	58	86	117	147	178	208	239	270	300	331	361
28.	28	59	87	118	148	179	209	240	271	301	332	362
29.	29	—	88	119	149	180	210	241	272	302	333	363
30.	30	—	89	120	150	181	211	242	273	303	334	364
31.	31	—	90	—	151	—	212	243	—	304	—	365

EXAMPLES. LXXVIII.

1. Explain the use of a bill of exchange and of a promissory note.
2. Draw up a bill for £500 where J. Brook is the drawer, T. Nunn the drawee, who accepts it, payable at the Union Bank in 3 months.
3. Distinguish between banker's and true discount.
4. Explain what you mean by discounting a bill and by its discounted value.
5. T. Jones borrows £50 from R. Bell. Draw up a promissory note showing the amount due in 3 months at 5 % p.a. interest.

6. A wine merchant holds a stock which he reckons will be worth £1500 in 3 years. In determining its present value should he reckon banker's or true discount, and why?

What is the discounted value¹ of the following bills:

	Amount of Bill.	Drawn.	Period.	Discounted.	Rate per Cent. p.a.
	£ s. d.				
7.	350 0 0	Jan. 8	30 days' sight	After 8 days	2
8.	485 0 0	Mar. 12	3 months	April 26	2½
9.	547 0 0	April 14	60 days	After 23 days	2½
10.	865 0 0	Feb. 10	July 10	May 14	2½
11.	480 10 0	Sept. 2	90 days	Sept. 25	3
12.	575 15 0	Oct. 28	3 months	Jan. 1	2½
13.	364 12 6	Dec. 24	4 months	Jan. 17	2½
14.	730 13 9	Mar. 25	3 months	April 29	1½
15.	250 18 10	Sept. 12	Dec. 30	Oct. 4	1½
16.	1000 10 6	Nov. 15	Jan. 30	Jan. 3	2½
17.	380 7 8	June 24	Dec. 24	Sept. 28	2½
18.	745 6 4	July 8	Feb. 8	Jan. 12	3

(The student should now take any names that may occur to him and draw up twelve bills in accordance with the data given in Questions 7 to 18.)

Find the value of the following bills discounted on the day that they were drawn (Questions 19 to 30):

19. 51100 francs drawn 25th January, due 25th March, at 1¼ %.

20. 21900 dollars drawn 10th August for 3 months at 2 % (U.S.A.). (Allow 6 days' grace.)

21. 10950 dollars drawn 25th June for 60 days at 3 % (Canada).

22. 29200 drachmæ drawn 8th April, due 8th May, at 2¾ %.

23. 14600 marks drawn 5th December, due 10th March (leap year), at 3 %.

24. 80000 roubles drawn 15th October for 6 months at 2¼ %.

25. 58400 gulden drawn 10th December for 60 days at 3 %.

26. £250 due 37 days hence at 3½ % p.a.

27. £560 due 70 days' sight at 2¾ % p.a.

28. 4015 francs due 60 days hence at 4¼ % p.a.

¹ In Questions 7 to 30 "days of grace" should be allowed if and when the monetary unit employed belongs to a country where days of grace are usually allowed. The due-date which we give does *not* include the days of grace.

29. 12045 roubles due 80 days hence at $6\frac{1}{2}\%$ p.a.

30. 8030 lire due 146 days hence at $3\frac{3}{4}\%$ p.a.

In the following questions DO NOT ADD DAYS OF GRACE unless told to do so:

31. What is the discount on a bill for £350 16s. 8d. maturing on 23rd December and discounted at 6% p.a. on 30th September?

32. What is the discounted value of a bill for 50000 francs due 25th July and discounted on 24th June at $2\frac{1}{4}\%$ p.a.?

33. I have a bill for £7300 due on 25th November and I sell it on 20th August at a discount rate of 4% p.a. Would it have been better for me to have held it till 1st September and sold it then at a discount rate of $4\frac{1}{4}\%$ p.a.?

34. A broker charged $3\frac{1}{2}\%$ p.a. in discounting on 15th September a bill which matured on 1st November, and received £23 10s. by way of discount. What was the amount of the bill?

35. If in Question 34 the discount had amounted to £73, what would have been the amount of the bill?

36. A bill for 3504 dollars is due on 31st January and is discounted in New York on 27th November, 24.96 dollars being allowed as discount. What is the rate per cent. p.a.?

37. What is the rate per cent. p.a. charged in discounting, on 4th April, a bill for £876, which matures on 25th May, if the discount allowed is £7 2s. 7d.?

38. We see by our newspapers that the East Indian Railway Company (guaranteed by the Secretary of State for India) wants people to subscribe £3,500,000 in multiples of £100 as follows: $£5\%$ at once; $£24\%$ on 21st May; $£20\%$ on 11th June; $£25\%$ on 8th July; and $£25\%$ on 5th August. We are informed, too, that all the balance can be paid on 21st May and will be discounted at $2\frac{1}{2}\%$ p.a. How much must we pay on 21st May?

39. "War Loan 1925-1928, bearing interest at $3\frac{1}{2}\%$ p.a. Applications must be for £100, or multiples of £100, which must be paid as follows: $£2\%$ on application; $£3\%$ 7th December 1914; $£10\%$ 21st December 1914; $£10\%$ 7th January 1915; $£10\%$ 21st January 1915; $£10\%$ 4th February 1915; $£10\%$ 22nd February 1915; $£10\%$ 11th March 1915; $£10\%$ 25th March 1915; $£10\%$ 12th April 1915; $£10\%$ 26th April 1915." Find the amount that must be paid on 7th December 1914, per £100 stock, to complete the outstanding payments, discount being reckoned at 3% p.a. (See also Question 40.)

40. If we paid on 11th March what discount was allowed us?

41. A banker discounts, on 29th December, a bill for £575 15s.

drawn on 28th October at 3 months allowing $2\frac{1}{4}\%$ p.a. Find (1) the amount of the discount; (2) the rate per cent. p.a. which he receives as interest on his money.

42. If the figures for the last question had been £1000 10s. 6d. due 30th January discounted on 31st December at $2\frac{1}{8}\%$ p.a., what would have been the rate per cent. p.a. at which the banker received interest on his money?

43. If I took a bill to my broker and he deducted £3, and handed me the balance, find what I received if the discount rate was 5% p.a. and the bill had 30 days more to run.

44. You have a bill for £700 which your banker discounts at 3% p.a., and you put the cash received into the Bank at $2\frac{1}{2}\%$. If the bill were due in 6 months would you gain or lose by the transaction, and how much?

45. For what time would it be necessary to keep the money referred to in Question 44 in the Bank so that you would neither gain nor lose? (Reckon 30 days to a month, and give the answer to the nearest day.)

46. What will you offer on 11th May for a bill of £865 due 10th July if you know the discount rate to be $2\frac{3}{4}\%$ p.a.?

47. If you sold the bill (Question 46) on 21st May at 3% p.a. discount, what profit did you make?

48. A merchant buys goods agreeing to pay the full cash value of £560 on delivery. He finds, however, that he cannot pay, and so asks for a 3-months' bill. His creditor finds that the current rate of discount yesterday was 2% p.a., but charges $2\frac{1}{4}\%$ in drawing the bill to safeguard himself. For what amount should the bill be drawn?

49. To what interest rate per cent. p.a. is a discount rate of 4% on 60-day bills equivalent?

50. A draper purchases goods to the value of £10000 from the wholesale house and agrees to pay £3500 down and the balance in 3 months. If the discount rate p.a. be 4% , for what amount must a 3-months' bill be drawn so that the creditor may not lose any money at all?

51. What would you offer now for a consignment of wine which will be worth £10000 in 12 months? (Interest, 5% p.a.)

52. A merchant has received a consignment of iron pipes which he can pay for in cash at 3% cash discount, or at 3 months net. Which course should he adopt if he can get $3\frac{1}{2}\%$ p.a. on his money by holding it over?

53. If the discount on a bill for £380 7s. 8d. due 24th December and discounted on 25th September be £2 2s. $2\frac{1}{2}$ d., what is the discount rate per cent. p.a.?

54. The discount on a bill for £745 6s. 4d. at 3 % p.a. is £18 7s. 6d. For how many days had it to run (to the nearest day) ?

55. One of my clients owes me £485 which is due on 30th November, but he offers to pay on 14th October. What amount shall I accept if the current discount rate is $2\frac{1}{2}$ % p.a. ?

56. Upon what amount due 6 months hence at 5 % is the difference between the banker's and true discount 12s. ?

57. A merchant has a 3-months' bill for £100 which his broker discounts at $2\frac{1}{2}$ %. Find what rate per cent. p.a. he must earn on the discounted value so that he does not lose by selling the bill.

58. If the Government has borrowed £450,000,000 at 4 % and sets aside £30,000,000 a year partly to meet the interest due and partly to paying off the debt, in how many years will the whole be settled ? (Work after reading Part III.)

59. A fruit-grower reckons that his orchards will be worth £5000 in 4 years' time. What would you offer for them now, reckoning Simple Interest at 4 % ?

60. A broker buys a £350 bill and he allows $2\frac{1}{2}$ % p.a. discount. If it had 60 days to run (including days of grace), at what rate must the money be invested that the vendor of the bill may not lose anything ?

61. Upon what sum of money due 146 days hence at 4 % p.a. is the difference between the commercial and true discount 15s. ?

SECTION XXII

STOCKS AND SHARES

A. Stocks

351. Smith is an old friend of mine who has been working at dyes for some years. Yesterday he asked five of us round to his house, and told us the general plan of a scheme he has in his mind for developing a particular dye and for making it pay. He also explained that he wanted £500 to buy machinery and the like to start working, but said that he, not having the money, would like to borrow it from us, and in return would give us a proper proportion of the profits. We agreed to this, and he prepared some vouchers which ran as follows :

SMITH'S DYE SCHEME.
£100 Stock

and handed one to each of us on payment of £100. We then held £100 of the Dye Scheme "Stock," and the voucher was our receipt and our title to a share of the profits as well.

352. Let us now imagine that a year has passed, and that we each get £20 out of the profits, and then, after another year, £21. Smith's Dye Scheme is a paying concern, and the dividends, of £20 and £21, are good. A friend of mine gets to hear that I have one of Smith's vouchers, and he wants to buy it, while I happen to want some ready money to buy a motor-car, so I agree to sell it to him for £106. If the business had not paid well, I might have been glad to sell the voucher whose face value is £100 for £90, or even for £9.¹

In this imaginary episode you have the whole run of stocks, and, we might add, that two men might have each bought £50 worth of my stock and then they would have received half the dividend each.

353. Now consider the following :

On going into a grocer's shop we can buy 1 lb. or $\frac{1}{2}$ lb. of coffee and have it weighed up and put in a small parcel while we wait, or we can buy a 1-lb. or $\frac{1}{2}$ -lb. tin. In the same way we might buy 2 oz. of tea and have it weighed up and put into a bag, or we could have a 1-lb. or $\frac{1}{2}$ -lb. **packet** of tea, but we could not have $\frac{1}{2}$ lb. of coffee **out of a 1-lb. tin**, nor 2 oz. of tea **from a $\frac{1}{4}$ -lb. packet**, for the grocer would not break the tin or the packet.

So it is with stocks and shares.

Stocks are as the coffee or tea which can be bought in bulk, 2 oz., 5 oz., 18 oz., or any amount, for you can buy **any amount of stock**, e.g. £5, £68 15s. 8d., £1234 19s. 6d.

Shares are as the coffee, etc., bought in tins or in packets, which cannot be broken up, and you can buy only **a complete number of them**. If, for example, each share be worth 10s., then you could not get 15s. worth of shares, for 10s. would buy one and £1 two, while 15s. would buy one and give you 5s. change, not half a share.

We now apply our elementary notions to the general case.

354. Business houses, or railway companies, or Governments, can prepare vouchers just as Smith did, which can be bought and

¹ One of the commonest illustrations of the difference between "face value" and "cash value" is the case of tickets for an opera or a theatre. A ticket for the pit is often sold at 2s. 6d., but as time goes on and all the tickets are sold, people are prepared to pay 7s. or 10s. for a pit ticket rather than miss the performance. Thus the face value is 2s. 6d. and the cash value 7s.

sold, sometimes at their face value, at other times a good deal above or below it.

Take the case of a Government which wants money for war purposes ; it will advertise half a million £100 vouchers for sale at £99 each. If the Government is a good one, people will buy up the vouchers as quickly as possible and receive a guaranteed amount or DIVIDEND every quarter, half-year, or year, as the case may be. (See Plate XVI., p. 496.)

The face value of all the vouchers sold is called the **Stock** of the Government, and the holder of a £100 voucher is said to have £100 stock.

In raising the Great War Loan of June 1915 the Government issued 5s. and 10s. vouchers which could be bought at any Post Office. We give a facsimile of one on opposite page.

355. Sometimes vouchers must be handed back to the Government at the end of a period of years, when the face value will be paid for them, but they can be bought and sold just as we please in the interim. When the stock is bought back by the Government it is said to be **Redeemed**.

If, having bought a voucher, we keep it, then it provides a regular income of £3 or £4 a year until we feel disposed to sell it. If, however, we had bought a railway company's voucher, then the dividend upon it might have been much higher, perhaps £10 or £12, but this and the marketable value of the voucher itself depend entirely on the prosperity of the company and the consequent demand for its vouchers. As we have said, the face value of a voucher, even when it is first issued, is not necessarily its **cash** value. For example, the face value of the following is £100, but their price when issued was :

Queensland Government $4\frac{1}{2}\%$ Loan,¹ £99 ; Great War Loan, $3\frac{1}{2}\%$, £95 ; East India Railway Co., $4\frac{1}{2}\%$, £99 ; Argentine 6 % Bonds,² £99. We pay, therefore, £95 for a £100 War Loan voucher and £99 for the others.

356. A voucher has then—(1) a face value ; (2) a price of issue ; and (3) a marketable value ; and the last can always be ascertained from the newspapers.

¹ See § 363.

² A Bond is a legally binding promise, made by a Government or company, to repay the amount of a loan at a particular time. One class is called a "Bond to Bearer," to which coupons are attached, so that when the dividend is due the holder simply tears off the proper coupon and presents it at the Bank for payment.

4½% War Loan



№ 057277

SCRIP VOUCHER

MONTH OF ISSUE—JULY

The Voucher is a Scrip Voucher for Five Shillings (5s.). Scrip Vouchers to a total amount of £2.5 or any multiple of £100 are issued at a Money Order Office. At a ny time between 1st & 15th December 1915, the holder is to pay for one War Stock or Bonds (1925-1928) at the same amount together with interest at the rate of 5 per cent per annum from the 1st day of the month following the month of issue to 30th November 1915, dated a payment by way of bonus at the rate of one shilling (1s.) for every £5 subscribed.

Name of Holder _____

Address _____

John Bradley

SECRETARY TO THE TREASURY
(For Conditions see over)



* If this space is filled up the voucher will be available only for use by the person whose name appears therein. If it is left blank it will be available for use by the Bearer.

Thus, to-day¹ we find the price of a £100 voucher in the four concerns named is: (1) London and North-Western Railway, £112 $\frac{3}{4}$; (2) Bank of England, £242; (3) New Zealand 4%, £96 $\frac{5}{8}$; (4) London, Chatham, and Dover Railway, £67.

When the price is above £100, as in (1) and (2), the stock is said to be **AT A PREMIUM**; when £100, **AT PAR**; and when below £100, **AT A DISCOUNT**, as in (3) and (4). Note that (1) is at a Premium of 12 $\frac{3}{4}$ %, but (4) is at a Discount of 33%.

357. It is then most important to distinguish between £100 stock and £100 cash. The former may have any value whatever and the £100 voucher may be worth (*e.g.*) £1000 or nothing at all; but £100 cash is a perfectly definite amount of money, and in any question the student should be careful to decide whether £500 means £500 stock or £500 cash. The word "voucher" can always be put for "stock" but not for "cash."

358. In considering the dividend we have really to ask just one question. Shall we be content with a small dividend if the money we put into the concern is safe, or are we ready to risk all we put in for the sake of a high dividend? The former is the wiser, the latter the more attractive course. Companies cater for both classes by issuing different kinds of stock, which are:

(a) **Debenture Stock.**—The vouchers for this are issued on the understanding that a definite dividend will be paid, or, failing that, the holders can, if necessary, take the buildings, land, and plant of the company and dispose of them to get back their money and to pay their dividends. Debenture Stock is then absolutely safe, and the dividend is usually lower than that declared on

(b) **Preference Stock.**—On these vouchers a fixed dividend is paid **AFTER** that due on (a) has been met, and a **Cumulative Preference Stock** is one upon which the dividend, if it cannot be paid in any one year because of bad business, must be paid even though it is not for five years to come. So that if you had a Cumulative Preference voucher at 5% and the dividend was not paid for 3 years, and in the fourth year things went well, the company might pay you not only £5 for that year, but also £15 arrears, or at any rate a part of that £15, and you would be paid in full before the holders of

(c) **Ordinary Stock** were paid at all. Holders of these vouchers have what remains when (a) and (b) have had their due, but very often (c) draws a dividend of 8%, against (b) 5% and (a)

¹ Look in the newspapers **TO-DAY** and find the price of the various stocks, and so determine whether it has risen or fallen since this paragraph was written.

4%. If, however, the company lost, then (c) would get no dividend at all, (b) might get a little, but (a) is quite certain to be paid.

359. If you wish to buy or to sell stock it is necessary to go to a broker¹ and tell him that you want £100 stock in the Great Western Railway—that is, £100 worth of the capital of that company. He then meets his **Jobber**, and they inform you of the price to be paid, and that is determined

- (1) By the amount of stock on the market for sale; and
- (2) By the prosperity of the company, which, of course, influences condition (1).

The jobber would perhaps want £105 $\frac{3}{4}$ for £100 stock, and, on paying that amount of money, together with the cost of stamps, etc., you would hold £100, nor £105 $\frac{3}{4}$, Great Western Railway Stock. In precisely the same way you could sell £100 stock in the P. and O. Company and receive perhaps £288 for it.

360. The jobber always quotes two prices, e.g. Irish Land, 78 $\frac{1}{4}$ to 78 $\frac{3}{4}$, which means that all who **buy from him** must pay 78 $\frac{3}{4}$, and all who **sell to him** will get 78 $\frac{1}{4}$. If then he sells £100 stock for one client and buys the same amount for another, he pays the first £78 $\frac{1}{4}$ and takes £78 $\frac{3}{4}$ from the second, and makes £ $\frac{1}{2}$, i.e. 10s. profit, which is called the "**Jobber's Turn.**"

361. The broker usually adds on one-eighth to the buying price and so charges his client 78 $\frac{3}{4}$ + $\frac{1}{8}$ = 78 $\frac{7}{8}$, and deducts one-eighth from the price at which he sells for him, namely, 78 $\frac{1}{4}$ - $\frac{1}{8}$, or 78 $\frac{1}{8}$. The public therefore really buy at 78 $\frac{7}{8}$ and sell at 78 $\frac{1}{8}$, while the broker and jobber flourish on the difference.

Hence we have the following rule:

In buying add one-eighth to the Buying Price. In selling subtract one-eighth from the Selling Price, to allow for the brokerage (Section XVIII. B. II.) paid to the broker.

362. We have pointed out that the price of stock may vary,² and in some cases it must be said that the fluctuations are very

¹ A broker is an intermediary who brings the public into touch with the Jobber who does the actual buying and selling. The student should note that the term "Jobber" is not a vulgarism, but a name applied to a class of business men who are members of the Stock Exchange, and who are not even allowed to advertise in order to get business.

² We shall not here consider the CAUSES of these fluctuations.

great. This being so, it is clear that if one can anticipate a particular change and buy in or sell out quickly, it is possible to make a great deal of money in an hour or a day, while it is just as likely, and, among the uninitiated, practically certain, that one may be ruined by a wild speculation. In the case of Government and railway stocks, however, people usually buy with the intention of allowing their money to remain and produce a certain annuity upon which they may live, and hence it is important to know what DIVIDEND is to be paid. (See Plate XVI., p. 496, where a space is left for the signature of the payee when he pays the warrant into his bank.)

363. In considering the income we shall derive from any "investment," or purchase of vouchers, we find from our newspapers that:

- (1) Metropolitan $3\frac{1}{2}$ % Stock stands at 95 ;
- (2) Union of South Africa 4 % Stock stands at 94 ;
- (3) Brazilian 5 % Stock stands at 63 ;
- (4) Italian $3\frac{1}{2}$ % Stock stands at 73 ;
- (5) Russian 4 % Stock stands at $80\frac{1}{2}$;
- (6) New South Wales $4\frac{1}{2}$ % Bonds at $101\frac{1}{2}$;

and all but the last are at a discount.

In (1) every £95 paid produces £ $3\frac{1}{2}$ interest ; in (2) every £94 paid produces £4 interest ; in (3) every £63 paid produces £5 interest ; in (4) every £73 paid produces £ $3\frac{1}{2}$ interest ; in (5) every £ $80\frac{1}{2}$ paid produces £4 interest ; in (6) every £ $101\frac{1}{2}$ paid produces £ $4\frac{1}{2}$ interest.

364. At first sight it would seem best to invest in (3), for it gives £5 on £63, but if Brazil has to pay 5 % to get money, and other Governments can get it at $3\frac{1}{2}$ %, or, in the case of the British Government, at $2\frac{3}{4}$ %, then Brazil commands less confidence than the others do. We might say, in general, that if a Government has to offer a high rate of interest to get money, then it is not likely to prove a sound depository for one's money.

Some Governments have found it impossible to pay back the capital borrowed and have often not even paid the interest. In buying, then :

- (1) Choose a stable Government and one not likely to be overthrown (as some in Central and South America have been) by a ring of financiers.
- (2) Buy at a low price if possible.
- (3) Do not look for high rates of interest, for they are usually inversely proportional to stability.

365. In so far as the first point is concerned, British Government stock is perfectly secure. It originated under William III., when a great deal of money was borrowed for war purposes, and when our national debt assumed large proportions, quickly running up to £16,000,000. The American War added £121,000,000, the French wars of Nelson and Wellington £600,000,000, although in times of peace some was paid off by means of taxation and of money specially set apart for the purpose; the loan itself was called "The Funds." Between 1910 and 1912 no less than £51,000,000 was paid off, while the War Loan of 1915 added £350,000,000 at one stroke.

The Government originally paid £3 per annum¹ on every £100 voucher, which, in fact, could be bought for as little as £60 in the early nineteenth century, and so the position was really this: the Government offered an annuity of £3 a year, and people were ready to pay £60 for that annuity, hence the loan became called "The Consolidated Annuities," or, shortly, "Consols," dividends on which are paid at the Bank of England quarterly on the 5th of January, April, July, and October.

366. The debt of the Government is divided into:

(a) **The Funded Debt**, which it need not pay off, although it may do so, and must of course pay the dividend; and

(b) **The Unfunded Debt**, which consists of loans for short periods which the Government must pay off on a specified date.

The French Government Stock is called "Rentés."²

367. EXAMPLE 1.—What must be paid to-day for £300 stock in the Transvaal 3 per Cents?

The financial column in our newspaper shows that the stock is at £88—that is to say, a £100 voucher costs £88.

∴ a £300 voucher costs £264.

EXAMPLE 2.—What annual income will the last investment produce, and what per cent. return on the cash paid?

1. Income = £3 on every £100 stock

∴ income = £3 × 3 = £9.

2. Income is £9 for expenditure of £264

∴ income is $\frac{£9}{264} \times 100$ for expenditure of £100.

Income is at the rate of 3·41 % (nearly).

¹ Now only £2 10s. is paid.

² Pronounced something like raunt (cf. flaunt) and not at all like our English word "rent."

EXAMPLE 3.—How much India 3 % stock at $69\frac{1}{2}$ can be bought for £834 ?

£ $69\frac{1}{2}$ cash will buy one £100 voucher.

$$\begin{aligned} \therefore \text{£}834 \text{ cash will buy } & \text{£} \frac{100}{69\frac{1}{2}} \times 834 \text{ worth of vouchers} \\ & = \text{£}1200 \text{ worth of vouchers or stock.} \end{aligned}$$

EXAMPLE 4.—What income will be derived from investing £1140 in the Birmingham 3 % stock at 76, and £2020 in the Queensland $4\frac{1}{2}$ % at 101 ? Which of these two investments pays the better ?

1. (a) £76 produces £3 income

$$\begin{aligned} \therefore \text{£}1140 \text{ produces } & \text{£} \frac{3 \times 1140}{76} \text{ income} \\ & = \text{£}45 \text{ income.} \end{aligned}$$

(b) £101 produces £ $4\frac{1}{2}$ income

$$\begin{aligned} \therefore \text{£}2020 \text{ produces } & \text{£} \frac{4\frac{1}{2} \times 2020}{101} \text{ income} \\ & = \text{£}90 \text{ income} \end{aligned}$$

\therefore total income = £135.

2. £76 produces £3 income in the Birmingham stock

$$\begin{aligned} \therefore \text{£}101 \text{ produces } & \text{£} \frac{101 \times 3}{76} \text{ income in the Birmingham stock} \\ & = \text{£}4 \text{ very nearly ;} \end{aligned}$$

and £101 produces £ $4\frac{1}{2}$ in the Queensland stock,

\therefore the latter is the more remunerative.

EXAMPLES. LXXIX. (a)

1. Explain clearly the difference between “stocks” and “shares.”

2. What difference is there in meaning between “the price of issue,” “the face value,” and “the cash value” of stock ?

3. What is meant by (a) consols, (b) bonds, (c) redeemable in 50 years at par, (d) “at a discount,” (e) “at a premium,” (f) Debenture Stock, (g) Preference Stock, (h) Cumulative Preference Stock ?

4. What is the difference between a jobber and a broker ? How do they make a living out of stocks and shares ?

5. What do you mean by the Funded and Unfunded Debts of the Government ?

What must be paid for the following (Questions 6 to 15):

- | | |
|-------------------------------------|---|
| 6. £300 stock at 50? | 11. £325 stock at 75? |
| 7. £500 stock at 67? | 12. £586 stock at 60? |
| 8. £800 stock at $72\frac{1}{2}$? | 13. £756 10s. stock at 80? |
| 9. £1000 stock at 120? | 14. £848 12s. stock at $70\frac{1}{2}$? |
| 10. £760 stock at $80\frac{1}{4}$? | 15. £5350 10s. stock at $66\frac{1}{4}$? |

How much of the following priced stocks can be bought for the cash stated (Questions 16 to 25):

- | | |
|--|--|
| 16. Cash £525, stock at 75? | 21. Cash £3069, stock at $85\frac{1}{4}$? |
| 17. Cash £836, stock at 66? | 22. Cash £5130, stock at 95? |
| 18. Cash £850, stock at $65\frac{1}{4}$? | 23. Cash £3105, stock at $86\frac{1}{4}$? |
| 19. Cash £1360, stock at $85\frac{5}{8}$? | 24. Cash £1256, stock at $78\frac{1}{2}$? |
| 20. Cash £1639, stock at $99\frac{1}{4}$? | 25. Cash £2796, stock at $58\frac{1}{4}$? |

Disregard brokerage in Questions 26 to 76.

26. What must be paid for £600 worth of Bristol 3 % stock at 76?

27. What is the cash value of £1000 worth of Victoria $3\frac{1}{2}$ % at $91\frac{1}{4}$?

28. How much should be paid for £1030 London and Brighton at 86?

29. How much would you offer a client for £3200 6 % Underground Electric at $80\frac{1}{2}$?

30. What shall I accept for £2500 Louisville (American Railroads) at 125?

31. A jobber offers my broker 500 Southern Pacific for £46025. Shall I accept? (The market price is 92.)

32. What will you take for £700 Grand Trunk (Canada) at 65?

33. How much Bank of Ireland stock at £240 can be bought for £2880?

34. What amount of Consols can be bought for £5320 if the price is $66\frac{1}{2}$?

35. What amount of Caledonian at 60 can be bought for £21360?

36. How much Illinois Central at 114 can be bought for £4104?

37. What amount of South Australian 4 % at 95 can be bought for £1140?

38. What value of Uruguay $3\frac{1}{2}$ % at 64 can be bought for £2048?

39. What is the percentage return on Spanish 4 % at 84?

- ✕40. What return per cent. is yielded by Portuguese $3\frac{1}{2}\%$ at 54?
41. What percentage return is yielded (I.) by $2\frac{1}{2}\%$ Consols at the following prices: (1) £89 16s. 3d.; (2) £88 6s. 3d.; (3) £84 2s. 6d.; (4) £86 1s. 3d.; (5) £83 17s. 6d.; (6) £79 6s. 3d. and (II.) by $2\frac{3}{4}\%$ Consols at the following prices: (7) £95 15s.; (8) £110 15s.; (9) £94 7s. 6d.; (10) £110 18s. 9d.; (11) £106 17s. 6d.; (12) £99 12s. 6d.?
42. Which of the following is at a premium and which at a discount: Bengal Railway, 145; Buenos Ayres Railway, $96\frac{1}{4}$; Canadian Pacific Railway, $164\frac{1}{2}$; Chilian 4% stock, 74; Peruvian stock, 90; San Paulo Railway, 192?
43. How much does £1182 invested in the Cuban 5% Bonds at $98\frac{1}{2}$ yield per annum?
44. What percentage return does the Chinese 5% at 80 yield?
45. Which pays the higher rate per cent.: the Japan $4\frac{1}{2}\%$ at $86\frac{1}{2}$, or the 5% at 91?
46. What yield per cent. is obtained from the Mexican 5% at $54\frac{1}{2}$?
47. What must be the price of Consols to yield at $2\frac{1}{2}\%$ the same as the Mexicans of the last question yield at 5%?

What income will the following investments yield:

48. £5000 in the 3 per Cents at 60?
49. £860 in the $3\frac{1}{2}$ per Cents at 43?
50. £1584 in the $2\frac{1}{2}$ per Cents at 66?
51. £913 10s. in the $3\frac{1}{4}$ per Cents at $72\frac{1}{2}$?
52. £2600 in the 4 per Cents at $81\frac{1}{4}$?
53. £36 15s. in the 5 per Cents at $73\frac{1}{2}$?
54. £2988 in the $4\frac{1}{2}$ per Cents at $62\frac{1}{4}$?
55. £2431 in the $2\frac{3}{4}$ per Cents at $110\frac{1}{2}$?
56. £240 10s. in the $4\frac{1}{4}$ per Cents at $120\frac{1}{4}$?
57. £1482 10s. in the $5\frac{1}{4}$ per Cents at $148\frac{1}{4}$?

What income will be derived from the following holdings:

58. £3000 stock in the 4 per Cents?
59. £5860 stock in the $3\frac{1}{2}$ per Cents?
60. £7382 stock in the $2\frac{1}{4}$ per Cents?
61. £6558 10s. stock in the $3\frac{1}{4}$ per Cents?
62. £821 13s. 4d. stock in the $4\frac{3}{4}$ per Cents?
63. £576 6s. 8d. stock in the $5\frac{1}{4}$ per Cents?
64. £386 15s. stock in the $2\frac{3}{4}$ per Cents?
65. £536 17s. 6d. stock in the $3\frac{1}{2}$ per Cents?
66. £250 15s. stock in the $2\frac{1}{2}$ per Cents?
67. £360 18s. stock in the $3\frac{1}{2}$ per Cents?
68. £485 13s. 6d. stock in the $4\frac{1}{4}$ per Cents?

✓69. How much must be invested in the Belgian 3 % at 67 to produce an income of £240 per annum ?

✓70. What income will be derived from £134257 10s. invested in the Grand Trunk Canada $5\frac{1}{2}$ % at $101\frac{1}{4}$?

✓71. I have a certain sum of money to invest. Which of the following would you recommend as producing the highest income : Canada 4 % at $94\frac{1}{2}$; Natal 3 % at $75\frac{1}{2}$; West Australia $3\frac{1}{2}$ % at 82 ?

✓72. What half-yearly dividend will be derived by investing £1000 in the 3 % stock at 66 ?

73. What quarterly dividend will be obtained by a holding of £5000 stock in the 4 per Cents ?

✓74. What income will be derived in 10 years from an investment of £1400 in the Japan $4\frac{1}{2}$ % at $87\frac{1}{2}$?

75. The trustees for a merchant's estate invested money as follows : £554 8s. in $2\frac{1}{2}$ % Consols at 66 ; £1805 in 3 % Exchequer Bonds at 95 ; £10647 in 3 % Local Loans at 78 ; £8748 in $3\frac{1}{2}$ % India at 81. What income was derived from these investments ?

76. If £237276 be invested in the 3 % Local Loans at 78, and £68921 in the $3\frac{1}{2}$ % India at 82, calculate the net income obtained after deducting income-tax at 1s. 2d. in the pound.

368. EXAMPLE 1.—The prices quoted for South Australian 3 % are $70\frac{1}{8}$ to $70\frac{7}{16}$, and for Johannesburg 4 %, $86\frac{1}{4}$ to $86\frac{3}{8}$. Allowing brokerage at $\frac{1}{8}$ %, calculate the amount to be paid for £1600 stock in the former, and the amount derived from selling £2400 stock in the latter.

1. We buy Australian and have to pay $70\frac{7}{16}$ to the jobber for £100 stock ; add to this $\frac{1}{8}$, and then the cost becomes $70\frac{9}{16}$;

∴ $£70\frac{9}{16}$ has to be paid for £100 stock ;

∴ $£70\frac{9}{16} \times \frac{1600}{100}$ has to be paid for £1600 stock ;

∴ cost required = $£\frac{1129}{16} \times \frac{1600}{100} = £1129$.

2. For every £100 stock sold, the jobber pays the broker $£86\frac{1}{4}$ and the broker pays the seller $£86\frac{1}{4} - \frac{1}{8} = £86\frac{1}{8}$;

∴ £100 stock brings in $£86\frac{1}{8}$,

and £2400 " " $\frac{2400 \times 86\frac{1}{8}}{100}$
= £2067.

EXAMPLES. LXXIX (b).

1. Fill in the following table :

	Name of Stock.	Closing Prices.		Jobber's Turn.	Broker's Price to a Client	
					for Selling.	for Buying.
		£	£			
(1)	London County $3\frac{1}{2}\%$.	88	to 88 $\frac{1}{2}$			
(2)	War Loan	94	,, 94 $\frac{1}{8}$			
(3)	Metropolitan $3\frac{1}{2}\%$.	95 $\frac{1}{2}$	,, 95 $\frac{7}{8}$			
(4)	Port of London 3% .	69 $\frac{1}{2}$	,, 70 $\frac{1}{8}$			
(5)	Leeds $2\frac{1}{2}\%$	63 $\frac{1}{2}$	,, 64 $\frac{1}{8}$			
(6)	Mersey Dock $3\frac{1}{4}\%$.	83 $\frac{1}{4}$	,, 83 $\frac{3}{8}$			
(7)	Johannesburg 4%	86 $\frac{1}{4}$	,, 86 $\frac{3}{8}$			
(8)	South Australian 3%	70 $\frac{1}{8}$	,, 70 $\frac{7}{8}$			

What amount would be obtained by selling :

2. £560 stock at $75\frac{3}{8}$; brokerage, $\frac{1}{8}\%$?
3. £485 stock at $82\frac{5}{8}$; brokerage, $\frac{1}{8}\%$?
4. £575 stock at $78\frac{7}{8}$; brokerage $\frac{1}{8}\%$?
5. £980 stock at $125\frac{3}{4}$; brokerage, $\frac{1}{4}\%$?
6. £1000 stock at $156\frac{1}{4}$; brokerage, $\frac{1}{4}\%$?
7. £750 stock at $175\frac{1}{8}$; brokerage, $\frac{1}{8}\%$?

How much stock at the prices given can be bought for the sums stated :

8. Cash, £5000 stock at $85\frac{1}{4}$; brokerage, $\frac{1}{8}\%$?
9. Cash, £4850 stock at $75\frac{1}{2}$; brokerage, $\frac{1}{4}\%$?
10. Cash, £455 stock at $68\frac{1}{4}$; brokerage, $\frac{1}{8}\%$?
11. Cash, £385 stock at $120\frac{1}{2}$; brokerage, 2s. 6d. $\%$?
12. Cash, £755 stock at $150\frac{1}{4}$; brokerage, 2s. 6d. $\%$?
13. Cash, £853 stock at $160\frac{1}{8}$; brokerage, 2s. 6d. $\%$?

Allow brokerage of $\frac{1}{8}\%$ in the following transactions, taking the prices from Question 1 :

14. What must I pay for £6381 of London County stock ?
15. A merchant sold £2680 of Johannesburg stock ; what cash payment did he receive from his broker ?
16. A jobber bought £3750 Port of London yesterday and sold them this morning. What profit did he make ?
17. What does a broker make by buying and selling £50000 of South Australian 3% ?
18. What would you expect to pay your broker for buying £5000 War Loan stock ?

19. What would a broker make in buying and selling £6500 Leeds $2\frac{1}{2}$ % stock?

20. How much Mersey Dock $3\frac{1}{2}$ % should be bought for £753 15s. cash?

21. If you put 5620 guineas into the Port of London 3 % stock, what income would you get?

22. What would have to be the price of Metropolitan $3\frac{1}{2}$ % to give the same income as the Port of London (Question 21)?

23. If my firm bought £3500 London County stock when it stood at $86-86\frac{1}{4}$ and sold it at $88-88\frac{1}{2}$, what profit was made? (Ignore brokerage.)

B. Shares

369. Let us suppose that we are in a town in the Provinces where there is no electric light, and that Mr. Wells is an enterprising business man who sees what advantages would accrue to the town by having electric light. He has not enough money himself to embark upon the undertaking, and he may therefore do one of three things:

1. He may get a number of friends to combine with him¹ and enter into **Partnership**, so that they supply the money and divide the profits among them.²

He may also allow people, other than the partners, to put money into the business, for which they may receive a dividend; and if such people exercise no control whatever in the management of the affairs, then the business is said to be a **Limited Partnership**. The term "limited" is used in the same sense as in § 372.

2. He may form a **Private Company** with one of his friends or with more if he likes, but they must not appeal to the public in general to lend them money, nor need they make their affairs public in any way, although the company must be registered. This method of procedure would be excellent if Mr. Wells had a brother, or immediate relatives, who would subscribe and so keep the concern "in the family."

3. He may prepare a statement or prospectus showing the pros and cons of the case, drawing attention to the advantages, and so on, and then he, in company with six others, could **float a Public Company**, send out the prospectus, advertise in the newspapers, and so get people to lend money to erect a generating station, purchase alternators and plant in general, and then receive a share of the profits in due course. (See also § 372.)

¹ If more than twenty men are involved in the partnership it must be registered.

² Section XVII. B (1).

370. Let us suppose that £100000 is necessary for the undertaking. This amount will be divided into, say, 1000 £10 5 % Debenture Shares;¹ 3000 £5, 6 % Preference Shares; and 75000 £1 Ordinary Shares. Mr. Wells will probably become managing director, and he will place his friends in suitable positions, appoint bankers, auditors, a secretary, and others, who will probably take up some shares in the company.

371. Now let us see what the issuing of shares means. There are in all 79000 shares, and so 79000 vouchers will be prepared and numbered consecutively. These vouchers will say, for example:

<p>£10 DEBENTURE SHARE.</p> <p>No. 1.</p> <p>HELD BY</p> <p>R. WELLS, Esq.</p>	<p>£5 PREFERENCE SHARE.</p> <p>No. 3005.</p> <p>HELD BY</p> <p>SIR CHARLES MARLOWE.</p>
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It is clear that Mr. Wells might hold Debenture shares 1-10; Preference shares 3100-4200; and Ordinary shares 8000-9000, but he could not hold $1\frac{1}{2}$ Debenture shares, for, as we have said, the shares are as packets of tea and one cannot buy half a packet. Shares, we repeat, are sold in whole numbers, but stock in any amount (§ 353).

Facing this page we give a facsimile share certificate (Plate XV.).

372. When the public have bought up all the vouchers² that are for sale, and the directors—that is, Mr. Wells and his friends—have the money, then they proceed to spend the same and endeavour to make the concern pay. If all goes well, the Debenture holders will get £5 % on the face value of each voucher they have, the Preference holders £6 % perhaps, and the Ordinary holders perhaps £10 %. If things go badly, the first will still

¹ § 358.

² Sometimes the whole face value of the vouchers is not paid at once, for the directors might not want more than £80000 for a year or so, and of that amount only, say, £50000 to begin with, and so they would ask each shareholder to pay £5, £2 10s., or 10s. per share as the case may be, and then we should say: Authorised or Nominal Capital, £100000; Subscribed, or Issued Capital, £80000; PAID-UP CAPITAL, £50000. In *Whitaker's Almanack*, p. 356, we find that one of the largest Banks has an Authorised Capital of £26,000,000, but a Paid-up Capital of only £4,000,000.

get £5 %, the second may get something, and the third nothing. If business goes from bad to worse, the Debenture holders may sell the generating station and everything else, reimburse themselves, and hand over the balance, if there is any, to the Preference holders, who then take their due, and finally the Ordinary holders may have to console themselves with just as much money as the cats did cheese in the fable. Be that as it may, if the assets are not enough to meet the liabilities the creditors have to bear the loss, and they cannot call upon the shareholders to advance any more money than they have paid for their shares, so that their liability to pay is **limited** to the amount they have subscribed. Thus, if you had bought 40 Ordinary vouchers you might lose the amount you paid, namely, £40, but you could not lose more. Such a company as this is called a **Limited Liability Company**. Many of the large firms of to-day have merged from partnerships or private companies into limited companies, and if one puts his money into them he is at any rate sure of the **extent** of his responsibility.

373. The method of buying shares is just the same as that employed in the case of stock, except that the broker usually charges 3d. or 6d. a share and not $\frac{1}{8}$ %.

The face value of share vouchers is usually low, perhaps 2s. 6d., £1, or £5, and their cash or marketable value¹ may be anything at all; we find out what it is on any day from the newspapers.

EXAMPLES. LXXX.

1. Explain some methods by which a merchant may raise money to extend his business.
2. Would you expect Preference or Ordinary shares to earn the higher dividend? Give reasons.
3. What shares are (a) the surest and (b) most remunerative so long as the business is prosperous?
4. Distinguish between "Authorised Capital" and "Paid-up Capital."
5. What privileges have the Debenture holders of a company if it fails?
6. What is meant by a Limited Liability Company?
7. What is the capital of a company which has issued 100000 five-shilling shares?

¹ See also *Whitaker's Almanack*, p. 356, for price of issue of shares of the great Banks and also for their marketable value.

8. How much capital would 5000 £5 Preference shares and 10000 £2 Ordinary shares produce?

9. How many shares of 30s. must be taken up to raise £60000 capital?

10. What capital do 50000 12s. 6d. shares produce?

11. A company is floated with 500 Debenture shares of £5 each, 800 Preference shares of £3 each, and 10000 Ordinary shares of £1 each. What is its capital?

12. A company issues 3500 Debenture shares of £6 each, 2300 Preference shares of £5 each, and 10000 Ordinary shares of £1 each. What is its capital?

13. Distinguish between Stock and Shares.

14. If in Question 12 £3 has been paid up on the £6 shares, £2 on the £5, and 10s. on the £1, to how much does the paid-up capital amount?

15. A company intends to issue 300 Debenture shares at £30 each; how many Ordinary £5 shares must it issue as well to raise £20000 capital?

16. The capital of a company amounts to £100000, of which part is in Ordinary shares of £10 each and part in 3000 Preference shares of £20 each. How many Ordinary shares were issued?

17. The ratio of the number of £3 Preference shares to £1 Ordinary shares in a company was 2:9, and there were 20403 of the latter. Calculate the capital of the company.

18. It is proposed to raise £1,000,000 partly in £60 Debenture shares, partly in £40 Preference shares, and the balance in £10 Ordinary shares. If there are 200 of the first and 4000 of the second, what capital was raised by the Ordinary shares, and how many of them were issued?

19. If there had been £20 paid up on the Debenture shares of the last question, £30 on the Preference, and £5 on the Ordinary, by how much would the paid-up capital have been less than the total provided for?

Ignore brokerage in Questions 20 to 46:

20. How much ought my broker to charge for 90 London County and Westminster Bank shares at £19?

21. What will you offer for 500 shares in the London-Asiatic Rubber Company at 6s. 6d.?

22. What should be offered for 76 Vickers at 35s.?

23. What must be paid for 60 Anglo-American Tobacco at £22½?

24. What will be left out of £100 after purchasing as many British South Africans at £2½ as possible?

25. What will 1500 Bovril at 21s. 6d. cost me?

26. If you sell 550 Bradford Dyers at a guinea, and buy as many Calico Printers as you can at 6s. 7½d., how many of the latter can you get, and what cash will be left over?

27. If a merchant bought 350 Coats at £5 $\frac{1}{8}$ yesterday and sold them all to-day at £6, what profit did he make?

28. What will 500 Dunlop Ordinary cost at 44s.?

29. How many Hudson's Bay at £6 $\frac{3}{8}$ can be bought for £100?

30. If one-third of the shares in Question 29 are sold at £7 and the remainder at £6 $\frac{1}{2}$, what profit or loss is made by the transaction?

31. What difference is there in cost between 560 Aerated Bread at £3 $\frac{1}{2}$ and 640 British South Africans at £2 $\frac{5}{8}$?

32. How many Marconi Wireless at 33s. 6d. can be bought for £1005?

33. How many Rubber shares at 73 can be bought for £1825?

34. What number of Maypole Dairy shares at 25s. can be bought for £1950?

35. How much will be left out of £27 if the greatest number of £1 shares in Bovril at 21s 6d. be purchased?

36. What profit would be made by selling the shares of the last question at 22s. each?

37. What would you pay for 500 £1 shares in Armstrong-Whitworth at par?

38. What would the shares of the previous question cost at a premium of 10 %?

39. What would you make by buying 300 £10 Nobel Dynamite at par and selling at £16?

40. If the Aerated Bread £1 shares stand at £3 $\frac{1}{2}$, what is the premium?

41. If Lipton £1 shares are on sale at 16s. 2d., at what discount do they stand?

42. What loss would be sustained if one had bought 750 Liptons at par and sold them at 16s. 2d.?

43. What income will 1000 Bovril £1 shares bring in if the dividend is 7 %?

44. If we buy £105 worth of Harrod's shares and the dividend is 29 %, what income will be obtained if the shares are at par?

45. What income will be derived from 760 ten-shilling shares if the dividend be 15 %?

46. What income will be obtained by investing £500 in 5 % shares at £15?

47. Draw up and then fill in the following table, allowing in (1), (2), (3), (6), and (7), 1s. 3d. ; in (4) and (5), 3d. ; and in (8), 1d. per share for brokerage :

	Name of Share.	Closing Prices.	Jobber's Turn.	Broker's Price to his Client	
				for Selling.	for Buying.
(1)	Barclay's Bank . .	£12 $\frac{1}{8}$ to £12 $\frac{3}{8}$			
(2)	Parr's Bank . . .	£36 $\frac{1}{4}$ to £36 $\frac{3}{8}$			
(3)	Burma (Oil) . . .	£4 $\frac{3}{8}$ to £4 $\frac{7}{8}$			
(4)	Imperial Tobacco .	25s. 3d. to 25s. 9d.			
(5)	Anglo-Malay (Rubber)	9s. to 9s. 3d.			
(6)	Royal Dutch (Oil) .	£44 $\frac{1}{2}$ to £44 $\frac{3}{4}$			
(7)	London and S. W. Bank	£13 $\frac{1}{2}$ to £13 $\frac{3}{8}$			
(8)	Van Den Berghs .	1s. 3d. to 1s. 4d.			

Allow brokerage in each of the Questions 48 to 55, taking brokerage and prices from the last question :

48. What will you pay over to your client if you sell 1000 Parr's Bank shares for him ?

49. What must you pay your broker if he buys 5000 Burma Oil for you ?

50. For what amount should a cheque be drawn to purchase 5600 Anglo-Malays ?

51. A merchant sells 650 Barclay's Bank shares ; what cash payment does he get ?

52. If the cash of the last question be put into South Australians (page 490), how much stock could be obtained ?

53. James Williams, Esq., instructs his brokers, Dawson & Sons, to buy for him 4500 Glencairn (South African) mining shares at 2s. 6d. He encloses a cheque for £750 and knows that he must pay the broker 3d. a share for buying. Find (1) the amount paid for the shares ; (2) the amount paid to the broker ; and (3) draw a crossed cheque upon the Upton Bank (Messrs. Dawson & Sons are the drawers and Mr. Williams the drawee) for the balance due to Mr. Williams.

54. What will be left out of £1200 after buying as many £13 $\frac{1}{2}$ shares in the London and South-Western Bank as possible, and what income do they produce if the dividend is 17 % (the par value of the shares is £10) ?

55. What do the jobber and broker make respectively by buying and selling 1500 Imperial Tobacco shares ?

REVISION QUESTIONS. III.**A. (1)****SECTION XVII. A (1)**

The student will do well to read through the *book work* in the various sections before proceeding with these sets of Examples.

1. If I have to pay 5s. for a piece of looking-glass 25 in. by 12 in., how much shall I have to pay for a piece 30 in. by 11 in., if the price is proportional to the area?

2. A carpet 15 ft. by 9 ft. costs £3 3s. ; what should be paid for one 18 ft. by 12 ft. 6 in., if the maker charges 6d. per sq. yard more than the ratio of the areas would demand?

3. The ratio of the width of a field to the length is as $2\frac{3}{4} : 6\frac{3}{8}$. What is the area if the length is 150 yards?

4. A dairyman pays 25 men £40 a week in wages. His business increases and then he employs 36 men. What increase is there in his wages bill per week?

5. Three great companies contribute to the erection of a large educational institution. One company contributes as much as the other two together, and they contribute in the ratio of their total incomes, namely, £58000 and £50000. If the smallest contribution is £1200, what is the total amount by which education is indebted to the three companies?

6. There were 15640 felonies committed in London in 1911 and 15980 in 1912, the population being 7,321,420 and 7,393,970 respectively. Is the number of felonies per 1000 of the population increasing or decreasing?

7. The value of an engine depends on the time it has been in use, and its life is reckoned at 15 years. Calculate its value at the end of 5 years, of 8 years, and of 12 years, if it cost £7500 to begin with.

8. If a reaping-machine can reap 8 acres in $1\frac{3}{4}$ day, how long would it take to reap $15\frac{1}{2}$ acres if there were a breakdown taking 5 hours to repair? (Take $10\frac{1}{2}$ hours = 1 day.)

9. The value of a plantation in South America is greatest in the eighth year of its development, and it is then worth £6000. Its value in the ninth year bears to that in the eighth the ratio of 2 : 3, and its value in the fifteenth year bears to that in the eighth the ratio of 1 : 100. Find the average fall in value per annum between the ninth and fifteenth years.

A. (2)

1. The value of the 3,007,040 galls. of lubricating oil imported into South Africa in 1912-13 was £143760. What quantity was imported in 1913-14 if its value was £150100?

2. The value of the 1,528,000 lb. of glue imported into Canada from the United Kingdom was 109200 dollars last year. If that rate continued, what should be the value of the 1,539,000 lb. imported in the present year, and how much is the value obtained from the question greater or less than the actual value, 129000 dollars? Is the market improving or not?

3. The cost of providing electric light for the illumination of Southampton Docks (and all others too) depends on the candle-power (C.P.) of the lamps employed and also on the number of them and on the time that they "run" (*i.e.* are lighted). If there are 50 300-C.P. lamps the cost is £3 a week. What would it cost to run 80 250-C.P. lamps?

4. If a train travels at an average speed of 64 miles per hour between London and Liverpool it can do the journey in 6 hrs. 15 mins. To what must the average speed be increased in order that 15 minutes may be saved on the journey?

5. There are four trap-doors fitted into the gates of a lock, each being 7 sq. ft. in area; they allow the water to flow out to the required level in $4\frac{1}{2}$ minutes. What size must each of three doors be to allow the water to run out in $3\frac{1}{2}$ minutes?

6. In planning the seating accommodation of a hall it is found that with seats 1 ft. 8 in. wide the total number that can be put in is 1000. By how much must the width of each seat be reduced in order that there may be room for 1250 people?

The student should now rework Examples LXI. (a) and LXI. (b).

A. (3)

1. Three grocers in a suburban town enter into partnership together. The first supplies stock valued at £380 and also £120 in cash, the second supplies £560 value of goods and £80 cash, the third supplies £750 goods. Divide the profit of £472 10s. between them.

2. Divide £4641 among five merchants engaged in the same business in the ratio of $2 : 4\frac{1}{2} : 5 : 8 : 3\frac{1}{4}$.

3. Three partners agree that one shall be managing director of the firm and receive a salary of £450 per annum, the other shall be town manager at a salary of £300 per annum, while the third shall be a sleeping partner. They advance respectively

£3500, £5800, £10000, and the profits are £2487. Pay the first two their salaries and divide the balance in proportion to the capital advanced.

4. There are 3844 shareholders in a company divided into four equal groups, the value of their holdings being in the ratio of $1 : 1\frac{1}{2} : 2 : 2\frac{1}{2}$. The total amount available for dividend is £9356 4s. Calculate the amount available for each group and the average amount received by each individual shareholder in the group.

A. (4)

SECTION XVII. B (1) to B (5)

1. A draper pays £23 4s. 8d. in a year in rates which were at 8s. in the pound; what is the rateable value of his premises, and what rent should he pay if the rateable value is $\frac{7}{8}$ of the rental?

2. The rates in Poplar (London) stand at 11s. 7d. in the pound and are the highest among the Metropolitan Boroughs, while the rates at Kensington are 7s., and are the lowest. If the rateable value of the former borough be £811000 and of the latter £2,433,000, calculate which of the two produces the greater amount, and by how much. (To the nearest £100.)

3. The rates in one city are 7s. 6d. and in another 8s. 2d. in the pound per annum. There are 87000 houses in the former and 96000 in the latter. The rateable value is £2,639,000 and £2,848,000 respectively. Find by how much the average amount paid in rates per house in the second city is greater than in the first, per half-year.

4. Determine a merchant's net income from the following: Net profit on sales of goods, £500; income from investments, £180; rent paid for premises, £84; rateable value of premises, $\frac{5}{8}$ of rental; rates are 8s. 6d. in the pound; income-tax abatement, £150; income-tax, earned income, 9d. in the pound; income-tax, unearned income, 1s. 2d. in the pound. Give the answer to the nearest £1. (The income-tax is charged on the income before rent and rates are paid.)

5. With income-tax at 2s. 1d. in the pound a tenant deducts £7 10s. from his March quarter's rent in consideration of the tax he has paid. What rates does he pay per half-year if they are 7s. 8d. in the pound?

6. My partner has some money in a large silk mercer's, and he finds when the voucher comes in that £24 1s. 3d. has been deducted for income-tax, which stands at 1s. 9d. in the pound. What was his net income?

7. A traveller has £3500 stock in the London and Western Railway which pays him $5\frac{1}{2}\%$ p.a. If income-tax is 2s. 3d. in the pound, what is his net unearned income?

8. How much more would the net income of the traveller of the last question have been if he had had his money in the London and Eastern Railway, paying 6% p.a. ? (Income-tax as before.)

The student should now rework Examples LXX.

A. (5)

1. If a dairyman pays an annual fire insurance premium of 15s. on premises valued at £1000, what is the rate per cent. ?

2. If a coal merchant, aged 41, holds a life policy for £5600 and pays a premium of £3 7s. 2d. $\%$, how much abatement can he claim in respect to income-tax ?

3. The premium payable to one life office for insured, aged 50, is £4 11s. 10d. $\%$ with profits, while another office charges £25 9s. 8d. on a £550 policy. If now a merchant insures for £1000 in the one charging the lower rate, how much would he save per annum in premium ?

4. A banker insures his life for £3500 and pays a premium of £2 3s. 4d. $\%$ p.a. After 15 years he surrenders the policy and receives £600 in cash. What has the company actually charged him for covering his life for the period named ? (Neglect interest.)

5. Three tea merchants¹ are in partnership and they agree to pay all outgoings in proportion to the capital they put in, namely, £3000, £5000, £4500. They have a store containing tea valued at £4000 which is covered against fire at 2s. 6d. $\%$. What must each contribute to the premium which will provide for a policy to cover both tea and premium ?

A. (6)

SECTION XVII. B (6)

1. An estate agent finds that his liabilities are £5644 16s. and his assets £3292 16s. A friend offers to give £940 16s., provided the affairs are not put in the receiver's hands. By how much will a creditor for £560 benefit by accepting the latter arrangement ?

¹ Tea merchants often have large stocks for customers, and they always hold them covered against fire.

2. A bankrupt's liabilities are £9876 6s. 9d., including preferential claims which amount to £185. What assets must he have to allow for a dividend of 6s. 8d. in the pound?

3. A bankrupt pays 4s. 6d. in the pound, and I find that I have lost £8 18s. 3d. thereby. What did he owe me?

4. A firm has assets to the value of £11185 and the liabilities are stated to be £40650. On examination it is found that one item in the former is a debt of £750 which realises 18s. in the pound, and among the liabilities a claim for £250 is disallowed. What dividend can be paid?

5. A bankrupt pays a dividend of 8s. 4d., and 6 months later a further dividend of 3s. 6d., and after three months a final dividend of 2s. 2d. What amount does a creditor whose account stands at £2800 receive on each occasion, and what does he lose altogether?

6. The creditors of a bankrupt find that the assets are £6430, the liabilities £12600, and that preferential claims, other than legal expenses, are £350. The dividend is 9s. 4d. in the pound, what were the lawyer's charges?

7. Find the dividend payable in the following case: Assets—cash, £2350; goods, £1250; good debts, £1000; bad debts reckoned to produce 5s. in the pound, £780; bad debts reckoned to produce 8s. in the pound, £985; bad debts reckoned to produce 12s. in the pound, £360. Liabilities—preferential claims, £380; other claims, £8420.

The student should now rework Examples LXVIII.

B. (1)

SECTION XVIII.

1. $15\frac{1}{4}$ cwt. is 60 % of a consignment of mahogany¹ from the West Indies. What is the total weight?

2. A merchant orders 560 drums of Valencia raisins (of 24 lb. per drum) and finds that 375 have been delivered in one lot. What percentage of his order has still to be delivered?

3. Find, correct to three decimal places, the percentage error in calling an account for £350 18s. 6d., £351.

4. The United States is said to have manufactured 88,514,000 barrels of cement last year and 92,097,000 the year before. What was the decrease per cent.?

5. In 1910, 35,101,500 sovereigns were coined; in 1911,

¹ This wood is said to have been brought to England first by Sir Walter Raleigh in 1595.

43,260,000; and in 1912, 42,519,000. What difference is there between the percentage increase in 1910-11 and the percentage fall in 1911-12?

6. If the rate of exchange be 25·25 francs to the pound on one date and 25·20 on another, calculate the percentage rise or fall in the value of a franc in the second case, and so decide upon which day it would be better to dispose of a 1000-franc bill¹ in London.

7. In 1892 the general level of the retail price of beef was 99·4; in 1902, 105·3; and in 1912, 108·9 (the year 1900 being taken as the standard, 100). Was the percentage rise 1892-1902 greater or less than that in 1902-12, and by how much?

8. Labour Exchange returns show the following:

Year.	Applications for Work.	Number of Applicants.
1911 . . .	2010113	1502268
1912 . . .	2423213	1628517

Calculate (1) the percentage increase, in each case, on the number for 1911; and (2) the difference between the percentage increase in the number of applications for work and that in the number of applicants.

9. A diamond merchant pays his agent 2s. 3d. % on his sales, which amount to £15890 15s. What is the total amount paid in commission?

B. (2)

1. Exports of Cardiff—total, £9,695,000; coal, coke, and patent fuel, £9,650,000. What percentage of the total exports were *not* included under coal, coke, and patent fuel?

2. The Government of India spent £114293 in 1912 on Famine Relief, including protective railways and irrigation works, and £188885 in 1913. Calculate the percentage increase in the expenditure in the second year over that in the first.²

3. In two successive years a Russian iron-selling syndicate booked orders to the extent of 147,679,340 poods and 118,555,680 poods respectively. Find the decrease per cent. in the year's sales.

¹ § 338. See Plate XIII., p. 468.

² The lowest expenditure since 1902 was in 1905, namely, £2087, and the highest was in 1913.

4. Last year the value of the products of a potash manufacturing company in Germany was 156 million marks, while the year before it was 192 million. By how much per cent. did the value of the production fall in the period named?

5. In two successive years the wheat production of the Australian Commonwealth increased from 71,636,347 to 91,969,547 bushels. Find the increase per cent.

6.

THE INDIAN¹ CROP.

(FROM OUR CORRESPONDENT.)

DELHI, March 7.

The second wheat forecast shows 32,028,000 acres of crop, or 23 % above the same period of last year. The first forecast, on January 7, was 28,694,000 so that late sowings have increased the acreage by 3,334,000.

Find from the data given above (taken from a newspaper) (1) the acreage last year; (2) the percentage increase in the January estimate produced by late sowings.

7. Tenders are invited by the Department of Street Cleaning in Toronto for furnaces and appurtenances for refuse incinerating plant. Sealed tenders must be accompanied by a cash deposit or a marked cheque for $2\frac{1}{2}$ % of the value of the offer, made payable to the City Treasurer. If a firm submits a tender of £5864 15s. for part of the plant, for what value, in dollars, must a marked cheque be drawn? (1 dollar = 4s. $1\frac{1}{2}$ d.)

B. (3)

1.

OFFICIAL CLOSING QUOTATIONS.

Pig Iron (price per ton)—

	To-Day.	Yesterday.
Cleveland—cash . . .	56s. 4d.	56s. 4 $\frac{1}{2}$ d.
One month . . .	56s. 8d.	56s. 8 $\frac{1}{2}$ d.
Three months . . .	57s.	57s. 3d.

The details given are taken from our newspaper. By how much per cent. (of yesterday's price) has the cost per ton fallen from yesterday to to-day?

2. What must be the retail price per ton of foreign tin selling wholesale at £176 per ton to gain 22 % on the retail price?

3. What is the retail price per cwt. of Castile soap imported from France into Canada, if 2,626,500 lb. are valued at 152800 dollars and sold retail at 15 % profit on that value?

¹ In thinking of India think of the British Government's supreme achievement—irrigation.

4. A merchant in the Midlands sends piston-ring castings in the rough to New Zealand to the value of £356 15s. The duty payable is 20 % *ad val.* Find the duty to be paid, and thence calculate the percentage profit on the selling price of 420 guineas.

5. If 617500 bunches of bananas valued at £30320 were exported from British Honduras last year, calculate, to the nearest shilling, the retail price per bunch to gain 10 % on the original value.

6. If bananas are sold in London for three a penny, what is the wholesale price per bunch of 150 if the profit is $12\frac{1}{2}$ % on the wholesale price?

7. A costermonger buys oranges at $4\frac{1}{4}$ d. a dozen and sells two-thirds of them at two a penny, two-fifths of the remainder at five for 2d., and the rest at three a penny. What percentage profit does he make?

8. A wholesale firm allows 5 % off the prices in the price list. The retailer sells to the consumer so as to gain 20 % on his cost price. By how much per cent. of the wholesale list price has the consumer to pay more than if he could buy direct from the wholesale merchant at the list price?

9. A cubic centimetre of water weighs 0.99996 gm. at 4° C., and 0.99969 at 10° C. Calculate the average percentage fall in weight for each degree rise in temperature from 4° to 10° C.

10. The Freight Market report in our newspaper contains the following: "Steamer, 3000 tons, Bilbao, 12s. 9d. to Middlesborough or West Hartlepool, 12s. 6d. to the Tyne, May." What is the percentage decrease for conveying cargo to the Tyne rather than to either of the other places named? Put the information between the inverted commas into your own words.

C.

SECTION XIX.

(The following have been taken from recent examination papers.)

1. Enter the following transactions in your Subsidiary Books, post into the Ledger, and then balance your Ledger and prepare a Trial Balance. Feb. 1, 1915. Charles Dugmore began business with cash amounting to £120. Feb. 3. Bought goods from R. Russell, £75 6s. 8d. Feb. 5. Bought goods for cash, £22 3s. 4d. Feb. 6. Sold goods to F. Shepherd, £21 2s. 6d. Feb. 8. Paid R. Russell on account, £20. Feb. 10. Sold goods for cash, £30. Feb. 15. Bought goods from C. Oliver, £10 12s. 5d.

Feb. 19. Sold goods to G. Markham, £5 16s. 10d. Feb. 25. Received cash from F. Shepherd, £20; and allowed him discount, £1 2s. 6d. Feb. 28. Paid trade expenses, £4 10s. 6d.

2. (a) Why is there a debit and a credit entry for each transaction? Give as full an explanation as you can. (b) What is the effect on a Trial Balance if (i) a debit entry is not posted into the Ledger; and (ii) a credit entry is posted to the Ledger on the correct side, but to the wrong account?

3. From the following list of transactions write up the Cash Book, Day Books, and Ledger of F. Mathews, and prepare Trial Balance: Nov. 1. Started business with cash, £60. Nov. 2. Bought goods from Smith & Co., £50. Nov. 3. Cash purchases, £25. Nov. 4. Cash sales, £20. Nov. 5. Sold goods to Burgess & Co., £50. Nov. 6. Received from Burgess & Co. cash on account, £40. Nov. 10. Paid gas, rent, fuel, etc., £5. The stock of goods on hand were valued at £50.

4. Rule a page as for a Columnar Cash Book and enter therein the following receipts and payments: Jan. 1. Balance at Bank, £25; subscriptions received and paid into Bank, £25. Jan. 3. Donations received and paid into Bank, £30. Jan. 5. Dividends received by bankers direct, £25. Jan. 8. Contributions for particular "Cases" and paid into Bank, £35. Jan. 1. Coal purchased for "Cases" by cheque, £23. Jan. 3. Rent of offices paid by cheque, £10. Jan. 8. Money payments to "Cases" by cash withdrawn from Bank, £47. Jan. 8. Salaries paid by cheque, £6.

5. W. Carrick commenced business on 1st January and paid into his Bank Account as capital, £10000. There was paid from the Bank for premises, plant, and machinery, £5000. The following are the transactions for the twelve months: Purchases, £30000; sales, £45000; received from debtors, cash, £33000; allowed to debtors for discount, £2000; paid to creditors, £16000; received from creditors, discount, £1500; paid for trade expenses, £2500; paid for salaries and wages, £3000; neglect the value of the stock at the end of the year. Record the above in W. Carrick's Cash Book, Day Books, and Journal, post to the Ledger Accounts, and prepare the Balance Sheet and P. and L. Account at 31st December.

6. Enter the following transactions into the proper Subsidiary Books, post to the Ledger, and take out a Trial Balance: Bought of W. Murray, goods, £400; sold to M. Flockhart, goods, £840; sold to E. Barr, goods, £320. M. Flockhart settled his account as follows: Cheque, £500; bill at 2 months, £300; discount, £40. Drew from Bank for self, £50. Bought

from A. Troup, goods, £300. Settled W. Murray's Account as follows: Cheque, £100; bill at 3 months, £280; discount, £20. Paid A. Troup on account, £150. Paid office salaries for this month, January, by cheque, £60.

7. F. Nicholls has the following transactions with D. Chadwick: (1) On 1st January sells to D. Chadwick goods of the value of £200 subject to 25 % discount, payable in cash on 31st January. (2) On 1st January purchases from D. Chadwick goods of the value of £100 subject to 40 % discount, payable in cash on 30th January. The goods were delivered and paid for as agreed. Make the necessary entries in F. Nicholls' Day Books and Cash Book and post to the Ledger.

8. The following totals appear in the tabular Cash Book at the end of the month: On the Debit side—Bills receivable, £2500; cash sales, £650; discount, £400. On the Credit side—Bills payable, £4000; office expenses, £500; discounts, £600. Open Ledger Accounts for the above and post them to their respective accounts.

9. In preparing a Balance Sheet and P. and L. Account, in which account and on which side thereof do the following appear—(1) Profits; (2) Liabilities; (3) Losses; (4) Assets; (5) Capital; (6) Expenses; (7) Sinking Fund for a Lease; (8) Debenture Issue; (9) Stock at the end of the period; (10) Bills Payable?

10. The position of B. Salt on 1st February 1912 was as follows: Assets—Cash in hand, £24 3s. 6d.; cash at Bank, £312 8s. 9d.; bill receivable, due February 10, £86 10s.; G. Thorp, £21 6s. 8d.; W. Stott, £59 5s. 6d.; office furniture, £62 15s.; goods on hand, £522 7s. Liabilities—J. Firth, £218 9s. 6d.; J. Holroyd, £371 3s. 4d. His transactions for the month were as follows:

	£	s.	d.	£	s.	d.
Feb. 1. Received bill of exchange at 2 months from W. Stott in settlement of his account				59	5	6
„ 2. Sold goods to E. Evans for cash				81	6	0
„ 2. Paid into Bank				100	0	0
„ 3. Bought for cheque roll top desk				5	5	0
„ 6. Drew and cashed cheque for office cash				20	0	0
„ 9. Paid bill due 10th inst. into Bank				86	10	0

	£	s.	d.	£	s.	d.
Feb. 12. Bought goods from J. Holroyd				110	9	8
Paid J. Firth by cheque which with discount settled his account				207	11	0
„ 14. Sold goods to G. Thorp				290	3	4
„ 15. Gave J. Holroyd a bill of exchange for				371	3	4
„ 18. Received from G. Thorp a cheque which was paid into Bank same day	295	18	6			
And allowed him discount	15	11	6			
	-----			311	10	0
„ 21. Paid in cash carriage outwards				3	8	6
„ 25. Bought goods for cheque				70	8	6
Sold goods to W. Stott				62	12	8
„ 28. W. Stott returned part of goods invoiced on the 25th B. Salt draws a cheque for private purposes				20	6	8
„ 29. Charge depreciation of office furniture				1	5	0
Rates and taxes due but not paid				6	8	6

Record the above in the proper books, post to Ledger Accounts, and take out Trial Balance.

11. From the foregoing, close the accounts, bring down the balances, make out P. and L. Account and Balance Sheet. On 29th February 1912 the stock was valued at £339 19s. 10d.

12. Enter the following transactions in E. Elgood's Day Books, Cash Book, and Journal, post to the Ledger Accounts, and take out a Trial Balance of the books: Jan. 1. E. Elgood commenced business paying into his Banking Account as capital the sum of £1000. Jan. 4. Bought of J. Day, dry goods subject to a trade discount of 10 % (£65) of the value of £650. Jan. 15. Paid J. Day by cheque, receiving a discount of 5 % (£29 5s.) the sum of £555 15s. Jan. 16. Sold above goods to J. Jones, £700. Jan. 16. J. Jones wishes to pay by bill at 1 month with £3 10s. added for interest, which offer is accepted and a bill was received dated this day for £703 10s. Feb. 18. J. Jones' bill due to-morrow paid into the Bank for collection, the amount of the bill being for £703 10s. Feb. 20. J. Jones' bill returned

unpaid with 3s. 6d. added for expenses, the entry being for £703 13s. 6d. Feb. 21. J. Jones agreed to pay a further sum of £2 for interest and then to discharge his indebtedness as follows: Cheque which was paid into the Bank, £305 13s. 6d.; new bill at 1 month, £400. Mar. 22. J. Jones' bill was paid into the Bank for collection and was duly met for £400.

D. (1)

SECTION XX.

1. What must be paid for a loan of £550 for 14 days at $3\frac{1}{2}\%$ p.a.?

2. If interest is charged at 5% p.a., and a loan for 146 days brings in £10, what is the amount of money lent?

3. What will £784 15s. 8d. invested at $5\frac{1}{2}\%$ p.a. produce in interest in $4\frac{1}{2}$ years?

4. What will £856 12s. amount to at $6\frac{1}{4}\%$ p.a. if the interest is allowed to accumulate for 10 years?

5. A banker buys Government Bonds¹ to the value of £15580, and is to receive the interest quarterly at the rate of $4\frac{1}{2}\%$ p.a. What does he receive each quarter?

6. If a merchant lends his chief clerk £785 on mortgage on his house, and receives interest at the rate of $4\frac{1}{4}\%$ p.a., the clerk paying back the capital at the end of 5 years and the interest annually, calculate the total amount the merchant receives in interest in the 5 years, and the net amount after deducting income-tax at 1s. 2d. in the pound.

7. If 12000 francs be deposited on 31st January with a rate of interest of 3% p.a., which becomes $3\frac{1}{2}\%$ p.a. on 30th June and 4% on 30th September, calculate the interest due at the close of the year.

8. Interest is allowed at $2\frac{1}{2}\%$ p.a. on minimum monthly balances. What amount is due on 31st December on the following: June 30, £500; July 15, deposit, £100; August 18, withdrawal, £350; August 28, deposit, £500; September 8, deposit, £200; October 20, withdrawal, £100; November 3, withdrawal, £50; November 18, deposit, £300; November 28, withdrawal, £10; December 20, deposit, £200?

9. A sum of money put out at Simple Interest amounted in 6 years to £5200, and in 10 years to £6000. Find the sum and rate of interest.

¹ See page 480, note 2.

D. (2)

1. I invest £560 15s. 8d. for 3 years at 4 % p.a. Compound Interest; what amount shall I then have standing to my credit?

2. The Post Office Savings Bank allows $2\frac{1}{2}$ % p.a. on money invested. How much will be due to a clerk at the end of 2 years if he have £50 in the Bank to begin with?

3. What is the Compound Interest on £830 10s. 6d. invested for 4 years at 3 % p.a.?

4. Find the Compound Interest due after $3\frac{1}{2}$ years on £756 7s. 6d. invested at 2 % p.a.

5. A French wine merchant has a vineyard for which he paid 30000 francs. For 3 years it brings him in no income and does not increase in value, but from the third to the sixth year its value increases 10 % each year. At what price must he sell it at the end of the sixth year to make a profit of 5 % on its value at that time?

6. A colonist has a large area under fruit in Canada. He spends £1000 upon it, and receives $5\frac{1}{2}$ % the first year, 8 % the next, 10 % the next, and $12\frac{1}{2}$ % the next on the value at the beginning of the particular year in question. In the fifth year a frost blights the blossom and he makes nothing. Find his average receipts per annum during the five years.

7. A debt of £512 was left unpaid for 3 years. What amount is due to the creditor at the end of that time, reckoning Compound Interest at $4\frac{1}{2}$ % p.a.?

8. £625 was invested for 2 years at Compound Interest, the rate being 4 % p.a. for the first year and 3 % p.a. for the second. Interest was added half-yearly. Find the amount earned.

9. A mortgage of £1575, rate of interest 4 % p.a., was neglected for $3\frac{1}{2}$ years. What was the total amount then due, Compound Interest being charged?

10. Upon what sum of money invested at 5 % p.a. for 2 years is the difference between the Compound Interest and the Simple Interest 10s.?

E. (1)

SECTION XXI.

1. If a family consumes 12 loaves, costing $4\frac{1}{2}$ d. each, per week, and the baker allows a cash discount of $2\frac{1}{2}$ % on the monthly account, find the net amount payable.

2. A lady noticed that a sewing-machine was offered at £3 7s. 6d. with 5 % discount for cash. On going to purchase

the same the account was made out for £3 5s. By how much was this wrong?

3. A revolving bookcase in walnut is reduced from 32s. 6d. to 28s. 6d. for cash. At what rate per cent. is discount allowed?

4. What remains in each case after allowing discounts as follow: $2\frac{1}{2}\%$ from £500 10s.; 4% from £300 15s.; $7\frac{1}{2}\%$ from £600 10s.; $33\frac{1}{3}\%$ from £390 10s. 6d.?

5. The manufacturers' list price of a suite of furniture is £25, and his prices advance 10% . If the retailer is allowed 15% on the list price, how much more must he pay than he did before the manufacturers' advance?

6. If dried apricots are sold in cases of (about) 56 lb. at 30s. a case list price, and the retailer is allowed $2\frac{1}{2}\%$, calculate his selling price per lb. to gain 20% on his outlay.

7. The producer of cotton goods advances his price $12\frac{1}{2}\%$ and still allows the wholesale houses 15% . The latter usually make 50% profit on the actual cost to them, and they now advance their rate to 60% and reduce their trade discount to the retailer from 10% to 5% . How much more has the retailer to pay for shirts which the producer listed at 48s. per dozen?

8. I can buy my stock of ostrich feathers at 25% cash discount or net at 3 months. If my account runs to £700, at what rate per cent. per annum must I invest the money so that if I pay at 3 months I may not lose the amount of the cash discount? (Reckon Simple Interest.)

E. (2).

1. A contractor agrees to honour a bill for 53568 roubles on 9th September; it is discounted in Petrograd at 3% p.a. on 28th June. What is its discounted value?

2. If the broker who bought the bill in Question 1 sold it for 53250 roubles the same day, and invested the proceeds at $3\frac{1}{2}\%$ p.a. until 9th September, how much more did he make than if he had held the bill till its due date?

3. A bill for £750 was drawn on 6th March, payable 6 months hence, rate $4\frac{1}{2}\%$ p.a. It was discounted 28th June. What did the banker pay the holder of the bill?

4. A 6 months' bill is discounted at 5% p.a. To what rate of interest is this equivalent?

5. What rate of interest is equivalent to a discount rate of $2\frac{1}{2}\%$ p.a. for 3 months' bills?

6. A stock of timber which will be sufficiently seasoned for sale in 8 months will then be worth £4650. Find its present value: (a) By the method of true discount; (b) by the method of commercial discount. (Rate of interest per annum, 5 %.)

7. John Thompson & Co. draw on Bell & Evans at 3 months from 15th December 1914, for £650 6s. 8d. They discount the bill with Lloyd's Bank Ltd. on 31st January 1915, the rate charged being $4\frac{1}{2}$ % p.a. What amount do Thompson & Co. receive?

8. A bill of the value of £625 is drawn on 1st March, the latest day for its payment being 4th July following. It was discounted on 31st March, the rate of discount being 4 % p.a. What was received by the holder of the bill?

9. Find the difference between the true discount and the commercial discount on £1906 10s. due in half a year at 5 % p.a.

10. We take the following from our newspapers :—

“VICTORIAN GOVERNMENT $4\frac{1}{2}$ % LOAN,

1920-1925.

Applications on the form prescribed will be received at the London County and Westminster Bank Limited, Lothbury, and must be for multiples of £100 and accompanied by a deposit of 15 % on the nominal value applied for.

Payment will be required as follows :

£5 % on application.
 £10 % on 3rd May 1915.
 £40 % on 28th June 1915.
 £45 % on 26th July 1915.

Payment may be made in full on 3rd May 1915, or any subsequent day, under discount at the rate of $2\frac{1}{2}$ % p.a.”

What amount should be paid on 3rd May for £100 stock?

11. Messrs. Roche of Manchester do business with Hubert Frères of Lyons, who are able to buy a 6 months' bill for £5000 discounted at 4 % p.a. They find that at the current rate of exchange, namely, 25·20 francs, the discounted value of the bill will just meet their account with Messrs. Roche. How much is that account in francs?

12. The French Government issued the 5 % Rentes Loan, and English investors might pay £3 3s. 6d. on application or smaller sums at various dates. If the amount to be paid in the latter case were equivalent to £3 4s., due in 50 days, determine the discount rate.

F. (1)

SECTION XXII.

1. How much must be put into the Russian 4 % at $80\frac{1}{2}$ to give an income of £1000 p.a.?

2. Which investment will produce the larger income—Mexican 5 % at $54\frac{1}{2}$, or $2\frac{1}{2}$ % Consols at 66? Which would you choose to put your savings into?

3. What income will a merchant get by putting £5836 1s. into the Sheffield 3 % at 88?

4. If the merchant in Question 3 sells out at $89\frac{1}{2}$, what will he make on the deal?

5. Complete the following table :

Stock.	Price.	Yield per Cent. on Money invested.	Dividend declared per Cent.
G. W. R. . . .	135 $\frac{1}{2}$	£ s. d. 3 19 0	£ s. d. ?
East Indian . . .	?	2 19 3	4 0 0
N. W. R. . . .	156	?	6 2 6

6. As many Lyons shares as possible are bought for £100. If their par value be £1, the present price $£6\frac{1}{2}$, and the dividend 40 %, calculate the income obtained.

7. If Lyons shares rose to £7, what profit would be made by selling out the shares of Question 6?

8. If Hudson's Bay £1 shares stand at $£10\frac{1}{2}$ and the dividend is 50 %, what is the percentage return?

9. What would the dividend have to be on Hudson's Bay shares (Question 8) to give 5 % return?

10. What return % do Lyons £1 shares yield if they stand at $£6\frac{3}{4}$ and the dividend is 42 %?

11. A merchant invests £1000 in a stock paying 3 % and gets an income of £60 a year. What is the price of the stock?

F. (2)¹

1. Consols, bearing $2\frac{1}{2}$ % interest p.a., stand in the list at $75\frac{1}{2}$ ($£75\frac{1}{2} + £\frac{1}{2}$ for brokerage for £100 scrip). What amount of such scrip will £1206 purchase, and what rate per cent. is received on the money invested?

¹ Ignore Brokerage unless expressly told to allow it.

2. A banker having £1000 to invest spent part of it in buying £850's worth of $2\frac{1}{2}$ % Consols at $78\frac{1}{4}$, and the remainder in buying £5 shares in a water company quoted at $£5\frac{7}{8}$. If he received 8s. per share on the latter, what was his total income?

3. A merchant invests £2852 in 5 % railway stock at 115; he also expends £1620 in buying industrial shares at $£11\frac{1}{4}$. If the half-yearly dividend on the latter is 7s. 6d. per share, what is his total income?

4. A merchant had £6850 in $2\frac{1}{2}$ % Consols. He sold out at $78\frac{1}{4}$ and invested, in $3\frac{1}{2}$ % India stock at $96\frac{1}{4}$, as much as would produce the same income as before. How much money had he left?

5. A merchant invested £750 in the $3\frac{1}{2}$ % Stock at 77, and £500 more when the price was $82\frac{1}{4}$. Deduct income-tax at 1s. 2d. in the pound, and find his net income and the percentage return he obtained.

6. A broker derived an annual income of £253 6s. 8d. from money invested in $2\frac{1}{2}$ % Consols. He sold out at $77\frac{1}{2}$ and bought $3\frac{1}{2}$ % Stock with the proceeds, thereby increasing his income by £36. At what price did he buy the $3\frac{1}{2}$ % Stock?

7. A cotton mill has a capital of £40000. The profit made during the last quarter is £937; £537 is placed in the Reserve Fund, the rest is paid as dividend. What dividend will be received by a man holding shares of the nominal value of £1500? Supposing that he bought them at a discount of 7s. 6d. per £1 share, what interest *at least* does he make per annum on his investment?

8. In 1875 Britain acquired from the Khedive of Egypt 176602 shares in the Suez Canal Company for £4,000,000, and each share was of the value of 500 francs. If 25 francs equal £1, what was paid for one share in 1875? If the value of the shares be £34,930,000 at present, find the present market price of one share and the rate of interest earned on the original purchasing price.

9. A company whose issued capital consists of 90000 Cumulative 6 % Preference shares of £5 each fully paid, 500000 Cumulative 6 % B Preference shares of £1 each fully paid, and 625000 Ordinary shares of £1 each fully paid, distributes dividends in the year amounting to £166375. Apportion this amount amongst the three classes of shareholders, and calculate the rate per cent. which the Ordinary shareholders received.

10. A person held for 1 year £600 stock of the 6 % Peruvian Corporation Debentures, and 1000 mining shares of the value of 2s. 6d. each fully paid, which have paid in the year dividends

amounting to 1s. 3d. a share. When the selling price of the Peruvian Corporation Debentures is 106 and the selling price of the mining shares is 10s. 9d., he sells out all and invests the proceeds in the $2\frac{1}{2}$ % Consols at $74\frac{5}{8}$. What amount of the Consols did he buy, what will his income now be, and what was his income during the year he held the Debentures and the mining shares? (Allow brokerage of $\frac{1}{8}$ % on sale of Debentures, $\frac{1}{8}$ % on purchase of Consols, and a commission of 1 % on nominal value of mining shares for selling them.)

11. Taking Plate XVI., presume that you are A. Burt, and endorse the dividend warrant which is payable to your order, so that it may be paid by the bank "to the order of James Wilson." Now assume that you are James Wilson, and that you do not want to cash the warrant. Endorse it again so that it may be payable to the order of R. J. Wilkins.

- P. 295.** — 12. EXPERIMENT 3.—(1) $34\frac{1}{2}$ (34·66) cub. in. = 1 pt.
 (2) 61 cub. in. = 1 litre. (3) 1000 c.cm. (4) 568 c.cm. = 1 pt.
 (5) $\frac{1}{2}$ pt. = $17\frac{1}{4}$ cub. in. (nearly) = 284 c.cm.
13. (1) 1 c.cm. = 0·061 cub. in., correct to three places. (2) 0·061.
 EXPERIMENT 4.—(1) 8 cub. in. (2) 27 cub. in. (3) 2 cub. in.
 (4) 12 cub. in. (5) $17\frac{1}{2}$ cub. in.
- 14 and 15. The results of the last two columns should be the same for each individual vessel. Hence the rule is that the volume of a rectangular vessel is given by the product of its three dimensions (expressed in the same units).
16. There should be no difference whatever, but the student may find a small error called an "Experimental Error," due to the sand being a little more closely packed in one case than in another.

EXAMPLES. LIV.

SECTION XIV. A.

RECTANGULAR OBJECTS—(continued)

- P. 297.** — 1. (1) 72 cub. ft. (2) 16800 c.cm. (3) 0·78 cub. m.
 (4) 90 cub. ft. (5) $33\frac{3}{4}$ cub. yds.
2. 20 cub. in. 3. 327·7 c.cm. 4. $70\frac{1}{2}$ cub. in.
 5. $146\frac{1}{4}$ cub. in. 6. 35 cub. ft. 7. $2180\frac{1}{2}$ lb.
 8. 0·1692 cub. m. 9. 169·2 l. 10. 1600 cub. in.
- P. 298.** — 11. 3·9 cub. ft. 12. 5 cub. ft.
13. Volume of first is 0·86 times that of second.
 14. First costs 0·124s., and the second 0·071s. per cub. in., so that the larger costs less comparatively. Since labour AND material enter into both, their cost for any particular box is more than half as much as for a box twice the size.
15. £1 16s. 6d. (nearly). 16. £0·775 worse off.
 17. 2 ft. 3 in. \times 12 in. \times 7 in. 18. 2 ft. $3\frac{3}{4}$ in. \times $12\frac{3}{4}$ in. \times $7\frac{1}{2}$ in.
 19. 240. 20. 10 ft. 6 in. \times 4 ft. 6 in. \times 5 ft. $2\frac{1}{2}$ in.

EXAMPLES. LV.

SECTION XIV. B.

SPECIFIC GRAVITY

- P. 299.** — 1. 28·27 Kgm. 2. 0·696 lb. 3. 19·3 gm.
4. In the Metric System the unit of weight, 1 gm., is derived from the weight of 1 c.cm. of water, *i.e.* 1 c.cm. water weighs 1 gm., and so the weight of 1 c.cm. of gold is easily found by multiplying the specific gravity by 1. In the English System 1 cub. ft. of water weighs 62·321 lb.; \therefore the weight of 1 cub. ft. of gold involves multiplying its specific gravity by 62·321.

- P. 299.** — 5. Column 8 is—water, 1; salt, 1·2; powdered chalk, 1·11; powdered coal, 1·5; sand, 1·9; iron filings, 7·2; mercury, 13·6; paraffin, 0·8; glycerine, 1·25.
- P. 300.** — 6. 691·07 lb. 7. 666 lb. 8. $2\frac{1}{2}$ cub. ft. (very nearly).
 9. 0·099 cub. ft., *i.e.* $\frac{1}{10}$ cub. ft. (nearly). 10. $3571\frac{1}{2}$ tons.
 11. 1·5625 lb. 12. 16·19 cub. ft.
 13. Alcohol, 7·9 lb. per gall.; earth, 100 lb. per cub. ft.; brass, 550 lb. per cub. ft.; cork, 15 lb. per cub. ft.; wine, 9·9 lb. per gall.
 14. The numbers in Question 13, column 2, give the weights in grams. See answer to Question 4.
 15. Lubricating oil, 1·19 lb. per pint; methylated spirit, 1·06 lb. per pint; linseed oil, 1·175 lb. per pint; turpentine, 1·09 lb. per pint; sea water, 1·28 lb. per pint; milk, 1·29 lb. per pint.
- P. 301.** — 16. 1 cub. ft. contains 6·2321 gallons.
 17. (1) Keeping the order of Question 15, the weights per gallon are, in pounds—9·5, 8·5, 9·4, 8·7, 10·25, 10·3. (2) Weights per cub. foot are, in pounds—59·205, 52·973, 58·58, 54·219, 63·879, 64·191. (3) There are 6·2321 gallons of ANY liquid to 1 cub. ft.
 18. 222·854 cub. m. 19. 178284 Kgm. (correct to 1 Kgm.).
 20. 20·825 tons. 21. 2·75 (*i.e.* its specific gravity = 2·75).
 22. 0·9. 23. 0·9. 24. 98·6 lb.
 25. 2·0416 cub. ft. 26. 1444·3 lb. 27. 0·1075 ton.

EXAMPLES. LVI.

SECTION XIV. C.

THE PRISM LAW

- P. 303.** — 1. 0·0346 cub. ft. 2. 1·875 cub. ft. 3. 0·94 cub. ft.
 4. 0·0327 cub. ft. 5. 0·00005 cub. m. 6. 0·707 cub. m.
- P. 304.** — 7. 0·0203 cub. ft. 8. 116·91 cub. ft. 9. 11·926 tons.
 10. 8285 cub. ft. 11. 73730 cub. ft. 12. 98 pints.
 13. About $\frac{1}{2}$ more. 14. 60 shipping tons.
- P. 305.**—15. 4238 cub. yds. 16. 1800 cub. yds.; £180.

EXAMPLES. LVII.

SECTION XIV.

MISCELLANEOUS QUESTIONS

- P. 306.** — 1. 29 hrs. 10 min. 2. 14 ft. 3. £9 2s. (correct to 1s.).
 4. 0·949 cub. yd. 5. 1054 lb. (correct to 1 lb.).
 6. 3 ft. 6 in. \times 3 ft. 6 in. \times 5 ft. 3 in. 7. 218 cub. ft.
 8. 468·3 loads. 9. 10 ft.

- P. 307.**—10. 2180 lb. (1 ton nearly). 11. $1\frac{1}{2}$ shipping tons.
 12. 2 ft. $6\frac{1}{2}$ in. 13. 28·4 sq. cm. 14. 6 cm. (nearly).
 15. 50 cub. in. 16. 14·4 lb. 17. 3·4 galls. 18. 212 cm.
 19. 51 buckets. 20. 9,476,800 galls. (correct to 100).
- P. 308.**—21. 7·37 cub. in. 22. 3 lb. (nearly).
 23. 2 ft. (nearly): it is quite a reasonable depth.
 24. 37·2 lb. 25. 389·577 cub. cm.
 26. 132 oz., correct to 1 oz. (1 gram = 15·4323 grains).
 27. £12 14s. 6d. (nearly). 28. 11·04 cm. 29. 10·15 cm.
 30. 93·8 c.cm. 31. 609·7 gm. 32. 88·4 shipping tons.
- P. 309.**—33. £39 0s. 7d. 34. 103·4 c.cm. 35. 40,963,000 cub. yds.
 36. 1,525,000 cub. yds. 37. 76,968,000 cub. yds.
 38. $3\frac{1}{2}$ times dearer in England.
 39. 1·58 Kgm. 40. 35 ft. 8 in.
- P. 310.**—41. 200 Ha. 42. 0·771875 sq. mile.
 43. 3,524,000 galls. (correct to 1000). 44. 65,288,600 gallons.
 45. 684·4 cub. yds. 46. 97·62 cub. yds. 47. 146·6 tons.
 48. 359·8 cub. in. 49. $1140\frac{4}{7}$ yds.
 50. 211·9 cub. ft. per hour. 51. 330·1 gallons.

EXAMPLES. LVIII.

SECTION XV. WEIGHT AND CAPACITY

MISCELLANEOUS QUESTIONS

- P. 311.**—1. 80. 2. 36. 3. 19 cwt. 1 qr. 4 lb. 4. 20s.
 5. 193·2 bushels. 6. 16·12 tons. 7. 1s. $4\frac{1}{2}$ d. 8. 1s. $3\frac{3}{4}$ d.
- P. 312.**—9. 5d. 10. 2s. 2d. 11. £9 16s. 12. He loses £21 7s.
 13. 7·14 lb. 14. 1840 lb. (correct to 10 lb.). 15. 12s. 10d.
 16. 0·1275d. per cwt.-mile. 17. £39 1s. (correct to 1s.).
 18. £126 7s. (correct to 1s.). 19. £245 7s. (correct to 1s.).
 20. £241 8s. (correct to 1s.). 21. £44,593,500.
- P. 313.**—22. 1s. $2\frac{1}{2}$ d. 23. £4 0s. 10d.
 24. 2s. $6\frac{3}{4}$ d. (correct to one farthing). 25. 1 ton 3 cwt. 2 lb.
 26. 7s. $5\frac{3}{4}$ d. for merchandise; 1s. $10\frac{1}{2}$ d. for coal, coke, etc.; 2s. $4\frac{1}{2}$ d.
 for other minerals. 27. 8s. 10d.
 28. £183320. 29. 0·7168 oz. 30. £4800.
- P. 314.**—31. 9 tons 14 cwt. 0·6 qr. 32. 908 H.P. 33. 123·4 lb
 34. 2·89s. 35. 44,800,000 Kgm.; 93334 rails.
 36. £196 8s. 9d. 37. £1 17s. 3d. 38. £1 0s. 4d. (nearly).
 39. 250 lb. 40. 280 bushels.
- P. 315.**—41. £68 18s. 2d. (correct to 1d.). 42. 17s. $5\frac{1}{2}$ d.
 43. 1,431,144 gallons. 44. £51818 18s. 45. £2.
 46. 5111·2286 tons. 47. 1·05s. (nearly). 48. $11\frac{1}{2}$ d.
 49. 5,045,730 francs (correct to 10 francs); 50·46 francs per ton.
 50. £4,916,504. 51. 9·08 acres yield 1 ton of flax.

- P. 315.**—52. The weights in order are, in Kilograms, 40·8, 16·4, 3·2, 1·7, 0·9
5·9, 1·6, 97·1, 109·8.
- P. 316.**—53. 58199·47 tons. 54. 2·4d. 55. £1 18s. 6½d.
56. 13·7 kokus per chō ; 27·7 bushels per acre.
57. 12·5 bushels per acre ; difference, 12·2 bushels per acre.
58. 0·54 rouble per pood. 59. 108,450,496 oranges.
60. £150625 13s. 9d. 61. 16276 tons (correct to 1 ton).
62. 32·8 Hl. per Ha. 63. 24·3 francs per Hl.
64. 4·8s. per qr. 65. 2·78 francs per quintal.
- P. 317.**—66. 4·3d. per cental ; 1·775s. per qr.
67. 5 tons 19 cwt. 3 qrs. (nearly). 68. £11 19s. (correct to 1s.).
69. 110 tons 16 cwt. 1 qr. 70. 96 tons 5 cwt. 3 qrs.
71. 1 ton 3 cwt. 3 qrs. 18 lb. 72. 32·46 lb.
73. 3848·46 grams. 74. 1·2 in. 75. £16171 16s. 4d.
76. 5·102d. 77. 916·667. 78. £3 17s. 10½d.
79. £4 4s. 11½d.
80. £1. (Note that the actual value of the gold in a sovereign is its
face value. This is NOT, in general, true for silver coins.)
- P. 318.**—81. 50 lb. 82. 0·304 oz. (Troy). 83. 2s. 8·7d.
84. 6·048 grams. 85. 16s. 6½d.
86. 15s. 10½d. Since 1 franc = 9·513d., 20 francs = 15s. 10½d. — showing
that the actual value of the gold in a 20-franc piece is the same
as its face value. Hence the interchangeability of the standard
gold coins of various countries. 87. 22s. (nearly).
88. 4·032258 grams. 89. 4·1667. 90. 10s. 3d.
91. 5·96d. 92. 20·6 50-sen pieces equal one 5-yen piece.
93. £2 1s. 1½d. ; and since 1 dollar is worth 49·32d., the gold in a
10-dollar piece is worth the face value of the coin.
94. 1·8d. 95. £1 2s. 11·9d.
96. If a banker applies to the Mint for £2 worth of silver, he receives
forty shillings, and pays in two sovereigns. The actual value of
the former is £1 2s. 11·9d. less than the latter ; hence, if this
were all to be considered, the Government could obviously make
a very great deal over such transactions.
- P. 319.**—97. 7·06. 98. 8·96. 99. 2390 pats. 100. £16 8s. (correct to 1s.).
101. £36 8s. 1d. 102. 2·517 cwt. 103. 40·08 lb.
104. If it were made entirely of iron its weight would be about 5200 tons.
105. 3s. 5½d. per lb.
- P. 320.**—106. 1 franc 60 centimes. 107. 10s. 8d. per 56 lb. 108. 4·34d.
109. 822 nails. 110. 181 nails. 111. 6s. (very nearly).
112. 172·37 tons.
- P. 321.**—113. 5 francs 45 centimes. 114. £1003 3s. 5d. 115. £7 9s. 4d.
116. 3·4d. per lb. 117. 1·73d. per lb. 118. 1·23s. per lb.
119. 18s. 1d. 120. 19,996,720 bushels.
121. The price per ton in the United Kingdom is 1·08 time dearer than
in the United States.

- P. 321.**—122. 72,675,000 tons. 123. 84 lb.
P. 322.—124. 38 Kgm. 125. 1 yen per kwam (very nearly).
 126. 328 dollars (correct to 1 dollar). 127. 1s. 8d.
 128. Profit is £32 7s. 8d. 129. 31,559,200 lb.
 130. 0·00826 ton. 131. 0·16 per 1000 gallons.
 132. 12894·5 tons. 133. 160 lb.
P. 323.—134. £311265 (nearly). 135. 96,857,143 tons.
 136. 32,589,286 tons; 0·336. 137. 232,122,000 cwt.
 138. 399784 litres. 139. 1,980,000 gallons per hour.
 140. £55 1s. 7d. 141. £17 2s. 9d. (correct to 1d.).
 142. 38,398,268 acres.
P. 324.—143. 2·97d. per gallon. 144. 0·526 tons.
 145. 1,839,400 tons. 146. £1817 (correct to £1).
 147. The error is +21·24 Kgm. 148. 0·02124 metric tons.
 149. 475·95 tons.
 150. (1) 9713 cub. ft. per ton. (2) $\frac{3}{2} \frac{2}{5}$, i.e. 1 : 9 (nearly).
 (3) 4·7 gallons per ton.
 151. (1) £290 18s. 9d. (2) £26 2s. 8d. (3) £10 4s. 2d.
 152. £436. 153. 1 franc 88 centimes. 154. 163·9 francs.
 155. £29 7s. greater in Austria than in London.
P. 325.—156. 2s. 8d. 157. 1·227 time dearer in the United Kingdom.
 158. 650 hours.

EXAMPLES. LIX.

SECTION XIV. TIME

MISCELLANEOUS QUESTIONS

- P. 330.** — 1. Column 1—17, 29, 46, 41, 65, 52, 53, 33, 60, 42, 56, 71, 102.
 ,, 2—125, 199, 161, 196, 197, 278, 299, 316, 307, 347,
 159, 315, 263.
 2. 15 min. 53½ sec. 3. 21 min. 7 sec.
 4. Total, 60 days 14 hrs. 25 min.; average, 15 days 3 hrs. 36½ min.
 5. (1) 61 days and 15 days; (2) 60 days 14 hrs., and 15 days 4 hrs.
 6. 10 hrs. 10 min. 7. 12 hrs. 56 min.
P. 331. — 8. 45 hrs. 9. 1s. 5½d.
 10. £3 2s. 10d. 11. 4398 metres per hr. (correct to 1 ft.).
 12. £1 11s.
 13. 4 hrs. 7 min.; 11 hrs. 20 min.; 15 hrs. 53 min.; 7 hrs. 20 min.;
 6 hrs. 30 min.; 7 hrs. 59 min.; 13 hrs. 50 min.
 14. $\frac{2}{3}$ hr. 15. 1½ min. 16. 15 min., Wimbledon to Surbiton.
P. 332. —17. 7 min. 12 sec. 18. 3913½ hrs.
 19. 4892 francs 19 centimes. 20. £25025 is lost.
 21. The first earns £2 8s. 4d. more.
 22. 11058 oz. (correct to 1 oz.). 23. £1 10s. 3d. (correct to 1d.).
 24. £4 19s. 11d. (i.e. £5). 25. 6451 passengers. 26. £8 15s.

- P. 332.**—27. It would be better to emigrate ; the difference would be about £36 (£36 3s. 4d.).
- P. 333.**—28. 35·3, 44·15, 28·06, 24·58 miles per hour. 29. $14\frac{1}{2}$ min.
 30. 3 days 20 hrs. 31. 75600 tons.
 32. Put it on 1 hour. 33. £1189 8s.
 34. None ; for Lisbon observes Greenwich time. Lisbon LOCAL TIME is 39 min. slow on Greenwich.
 35. 9.30 p.m.
- P. 334.**—36. 9.55 a.m. 37. 24·64 nautical miles per hour.
 38. 28·37 statute miles per hour. 39. 0·69 mile per hour.
 40. Less by 27·57 statute miles per hour. 41. $6\frac{1}{2}$ hours fast.
 42. 150° . 43. 60° . 44. 6.30 a.m. ; by 32 min.
 45. 12 hrs. 45 min. ; 31·9 mi. per hour.
 46. (1) 13·59 knots. (2) 12 days 19 hrs. 47. 600 girders.
- P. 335.**—48. £3 16s. 2d.
 49. £7 1s. ; dearer by £3 4s. 10d. ; *i.e.* electricity is nearly twice as costly as gas.
 50. 667 dollars (nearly). 51. 8977 m. per hr.
 52. £13 11s. 6d. 53. £131400.
 54. £2625 7s. 5d. per week, so that £5625 16s. is wanted for the last $2\frac{1}{2}$ weeks, of which £131 8s. is in hand ; \therefore deficit is £5494 8s.
 55. Nearly 37 ; 9 hrs. 29 min., *i.e.* $9\frac{1}{2}$ hrs.
 56. 54·93 hrs.
 57. 11 days 16 hrs. ; 7 days 12 hrs. ; 10 days 1 hr.
- P. 336.**—58. £244 9s. (nearly). 59. £12266 13s. 4d.
 60. £3930 9s. (correct to 1s.). 61. 1,565,000 tons.
 62. 45 seconds (correct to 1 sec.). 63. 6 min. 16 sec. (correct to 1 sec.).
 64. 40 min. 55 sec. (correct to 1 sec.). 65. 4 hrs. 37 min.
 66. 30 min. 13 sec. 67. 30 hrs.
 68. 2 hrs. 5 min. 43 sec. 69. 52·6 sec.
 70. 1 min. $52\frac{1}{2}$ sec. (nearly). 71. 13 min. 20 sec.
 72. 44 hrs. 27 min. (nearly). 73. 11s. 3d.
 74. Two extra men. 75. $54\frac{1}{2}^\circ$.
 76. $75\frac{3}{4}^\circ$ W. 77. 2 hrs. $32\frac{1}{2}$ min.
 78. 115·1 miles. 79. 3.43 p.m.

REVISION QUESTIONS. II

A. (1)

SECTION XI.

- P. 338.**—1. 0·000253 gram less. 2. 85 oz. 16 dwt. 21 grs.
 3. $\frac{1}{2}$. 4. 0·0337 pint.

- P. 338.** — 5. 307 quarts. 6. £14 1s. (very nearly).
 7. £2 5s. (very nearly). 8. 17s. 3d.

9.

Km.	Miles.
1	= 0·6213824
2	= 1·2427648
3	= 1·8641473
4	= 2·4855297
5	= 3·1069121
6	= 3·7282945
7	= 4·3496769
8	= 4·9710593
9	= 5·5924418

562 Km. = 349·2169 mi.
 530 m. = 0·3293 „
 100000 cm. = 0·6214 „
 (correct to 4 places)

P. 339.—10.

Metres.	Yards.
1	= 1·093633
2	= 2·187266
3	= 3·280899
4	= 4·374532
5	= 5·468165
6	= 6·561798
7	= 7·655431
8	= 8·749064
9	= 9·842697

375 m. = 410·1124 yds.

11. 0·4047.
 12. Cost is £10 15s. ; overcharge is 16s.
 13. £255 6s. 6d. 14. 27s. 5d.

A. (2)

For the actual forms of invoice the student is referred to Section XI. C.
 and Plate IX., BUT HE SHOULD MAKE OUT THE INVOICE IN FULL.

1. Total cost	.	.	.	£115 10 0	
Discount, 10 %	.	.	.	11 11 0	
				£103 19 0	
Packing charges	.	.	.	0 5 6	
					£104 4 6

P. 339. — 2. The items cost—

	£0 17 6	
	0 3 0	
	3 12 0	
	2 0 6	
	1 10 0	
	<hr/>	
Discount	£8 3 0	
	0 13 7	
	<hr/>	
		£7 9 5

Received with thanks 30th June 1911— RYLANDS & SON LIMITED per pro J. JONES.

3. The amounts are—

	£0 7 6	
	0 10 0	
	0 5 6	
	<hr/>	
Discount, 2½%	£1 3 0	
	0 0 7	
	<hr/>	
		£1 2 5

4. The amounts are—

	£2 17 6	
	0 16 4	
	1 14 4½	
	<hr/>	
Discount	£5 8 2½	
	0 5 5	
	<hr/>	
		£5 2 0½

Receipt as usual.

P. 340. — 5.

£12 12 0	
0 16 8	
3 10 0	
1 1 8	
0 12 6	
<hr/>	
£18 12 10	£18 12 10

- P. 340.** 6. For Statement see § 155, p. 211. Amount outstanding is £5 15s. 4d
7. Make this out carefully.

£1 10 7½	£1 9 1	
0 1 6½		
1 2 6	1 1 4	
0 1 2		
2 7 6	2 5 2	
0 2 4		
1 2 9	1 1 11	
0 0 10		
1 6 0	1 5 0	
0 1 0		
		£7 2 6

8. Work carefully through this as in §§ 158–170, drawing up a facsimile cheque for yourself. The entry in vendor's Sales Book will be—

No. of Invoice.	Date.	Particulars.	Ledger Folio.	£ s. d.
63	July 12	J. Rogers— Fish	53	8 14 0

In vendor's Returns Inwards Book there will be an entry for £2 (§ 177), and Mr. Rogers will receive a Credit Note (Plate VIII., page 224).

The amounts are—13s. 6d., £1 7s. 6d., £1 4s., £1 5s., £1 8s., £1, £1 16s.; total, £8 14s.

B. (1)

SECTION XII.

- P. 341.**—1. £1380. 2. £1472. 3. £47270. 4. 83 pieces.
5. 6 in. 6. 2, and 80 yds. over. 7. 82 ft. 10½ in. 8. 18 in.
9. Dimensions, in cm., 14·6 × 9·525; 20·32 × 13·335; 25·4 × 15·875;
27·94 × 19·05; 38·1 × 25·4.

B. (2)

- P. 342.**—1. 63·976 cm. 2. 43·18 cm.
3. 48 ft. of ¾-in. wood and 8 ft. of ½-in. wood. 4. 4s. 10½d.

- P. 342.** — 5. 4 ft. $3\frac{1}{2}$ in. ; 1 ft. $9\frac{3}{4}$ in. 6. 104·86 Km. 7. 65·159 mi.
P. 343. — 8. 19·28 ft. 9. 32·1 ft.

B. (3)

1. Length, 102 in., *i.e.* 8 ft. 6 in. ; width, 2 ft. $1\frac{1}{2}$ in. (nearly).
 2. 60 ft. 3. £47 2s. 10d.
P. 344. — 4. 946·6 ft. for the two lines of rails. 5. 5s. 1d. 6. 1274 ft.
 7. £19 18s. (correct to 1s.). 8. 43 lamps ; $1\frac{1}{3}$ d.
 9. 59 francs (nearly).

B. (4)

1. 372·6, 362·9, 566·1 Km. 2. 14·26 mi. ; 4·7 ft.
 3. 4 min. 5 sec. 4. 2·77 mi.
 5. 0·509 mi. There are about five times as many miles of railway per thousand people in the United States than in the United Kingdom, but since distances are so much greater in the States this is not surprising.
P. 345. — 6. 242 skirts. 7. £12 11s. 8d.
 8. 2·77d. each, and 13s. 10d. per week (nearly).

C. (1)

SECTION XIII.

1. 3 sq. ft. 108 sq. in. 2. 2s. 3d.
 3. 1029 sq. yds. (short side is front). 4. 4042.
 5. £94 14s. (correct to 1s.).
P. 346. — 6. $47\frac{1}{2}$ lb. 7. 1·01 sq. mi.

C. (2)

1. 1·414 in. 2. 10·75 cm. 3. $\frac{44}{13200}\%$.
 4. Area = 504·86 sq. ft. ; cost, £4 4s. (correct to 1s.).
P. 347. — 5. 0·694. 6. 10·21 sq. cm. 7. 33 39 sq. cm.
 8. 267 sq. in. (correct to 1 sq. in.).

C. (3)

1. £333 4s. (nearly). 2. 3164 francs. 3. 1160·25 francs.
 4. 8878 marks. 5. 136975 marks.
 6. 161914·6 francs per Ha. 7. £32 2s. 10d. 8. 3s.
 9. 0·4307 ton. 10. 954,803,200 Ha. ; 18·72 times larger.
P. 348. — 11. 344794, to nearest sq. mile. 12. 935·27 sq. ft. ; total cost, £1473.

D. (1)

SECTION XIV.

- P. 348.** — 1. $1171\frac{7}{8}$ cub. ft. 2. £140 5s. 3. 10565 lb., or 4·7166 tons.
 4. 1·0984 Kgm. 5. 27·752 lb. See answer to Question 4, Ex. LV.
 6. £3 16s. 4d. 7. 8 oz.

D. (2)

1. 1·8715 cub. ft.
P. 349. — 2. 292 gallons. 3. 875 gallons. 4. $1121\frac{3}{8}$ cub. ft.
 5. $1\frac{3}{4}$ 6. 1224 loads. 7. 9·63 cub. ft.
 8. Side, 1 inch; top, 1·8 inch; 1 cub. ft. 336 cub. in.
 9. $562\frac{1}{2}$ tons.

D. (3)

1. 13·5 cm. 2. 1·776 m. 3. 1·132 cub. m.
 4. 39; 195; 32·5 cm. 5. 3·6 times.
P. 350. — 6. 275 cub. ft. 7. (1) 21. (2) 33.
 8. 0·5 shipping ton; 7s. 6d. freight charge.

E. (1)

SECTION XV.

1. 2s. 8½d. 2. ½d. 3. 3s. 3½d.
P. 351. — 4. Former year higher by 0·76d. per oz.
 5. 26·9d. per oz. (correct to 1½d.).
 6. £23,687,740 (correct to £10); 224,410,163 roubles.

E. (2)

1. 2s. 5d. (nearly). 2. 17 tons 4 cwt. 3. £482 4s.
 4. 291 tons. 5. 1 lb. 6. 3739 gallons.
P. 352. — 7. 22·86 lb.; £5 14s. 1d. 8. 218·726 fathoms; 13208 gallons.
 9. £125000. 10. 8·8d. per pint.

E. (3)

1. 140 boxes. 2. 0·36 Kgm. 3. £4 19s. 9d. 4. £4 16s. 8d.
 5. 2s. 11d. 6. £1. 7. £3276 7s. 4d.
P. 353. — 8. 4s. 1d. (nearly). 9. 4s. 8d. per bushel; 7d.
 10. 407883 tons 9 cwt.

- P. 361.** — 27. 650 guineas. 28. (i) £15,156,000; (ii) £1,485,000 greater.
 29. 242 lb. (correct to 1 lb.). 30. 0.248 mi. per hour.
 31. 3.26 lb. per day. 32. 2.84 hours. 33. 1s. 6.4d.
 34. $\frac{1}{8}$ (or 0.167) pint. 35. 1.48 knot. 36. 342 men.
 37. 39 men.
- P. 362.** — 38. 0.644 cub. ft. 39. 104 metric tons. 40. $4\frac{3}{8}$ mi. per hour.
 41. (1) 15.123 min. (2) 9.423 min.

EXAMPLES. LXI. (a)

SECTION XVII. A. (2)

TEMPERATURE

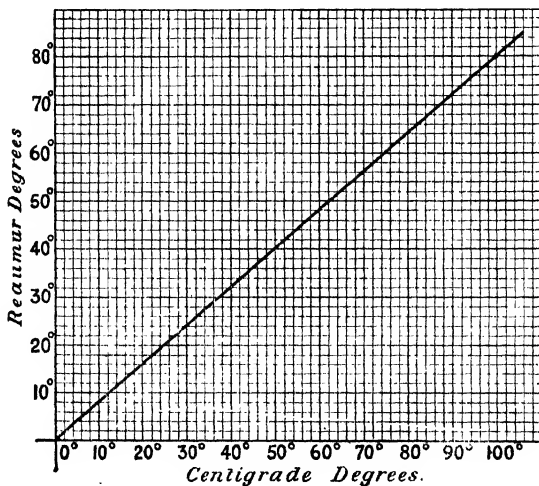
- P. 363.** — 1. 20° , 30.4° , 36.8° , 240° , -10° R.
 2. 27.5° , 31.25° , 47.5° , 50° , -25° C.
 3. 75.2° , 96.8° , 111.2° , 5° F.
 4. 65.75° , 88.25° , 117.5° , 9.5° F.
 5. 17.78° , 44.44° , 37.44° , 98.89° C.
 6. 10.67° , 74.67° , -1.77° , 0° R. 7. 37.44° C. 8. 2732° F.
- P. 364.** — 9. 3.33° C. 10. 1763.6° , 1947.2° , 1985° , 3100° F.
 11. 7232° F., 3200° R. 12. 287.78° C.

EXAMPLES. LXI. (b)

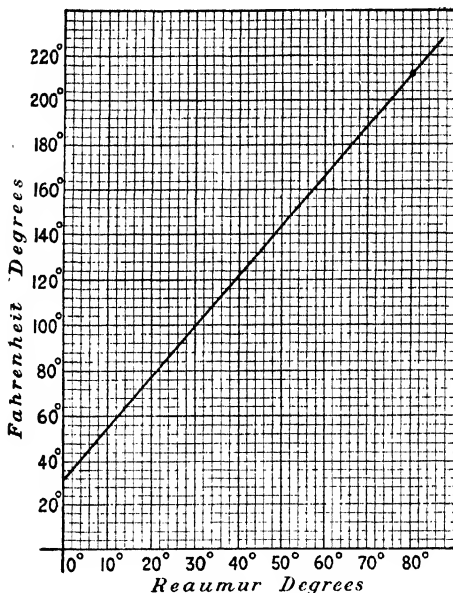
SECTION XVII. A. (2)

TEMPERATURE (GRAPHICAL)

- P. 365.** — 1.

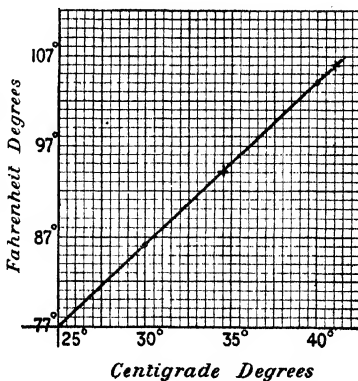


- P. 365.**—2. The results should agree fairly closely, *e.g.* 40° R. gives 50° C.
3.



4. See 2 above.

5. Take any two temperatures, *e.g.* 30° C. = 86° F., and 40° C. = 104° F., and then start from 25° C. or 77° F. and draw graph as shown; then the part between the crosses is alone required. We drew the line longer than was necessary to ensure greater accuracy. 104° F. = 40° C., *i.e.* 60° C. below the boiling-point.



EXAMPLES. LXII.

SECTION XVII. B. (1)

PARTNERSHIP

- P. 368.** — 1. £900, £720.
 2. The second receives £652 10s. more than the first, and £217 10s. more than the third. 3. £7200.
 4. £400 2s., £800 4s., £1000 5s., £1200 6s.
 5. 1, $1\frac{2}{3}$, $1\frac{1}{2}$, $2\frac{1}{2}$. 6. £360, £684, £540, £780.
 7. £500, £250, £625. 8. £131 5s., £261, £112 10s.
- P. 369.** — 9. 60 : 27 : 70, i.e. 1 : $\frac{9}{10}$: $1\frac{1}{2}$. 10. £1011 4s. 2d.
 11. £70, £85, £42 10s., £104.
 12. £46 17s. 6d., £62 10s., £78 2s. 6d., £98 15s. 13. $1\frac{1}{4}$ d.
 14. 6s. $11\frac{1}{2}$ d., 2s. $3\frac{1}{2}$ d., 16s. 6d.
 15. £1 11s. 3d., £2 4s. 2d., £1 9s. 7d.
 16. Proportion of rent, £18 9s. 5d. ; proportion of profits, £66 10s.
 17. £1 16s. $1\frac{1}{2}$ d., £1 4s. 1d., 12s. $0\frac{1}{2}$ d., £3 12s. 3d.

P. 370. — 18.

Income.	Profit.
3000 milreis.	1223·5 milreis.
6666·7 ,,	2718·9 ,,
13333·3 ,,	5437·6 ,,

19. £184 11s. 9d., £49 12s. 4d., £49 4s. 6d., £413 9s. 6d.

EXAMPLES. LXIII.

SECTION XVII. B. (2)

RATES

- P. 373.** — 1. £29 15s. 2. £41 1s. 4d.
 3. £260 8s. 4d., £250, £281 5s., £291 13s. 4d., and £1083 6s. 8d.
 4. Net annual income is (1) £1148 6s. 8d., (2) £1440 ; so that the second is better for the landlord by £291 13s. 4d., and it would certainly be better to adopt it, provided the chance of keeping the houses occupied was the same in both cases.
 5. £37 10s. 6. £2,144,000. 7. $2\frac{1}{2}$ d. (nearly).
 8. £9 14s. 10d. 9. First, £55 8s. 4d. ; second, £69 3s. 9d.
 10. £78.
- P. 374.** — 11. £6,608,000. 12. First, £108 6s. 8d. ; second, £130 13s. 4d.
 13. Rent and rates for first, £107 6s. 8d. ; rent and rates for second, £125 6s. 8d. Increase, £18. 14. £794 12s. 6d.

EXAMPLES. LXIV.

SECTION XVII. B. (3)

TAXES

- P. 376.** — 1. £294 3s. 4d., £217 10s., £179 3s. 4d. 2. £26 14s. 9d.
 3. £561 8s. 1½d. 4. £3157 18s.
 5. £723 15s. 6. 11d. 7. 1s.
- P. 377.** — 8. £469 19s. 5d. (nearly) and £187 19s. 9d. 9. £51 9s. 6d.
 10. £434 13s. 9d. 11. £955 8s. 4d.
 12. 7s. 4d. 13. £1,531,250. 14. £621605 3s. 4d.
 15. £1,017,511 12s. 8d. 16. £60.
- P. 378.** — 17. £280, £220, £336. 18. £31 7s.

EXAMPLES. LXV.

SECTION XVII. B. (4)

PROPERTY

- P. 379.** — 1. Tabulate thus :

Cost of Building.	Annual Income.	Rate per Cent.
£50000	£8000	16

The remaining answers (2 to 8) are :

- P. 380.** — 2. 10·53 % 3. 2·103 % 4. 5·2 %
 5. 6·3 % 6. 4·94 % 7. 35·53 % 8. 7·63 %
 9. £7032. 10. £135000.
 11. £2336 12s. 6d. 12. 12000 guineas. 13. £955.
 14. 12500 dollars. 15. 12,112,500 francs. 16. 587 francs.
 17. 125000 dollars. 18. 7639 gulden. 19. 4,350,000 lire.
 20. £422475. 21. £291 7s. 6d.
 22. (1) 29. (2) 14. (3) 13. (4) 7. (5) 5. (6) 4.
 (In each case to the nearest year above.)
 23. (1) 14·29. (2) 12·5. (3) 6·67. (4) 8. (5) 5·4. (6) 4 %.

EXAMPLES. LXVI.

SECTION XVII. B. (5)

INSURANCE

- P. 384.** — 1. 5s. 9d. (very nearly). 2. 21s. 5d. 3. £11 11s.
 4. £106 1s. 11d.
 5. 1s. 3d. ordinary stock ; 3s. 9d. inflammable part.
 6. (1) £635 10s. (2) 15s., 12s. 6d.

P. 384. — 7. Messrs. STOOPE & Co. To the BEADLE INSURANCE CORPORATION.

	£	s.	d.
Fire.—£1500 (Premises) @ 1s. 6d. %	1	2	6
£13000 (Goods A) @ 2s. %	13	0	0
£3000 (Goods B) @ 3s. 6d. %	5	5	0
Burglary.—£8000 @ 2s. %	8	0	0
Employees.—£10000 @ 3s. %	15	0	0
Machinery.—£12500 @ 4s. %	25	0	0
Fidelity Guarantee.—£8500 @ 5s. 6d. %	23	7	6
	90	15	0

Year ending December 31, 19—.

8. He pays in premiums £501 13s. 4d., and receives £974; ∴ he gains £472 6s. 8d.

P. 385. — 9. Premiums are £246 9s. 2d. and £194 13s. 9d. Profits made are £203 10s. 10d. and £55 6s. 3d. respectively; ∴ his gain by following my advice to take out a "With Profits" policy is £148 4s. 7d.

10. £847 7s. 6d. loss to the company.

11. The payments are respectively—£8 12s., £5 15s. 2d., £7 4s.
The compensation—£179 4s., £119 9s. 4d., £149 6s. 8d.

12. Gained £16 11s. 2d.

13. 465 francs (£18 8s. 8d.).

14. 4475 roubles.

15. 2s. 6d. %.

16. Policy, £8581 9s. 1d.; premium, £21 9s. 1d.

17. 186 lire (£7 8s.).

P. 386. — 18. Policy, £9979 2s. 6d.; premium, £419 2s. 6d. 19. £2 11s.

EXAMPLES. LXVII.

SECTION XVII. B. (6)

BANKRUPTCY

P. 388. — 1. £62 6s. 2. 11s. 6d. 3. £345. 4. £1436 13s. 4d.

5. 12s. 3d. 6. £80 13s. 3d.

7. 2s. 6d. in the £. Actual receipts: £37 10s., £56 5s., £70, £10.

8. 7s. 6d. in the £.

9. £10000. 10. £223 8s. 10d.

11. Dividend, 40 %; 88600 francs.

12. £46 18s., £140 14s., £234 10s.

13. Assets, £1496 18s. 2d.; loss, £141 2s. 9d. per creditor.

P. 389. — 14. £83 6s. 8d., £160. 15. 5s. 6d. 16. 75·8 %.

17. £831 (very nearly).

18. £5950 15s.

19. £5315.

20. 17s.

21. 9d. in the £.

22. £11052 12s. 8d. Increase in dividend, 2s. 5d. in the £.

P. 390. — 23. £3250, £74750.

24. A dividend of 8s. 6d. would need £24777 10s. assets; ∴ £200 has been allowed in preferential claims.

- P. 396.** — 1. (11) $\frac{1}{10}$. (12) $\frac{1}{10}$. (13) $\frac{1}{10}$. (14) $\frac{1}{5}$. (15) $\frac{1}{5}$.
 (16) $\frac{17}{10}$. (17) $\frac{1}{5}$. (18) $\frac{9}{10}$. (19) $\frac{1}{5}$. (20) $\frac{37}{10}$.
2. (1) 20%. (2) 50%. (3) 25%. (4) $12\frac{1}{2}\%$.
 (5) 10%. (6) 5%. (7) 4%. (8) 60%.
 (9) 62.5%. (10) 44.44%. (11) 93.75%. (12) 41.67%.
 (13) 72.41%. (14) 72%. (15) 87.09%. (16) 78.95%.
 (17) 1.5%. (18) 5.33%. (19) 11.25%. (20) $\frac{1}{10}\%$.
3. (1) £12 10s., £15, £27 10s., £38. (2) 3d., 4½d., 2s., 2s. 6d.
 (3) £45, £80 1s., £77 10s. (4) £1 1s., £1200, £11 11s.
 (5) 1s. 0¼d., £1 1s. 5d., 6s. 1½d. (nearly).
4. £7 10s., $\frac{5}{8}$ mi., 13.05 ac., 2.1 galls.
 5. 65.625 francs; yen 55.125; 12.29 dollars; 98.25 in.; 40.74 l.
 6. 132 yds., 12 cm., 1.25 sq. ch., 15 ares, 8.7 lire, 5 tons 0 cwt. 2.4 qrs.
 7. $12\frac{1}{2}\%$. 8. Each equals £0.66. 9. £2100.
 10. $\frac{1}{2}$ ac. 11. 1 ton 4 cwt. 2.1 qrs. 12. £1250.
- P. 397.** — 13. 80 ac. 14. £300. 15. £3 6s. 6d.
 16. £2 14s. 7d. 17. £3 9s. 4½d. 18. £8 2s. 1½d.
 19. £5 13s. 4¾d. 20. £89 5s. 21. 27s. 7¾d.
 22. £3 6s. 6d. 23. 4s. 4¼d. 24. 8s. 1½d.
 25. 16 ac. 11.43 sq. poles. 26. 151.442 grams. 27. 0.694%.
 28. 55.56%. 29. 0.41667%. 30. $21\frac{1}{3}\%$.
 31. 1.0625%. 32. 143 tons. 33. 7.32%.
 34. 2.148%. 35. 11.85%.
- P. 398.** — 36. $-12\frac{1}{2}$, $-14\frac{2}{3}$, $+33\frac{1}{3}\%$; the last is the greatest.
 37. $20\frac{5}{8}$ in. 38. 8.2656 mi.
 39. 2.314%. 40. 42.652%.
 41. 11.767%. 42. 1181 tons.
 43. 20%. 44. 18.50005 poods.
 45. 2.435%. 46. 1030.93 dollars.
- P. 399.** — 47. 18.06% and 10.89%. 48. 1.636%.
 49. 5.23%, 1.54%. The decrease is becoming less marked.
 50. Increase per cent. is 12.17 (1891-1901) and 10.9 (1901-11). Difference, 1.27%. Conclusions: 1. Increase per cent. in population (England and Wales) was much greater in 1811-21 than 1901-11, and the average annual increases were 1.8% and 1.1%.
 2. Average increase per cent. for South America was less than for England and Wales in 1811-21, and more than for 1901-11.

EXAMPLES. LXX.

SECTION XVIII.

B. Commission and Brokerage

- P. 401.** — 1. £25. 2. £5882 7s. 3. 8.5%.
- P. 402.** — 4. 8979.45 dollars. 5. 2,142,857 francs. 6. £74.
 7. 85.64 marks. 8. £240000. 9. £11 14s.
 10. £110 11s. 4d. 11. £1404 14s. 4d., £108 7s. 1d.

- P. 402.**— 12. £313 11s. 6d. 13. £797975.
14. £4,887,527 (correct to £1). 15. £3 17s. 11d.

EXAMPLES. LXXI.

SECTION XVIII.

C. Profit and Loss

- P. 405.**— 1. 5%. 2. $2\frac{1}{2}\%$. 3. $7\frac{1}{2}\%$. 4. $3\frac{1}{2}\%$.
5. 10%. 6. 15%. 7. -15%. 8. +27%.
9. -36%. 10. -18%. 11. 40·476%. 12. 37·23%.
13. $43\frac{1}{3}\%$. 14. 51·16%. 15. 99·4%. 16. 10·42%.
17. $17\frac{1}{3}\%$. 18. 19·9%. 19. $9\frac{1}{3}\%$. 20. 14·583%.
21. 5·26%. 22. 1s. $2\frac{1}{4}$ d. (correct to the nearest $\frac{1}{4}$ d. above).
P. 406.— 23. 14·286%. 24. 4s. 25. £49, £6·72.
26. Third is 2570 dollars greater than the first, and 800 dollars greater than the second.
27. 24·4% loss. 28. £101 4s.; 26·9%.
29. £7687 11s., to nearest 1s. 30. £12 10s.
31. £19 19s. 6d. 32. 30%. 33. 26%. 34. 30%.

EXAMPLES. LXXII.

SECTION XVIII.

MISCELLANEOUS QUESTIONS

- P. 406.**— 1. 966·67%.
P. 407.— 2. 485·7%. 3. $41\frac{1}{3}\%$ water, $58\frac{1}{3}$ wine.
4. £68 3s. 8d. 5. 32·6%. 6. 67·74%.
7. 0·209%; 4·6 lb. 8. 44·694%. 9. 17,691,690.
10. 6·33, to two places. 11. 7·3% (nearly).
P. 408.— 12. £6 9s. 7d. per cwt.; 1d. per lb.
13. 3 fr. 30 c. is higher by 23·5% of 2s. $6\frac{1}{2}$ d. 14. 6·25%, 81·25%.
15. 22·22%, 20%. 16. 18·5%.
17. 38·33%. 18. 61·7% (nearly).
19. 72,398,000 tons. 20. 35·714%, 26·315%.
21. 20·6%, 26%. 22. 1·34%, 0·134%.
23. 23s. per cwt. 24. 1·155%.
P. 409.— 25. 25s. 2d. 26. 26·25%.
27. £48908 10s. (nearly). 28. 18·75%; 6s. 2d.
29. 1s. $0\frac{1}{2}$ d. 30. 25·45%.
31. £33 6s. 8d. 32. 15·56%.
33. 22·74%; £1130 12s. 6d. 34. £24421.
P. 410.— 35. 86·1%. 36. 7·17%. 37. 8·16%, 7·55%.
38. 14·8% (nearly). 39. £385 17s. 6d. 40. £7 17s. 6d.

- P. 410.**—41. £42082. 42. £18 15s. 1d. 43. £18 7s. 7d.
 44. English is higher than French by £37 12s.
 45. 1·56, 0·00698, 8·57 %.
- P. 411.**—46. 15,508,000 (correct to 100). 47. 0·4998 lb. 48. £69 5s. 6d.
 49. (1) £200. (2) £235. (3) £825 15s. (4) £1739 10s.
 50. Increase, 0·94 %.
51. Decrease, 0·66 %.
52. 1s. 6d. per lb. 53. 34,675,500, to nearest 100 Kgm.
 54. 2,888,300, to nearest 100 kr.
 55. 1912 price was 0·0834 kr. per Kgm. ; 1913 price was 0·0606 kr. per Kgm. ; ∴ percentage decrease is 27·25 nearly.
 56. 33·60 %.
- P. 412.**—57. 62·73 % 90·42 %. There was a big fall in the amount sold, for the Government of India is reducing the sale of this drug year by year, but the market price rose more proportionately than the production fell.
58. £20475. 59. 6s. 2d.
 60. (1) 12·18 % (2) 28·12 % (3) 59·69 %.
 61. 6·196 % 62. £707 7s. (correct to 1s.).
 63. 0·3945 % 64. 4·7 %.
 65. 5·028 % 66. Decrease, 8·1 %.
- P. 413.**—67. 64·8 % 68. 43·3 %
 69. Cost of maintenance, £124 11s. 9d. ; profit, £131 15s. 3d.
 70. £23·87 % (nearly). 71. £11092 5s.
 72. £7523 2s. 10d. 73. £45138 16s. 10d.
 74. (1) £3·768, i.e. £3 15s. 4½d. (2) £6·586, i.e. £6 11s. 8½d.
 (3) £5·825, i.e. £5 16s. 6½d.
 75. 74·8 % 76. 54·6 %.

EXAMPLES. LXXIII. (a)

SECTION XIX.

DOUBLE ENTRY IN ACCOUNTS

- P. 419.**—1. § 279. 2. § 278 and § 279.
 3. § 280. Capital Account (P), Cash Account (R), Bank Account (R), Horse Account (N), Sheep Account (N), Ink Account (N), Silk Account (N).

4.

Dr.		J. TREE: CAPITAL ACCOUNT (P).			Cr.				
July 15.	To Balance c/d .	£	s.	d.	July 1.	By Cash . . .	£	s.	d.
		33	0	0	15.	„ Balance from	30	0	0
						Cash a/c . . .	3	0	0
		33	0	0			33	0	0
					Jan. 15.	By Balance b/d .	33	0	0

P. 419.—4.

<i>Dr.</i>		CASH ACCOUNT.						<i>Cr.</i>	
July 1.	To J. Tree . . .	£	s.	d.	July 8.	By Cart . . .	£	s.	d.
„ 15.	„ Cart . . .	30	0	0	„ 15.	„ Balance c/d . . .	5	0	0
		8	0	0			33	0	0
		<u>38 0 0</u>					<u>38 0 0</u>		
„ 15.	Balance b/d . . .	33	0	0					

<i>Dr.</i>		CART ACCOUNT.						<i>Cr.</i>	
July 8.	To Cash . . .	£	s.	d.	July 15.	By Cash . . .	£	s.	d.
„ 15.	„ Balance . . .	5	0	0			8	0	0
		3	0	0			<u>8 0 0</u>		
		<u>8 0 0</u>							

TRIAL BALANCE.									
				Balances.					
				<i>Dr.</i>		<i>Cr.</i>			
				£	s.	d.	£	s.	d.
Capital Account . . . . .	.	.	.	33	0	0	30	0	0
Cash Account . . . . .	.	.	.				3	0	0
Cart Account . . . . .	.	.	.			
				<u>33 0 0</u>			<u>33 0 0</u>		

BALANCE SHEET.								
Liabilities.				Assets.				
		£	s.	d.	£	s.	d.	
J. TREE—					Cash in hand	33	0	0
Capital Account	33	0	0				
		<u>33 0 0</u>				<u>33 0 0</u>		

5. Just the same as 4.

TRIAL BALANCE.									
				Balances.					
				<i>Dr.</i>		<i>Cr.</i>			
				£	s.	d.	£	s.	d.
Capital Account . . . . .	.	.	.	48	0	0	40	0	0
Cash Account . . . . .	.	.	.				8	0	0
Cloth Account . . . . .	.	.	.			
				<u>48 0 0</u>			<u>48 0 0</u>		

P. 419.—5.

BALANCE SHEET.			
Liabilities.		Assets.	
T. BROWN—	£ s. d.	Cash	£ s. d.
Capital	48 0 0		48 0 0
	<u>48 0 0</u>		<u>48 0 0</u>

6. As in 4 and 5.

TRIAL BALANCE.			
		Balances.	
		Dr.	Cr.
	£ s. d.	£ s. d.	£ s. d.
Capital Account		65 0 0	60 0 0
Cash Account			5 0 0
Woollen Account			
		<u>65 0 0</u>	<u>65 0 0</u>

BALANCE SHEET.			
Liabilities.		Assets.	
E. WILSON—	£ s. d.	Cash	£ s. d.
Capital	65 0 0		65 0 0
	<u>65 0 0</u>		<u>65 0 0</u>

7. On the heavier side.

8. The *Dr.* side.

9. (1) That there is a certain amount of money in hand with which to continue business; (2) a Debit balance means that the business owes the capitalist money which it cannot pay, and is therefore insolvent.

10.

<i>Dr.</i>		T. HILL: CAPITAL ACCOUNT.		<i>Cr.</i>	
To Drawings	£ 60	s. 0	d. 0	By Cash	£ 50
	<u>60</u>	<u>0</u>	<u>0</u>		<u>50</u>

He has therefore been allowed to take out more than he put in.

11. The balance of a N. Account represents either a profit or a loss, and therefore adds to, or takes from, the capital of the business, hence its proper place is in the Capital Account.

P. 419.—12. The *Dr.* entry means that we have bought £20 worth of silk, and the *Cr.* entry that we have sold some, or all, of it for £30. The balance is a *Cr.* balance; it represents a profit, and is put on the *Cr.* side of the P. and L. Account.

13. We have made a profit of £20.

14. The *Dr.* balance in Capital Account means that T. Wills owes the business £10, or has overdrawn his Capital Account.

15.

<i>Dr.</i>		J. BROWN: CAPITAL ACCOUNT.			<i>Cr.</i>				
		£	s.	d.					
Jan. 15.	To Loss from Iron Goods a/c	50	0	0	Jan. 1.	By Cash . . .	£ 400	s. 0	d. 0
„ 15.	To Balance c/d	350	0	0					
		<u>400</u>	<u>0</u>	<u>0</u>			<u>400</u>	<u>0</u>	<u>0</u>
					„ 15.	By Balance b/d	350	0	0

<i>Dr.</i>		CASH ACCOUNT.			<i>Cr.</i>				
		£	s.	d.					
Jan. 1.	To Cash . . .	400	0	0	Jan. 8.	By Iron Goods	£ 200	s. 0	d. 0
„ 15.	„ Iron Goods	150	0	0	„ 15.	„ Balance . .	350	0	0
		<u>550</u>	<u>0</u>	<u>0</u>			<u>550</u>	<u>0</u>	<u>0</u>
„ 15.	„ Cash in hand . .	350	0	0					

<i>Dr.</i>		GOODS ACCOUNT.			<i>Cr.</i>				
		£	s.	d.					
Jan. 8.	To Cash . . .	200	0	0	Jan. 15.	By Cash . . .	£ 150	s. 0	d. 0
					„ „	„ Balance (Loss on Sales, carried to Capital a/c)	50	0	0
		<u>200</u>	<u>0</u>	<u>0</u>			<u>200</u>	<u>0</u>	<u>0</u>

TRIAL BALANCE.										
					Balances.					
					<i>Dr.</i>		<i>Cr.</i>			
					£	s.	d.	£	s.	d.
Capital Account . . . . .	.	.	.	.				400	0	0
Cash Account . . . . .	.	.	.	.	350	0	0			
Iron Goods Account . . . . .	.	.	.	.	50	0	0			
					<u>400</u>	<u>0</u>	<u>0</u>	<u>400</u>	<u>0</u>	<u>0</u>

P. 419.—15.

BALANCE SHEET.					
Liabilities.			Assets.		
J. BROWN—					
Capital Account . . .	£	s. d.	Cash in hand . . .	£	s. d.
	350	0 0		350	0 0
	<u>350</u>	<u>0 0</u>		<u>350</u>	<u>0 0</u>

Hence the business has been conducted at a loss of £50.

EXAMPLES. LXXIII. (b)

SECTION XIX.

DOUBLE ENTRY IN ACCOUNTS

P. 424.—1. § 287.

2. (a) The balances of all N. accounts are entered in the P. and L. Account on the SAME side as they appear in their respective accounts. (b) Balances of the Personal and Real Accounts.
3. (a) *Dr.* side of P. and L. Account would be heavier than *Cr.* side, so that a *Dr.* P. and L. balance means a loss. (b) A *Cr.* P. and L. balance means a gain. (c) The *Cr.* balance of the Capital Account. (d) J. Lee's Account must be looked up. A Debit balance means that he owes us money, and a Credit balance that we owe him money. (e) *Dr.* side of P. and L. Account. (f) *Dr.* side of Cash Book (Cash column), (g) *Dr.* side of Bank Book (or Bank column of Cash Book).

4.

<i>Dr.</i> HENRY JAMES : CAPITAL ACCOUNT. <i>Cr.</i>					
Jan. 30.	To Balance c/d to February . . .	£	s.	d.	
		313	0	0	Jan. 1. By Cash . . .
					„ 30. „ Net Profit to P. and L. a/c . . .
		<u>313</u>	<u>0</u>	<u>0</u>	
					Feb. 1. By Balance b/d . . .

<i>Dr.</i> CASH ACCOUNT. <i>Cr.</i>					
Jan. 1.	To Henry James' Capital Account	£	s.	d.	
„ 18.	„ Bicycles . . .	300	0	0	Jan. 10. By Bicycles . . .
		100	0	0	„ 30. „ Wages . . .
					„ „ „ Rent . . .
					„ 31. „ Balance c/d . . .
		<u>400</u>	<u>0</u>	<u>0</u>	
„ 31.	To Balance b/d . . .	313	0	0	

P. 424.—4.

<i>Dr.</i>		BICYCLES ACCOUNT.			<i>Cr.</i>				
Jan. 10.	To Cash . . .	£	s.	d.	Jan. 18.	By Cash . . .	£	s.	d.
" 30.	" Balance c/d to P. and L. a/c	75	0	0			100	0	0
		25	0	0					
		<u>100</u>	<u>0</u>	<u>0</u>			<u>100</u>	<u>0</u>	<u>0</u>

<i>Dr.</i>		WAGES ACCOUNT.			<i>Cr.</i>				
Jan. 30.	To Cash . . .	£	s.	d.	Jan. 30.	By Balance c/d to P. and L. a/c . . .	£	s.	d.
		10	0	0			10	0	0
		<u>10</u>	<u>0</u>	<u>0</u>			<u>10</u>	<u>0</u>	<u>0</u>

<i>Dr.</i>		RENT ACCOUNT.			<i>Cr.</i>				
Jan. 30.	To Cash . . .	£	s.	d.	Jan. 30.	By Balance c/d to P. and L. a/c . . .	£	s.	d.
		2	0	0			2	0	0
		<u>2</u>	<u>0</u>	<u>0</u>			<u>2</u>	<u>0</u>	<u>0</u>

TRIAL BALANCE.										
					Balances.					
					<i>Dr.</i>		<i>Cr.</i>			
					£	s.	d.	£	s.	d.
Capital Account								300	0	0
Cash Account					313	0	0			
Bicycles Account								25	0	0
Wages Account					10	0	0			
Rent Account					2	0	0			
					<u>325</u>	<u>0</u>	<u>0</u>	<u>325</u>	<u>0</u>	<u>0</u>

<i>Dr.</i>		PROFIT AND LOSS ACCOUNT.			<i>Cr.</i>				
Jan. 31.	To Wages . . .	£	s.	d.	Jan. 31.	By Bicycles . . .	£	s.	d.
	" Rent . . .	10	0	0			25	0	0
	" Net Profit c/d to Capital a/c	2	0	0					
		13	0	0					
		<u>25</u>	<u>0</u>	<u>0</u>			<u>25</u>	<u>0</u>	<u>0</u>

P. 424.—4.

BALANCE SHEET.					
Liabilities.			Assets.		
Capital			£	s.	d.
	313	0	0		
	313	0	0		
Cash			£	s.	d.
	313	0	0		
	313	0	0		

5. Just as 4. Net profit is £5.
6. Just as 4 and 5, but open a Bank Account as well as a Cash Account. Net profit, £135.

EXAMPLES. LXXIII. (c)

SECTION XIX.

DOUBLE ENTRY IN ACCOUNTS

- P. 437. — 1. § 295, § 297, § 298.
2. Pp. 226-235 ; §§ 278-9 ; § 295 ; §§ 297-8 ; § 303-5 ; § 307.
3. On the *Dr.* side. 4. By a *Cr.* balance.
5. That we have BEEN ALLOWED more by way of discount than we have allowed other firms.
6. On *Dr.* side of Stock Account on 1st June; it will be transferred to the *Dr.* side of the P. and L. Account at the end of the month. On 1st July the new value of stock will appear on the *Dr.* side of the Stock Account.
7. § 311.
8. To show the amount of the net profit or net loss during the trading period.
- 9.

	<i>Assets—</i>		£	s.	d.		£	s.	d.
Jan. 1.	Cash in hand		50	0	0				
	Goods on hand		100	0	0				
	T. Jones (debt)		60	0	0				
	<i>Liabilities—</i>								
	To R. Brown						50	0	0
	„ T. Williams' net capital						160	0	0

10. To Capital, £170 10s. (set out as in Question 9).
11. To Capital, £610 (set out as in Question 9).
12. Purchases Account, *Dr.*, £305 ; T. Williams' Account, *Cr.*, £8 ; and so for the other Personal Accounts.

P. 437.—13. (a) Purchases Account, *Dr.*, £626; Personal Accounts, *Cr.* for various amounts. (b) Sales Account, *Cr.*, £693. Personal Account, *Dr.* for various amounts.

14. Returns Outwards Account, *Cr.*, £2 10s.; John Nelson's Account, *Dr.*, £2 10s.

15-17. See § 305, and proceed as shown there.

18. (1)

<i>Dr.</i>		BANK ACCOUNT.				<i>Cr.</i>			
					Jan. 10.	By Furniture and Fittings . .	£	s.	d.
							200	0	0

<i>Dr.</i>		FURNITURE AND FITTINGS.				<i>Cr.</i>			
Jan. 10.	To Bank . .	£	s.	d.					
		200	0	0					

(2)

<i>Dr.</i>		CASH ACCOUNT.				<i>Cr.</i>			
					Jan. 12.	By Tom Brown .	£	s.	d.
							50	0	0

<i>Dr.</i>		TOM BROWN'S ACCOUNT.				<i>Cr.</i>			
Jan. 12.	To Cash . .	£	s.	d.					
		50	0	0					

(3)

<i>Dr.</i>		HENRY JAGO'S ACCOUNT.				<i>Cr.</i>			
Jan. 12.	To Cash . .	£	s.	d.					
		100	0	0					
" "	" Discount . .	50	0	0					

<i>Dr.</i>		CASH ACCOUNT.				<i>Cr.</i>			
					Jan. 12.	By Henry Jago .	£	s.	d.
							100	0	0

P. 437.—18.

<i>Dr.</i>	DISCOUNT ACCOUNT.			<i>Cr.</i>	
	Jan. 12.	By Henry Jago .	£	s.	d.
			50	0	0

P. 438.—19.

TRIAL BALANCE.									
			Balances.						
			<i>Dr.</i>		<i>Cr.</i>				
			£	s.	d.	£	s.	d.	
Cash			40	0	0				
John Smith			10	15	0				
Capital						41	8	0	
F. Clarkson			4	4	6				
T. C. Jackson						10	10	0	
R. T. Nicholls			5	6	6				
R. S. James							6	8	0
F. H. Somerset							12	0	0
Goods			10	0	0				
			70	6	0	70	6	0	

(a) Would make a difference of £20 in the *Dr.* and *Cr.* sides—the *Dr.* £10 too much; the *Cr.* £10 short. (b) Would make the side on which error occurred 19s. short.

20.

SALES BOOK.								
		£	s.	d.	£	s.	d.	
Feb. 3.	J. Abel— 1 doz. photo frames @ 1s. each	0	12	0	0	12	0	
" 8.	J. Shrewsbury— 6 doz. dessert knives @ 20s. per doz. Less 5%	6	0	0	5	14	0	
" 5.	W. Humphreys— 6 razors @ 3s. each	0	18	0	0	18	0	
" 5.	L. Townsend— 2 cases fish knives @ £2 each	4	0	0	4	0	0	
" 7.	J. Hearne— 3 doz. pocket knives @ 30s. per doz. Less 5%	4	10	0	4	5	6	
" 7.	V. Gunn— ½ doz. glass match-stands @ 3s. 3d. each	2	9	6	2	9	6	
					17	19	0	

P. 438.—20.

PURCHASES BOOK.								
		£	s.	d.	£	s.	d.	
Feb. 3.	F. Grace— 2 doz pocket knives @ 4s. 6d. each	5	8	0	5	8	0	
" 4.	G. Mead— 2 doz. photo frames @ 5s. 6d. each . Less 10 %	6 0	12 13	0 2				
					5	18	10	
" 6.	B. Lilley— 2 doz. match-stands @ 6s. each .	7	4	0	7	4	0	
" 8.	L. Spooner— 6 cases of fish knives @ £3 each . Less 10 %	18 1	0 16	0 0				
					16	4	0	
					<u>34</u>	<u>14</u>	<u>10</u>	

RETURNS OUTWARDS BOOK.								
		£	s.	d.	£	s.	d.	
Feb. 4.	N. Hurst— 1 doz. pairs scissors @ 18s. per doz.	0	18	0	0	18	0	
" 5.	F. Grace— ½ doz. pocket knives @ 4s. 6d. each	1	7	0	1	7	0	
					<u>2</u>	<u>5</u>	<u>0</u>	

RETURNS INWARDS BOOK.								
		£	s.	d.	£	s.	d.	
Feb. 3.	B. Briggs— 1 case carvers @ £1 5s. each . . .	1	5	0	1	5	0	
" 6.	J. Abel— 6 photo frames @ 1s. each	0	6	0	0	6	0	
					<u>1</u>	<u>11</u>	<u>0</u>	

JOURNAL.								
		£	s.	d.	£	s.	d.	
Feb. 5.	W. Humphreys, Dr.	0	0	6				
	To Carriage, Cr. (Carriage on razors)				0	0	6	

P. 438. 20.

Dr.		GOODS ACCOUNT.			Cr.			
		£	s.	d.		£	s.	d.
To Purchases Book . . .		34	14	10	By Sales Book . .	17	19	0
" Returns Inwards Book . .		1	11	0	" Returns Outwards Book . .	2	5	0
		<u>36</u>	<u>5</u>	<u>0</u>		<u>20</u>	<u>4</u>	<u>0</u>

Dr.		CARRIAGE ACCOUNT.			Cr.				
						£	s.	d.	
					Feb. 5.	By W. Humphreys	0	0	6
							<u>0</u>	<u>0</u>	<u>6</u>

Dr.		J. ABEL.			Cr.				
Feb. 3.	To Goods . . .	£	s.	d.	Feb. 6.	By Returns . . .	£	s.	d.
		0	12	0			0	6	0
		<u>0</u>	<u>12</u>	<u>0</u>			<u>0</u>	<u>6</u>	<u>0</u>

Dr.		J. SHREWSBURY.			Cr.				
Feb. 3.	To Goods . . .	£	s.	d.					
		5	14	0					
		<u>5</u>	<u>14</u>	<u>0</u>					

Dr.		W. HUMPHREYS.			Cr.				
Feb. 5.	To Goods . . .	£	s.	d.					
" "	" Carriage . . .	0	0	6					
		<u>0</u>	<u>18</u>	<u>6</u>					

Dr.		L. TOWNSEND.			Cr.				
Feb. 5.	To Goods . . .	£	s.	d.					
		4	0	0					
		<u>4</u>	<u>0</u>	<u>0</u>					

Dr.		J. HEARNE.			Cr.				
Feb. 7.	To Goods . . .	£	s.	d.					
		4	5	6					
		<u>4</u>	<u>5</u>	<u>6</u>					

P. 438.--20.

<i>Dr.</i>		V. GUNN.			<i>Cr.</i>		
Feb. 7.	To Goods . . .	£	s.	d.			
		9	9	6			

<i>Dr.</i>		F. GRACE.			<i>Cr.</i>				
Feb. 5.	By Returns . . .	£	s.	d.	Feb. 3.	By Goods . . .	£	s.	d.
		1	7	0			5	8	0

<i>Dr.</i>		G. MEAD.			<i>Cr.</i>				
					Feb. 4.	By Goods . . .	£	s.	d.
							5	18	10

<i>Dr.</i>		B. LILLEY.			<i>Cr.</i>				
					Feb. 6.	By Goods . . .	£	s.	d.
							7	4	0

<i>Dr.</i>		L. SPOONER.			<i>Cr.</i>				
					Feb. 8.	By Goods . . .	£	s.	d.
							16	4	0

<i>Dr.</i>		N. HURST.			<i>Cr.</i>		
Feb. 4.	To Returns . . .	£	s.	d.			
		0	18	0			

<i>Dr.</i>		B. BRIGGS.			<i>Cr.</i>				
					Feb. 3.	By Returns . . .	£	s.	d.
							1	5	0

21.

<i>Dr.</i>		CHAS. DUGMORE: CAPITAL ACCOUNT.			<i>Cr.</i>				
Feb. 28.	To Balance c/d . . .	£	s.	d.	Feb. 1.	By Cash . . .	£	s.	d.
		147	7	1	" "	" Profit . . .	27	7	1
		147	7	1			147	7	1
					" 28.	By Balance b/d . . .	147	7	1

P. 433.-21.

<i>Dr.</i>		CASH ACCOUNT.						<i>Cr.</i>		
		£	s.	d.			£	s.	d.	
Feb. 1.	To Capital . . .	120	0	0	Feb. 4.	By Goods . . .	22	3	4	
" 10.	" Goods . . .	30	0	0	" 8.	" R. Russell . .	20	0	0	
" 25.	" F. Shepherd . .	20	0	0	" 28.	" Trade Expenses	4	10	6	
					" "	" Balance c/d . .	123	6	2	
		<u>170</u>	<u>0</u>	<u>0</u>			<u>170</u>	<u>0</u>	<u>0</u>	
" 28.	To Balance b/d . .	123	6	2						

<i>Dr.</i>		GOODS ACCOUNT.						<i>Cr.</i>		
		£	s.	d.			£	s.	d.	
Feb. 3.	To R. Russell . . .	75	6	8	Feb. 6.	By F. Shepherd . .	21	2	6	
" 5.	" Cash . . .	22	3	4	" 10.	" Cash . . .	30	0	0	
" 15.	" C. Oliver . . .	10	12	5	" 28.	" Stock c/d . . .	90	0	0	
" 28.	" Profit . . .	33	0	1						
		<u>141</u>	<u>2</u>	<u>6</u>			<u>141</u>	<u>2</u>	<u>6</u>	
" 28.	To Balance b/d . .	90	0	0						

<i>Dr.</i>		R. RUSSELL.						<i>Cr.</i>		
		£	s.	d.			£	s.	d.	
Feb. 8.	To Cash . . .	20	0	0	Feb. 3.	By Goods . . .	75	6	8	
" 28.	" Balance c/d . .	55	6	8						
		<u>75</u>	<u>6</u>	<u>8</u>	" 28.	By Balance b/d . .	55	6	8	

<i>Dr.</i>		F. SHEPHERD.						<i>Cr.</i>		
		£	s.	d.			£	s.	d.	
Feb. 6.	To Goods . . .	21	2	6	Feb. 25.	By Cash . . .	20	0	0	
					" "	" Discount . . .	1	2	6	
		<u>21</u>	<u>2</u>	<u>6</u>			<u>21</u>	<u>2</u>	<u>6</u>	

<i>Dr.</i>		C. OLIVER.						<i>Cr.</i>		
		£	s.	d.			£	s.	d.	
					Feb. 15.	By Goods . . .	10	12	5	

<i>Dr.</i>		DISCOUNT.						<i>Cr.</i>		
		£	s.	d.			£	s.	d.	
Feb. 25.	To F. Shepherd . .	1	2	6	Feb. 28.	By P. and L . . .	1	2	6	

P. 438.—21.

Dr.		TRADE EXPENSES.						Cr.	
Feb. 28.	To Cash . . .	£	s.	d.	Feb. 28.	By P. and L. . .	£	s.	d.
		4	10	6			1	2	6

TRIAL BALANCE.										
		Dr.			Totals.			Cr.		
		£	s.	d.	£	s.	d.	£	s.	d.
Capital					120	0	0	120	0	0
Cash		170	0	0	46	13	10	123	6	2
Goods		108	2	5	51	2	6	56	19	11
R. Russell		20	0	0	75	6	8			
F. Shepherd		21	2	6	21	2	6			
C. Oliver					10	12	5			
Discount		1	2	6				1	2	6
Trade Expenses		4	10	6				4	10	6
		<u>324</u>	<u>17</u>	<u>11</u>	<u>324</u>	<u>17</u>	<u>11</u>	<u>185</u>	<u>19</u>	<u>1</u>

Dr.		PROFIT AND LOSS ACCOUNT.						Cr.	
Feb. 28.	To Discount . . .	£	s.	d.	Feb. 28.	By Profit from	£	s.	d.
" "	" Trade Expenses	1	2	6		Goods a/c . . .	33	0	1
" "	" Net Profit transferred to Capital a/c . . .	4	10	6					
		27	7	1					
		<u>33</u>	<u>0</u>	<u>1</u>			<u>33</u>	<u>0</u>	<u>1</u>

BALANCE SHEET.										
Liabilities.					Assets.					
					£	s.	d.	£	s.	d.
R. Russell		55	6	8	Cash			123	6	2
C. Oliver		10	12	5	Stock			90	0	0
Capital		147	7	1						
		<u>213</u>	<u>6</u>	<u>2</u>				<u>213</u>	<u>6</u>	<u>2</u>

22.

Dr.		CASH BOOK.						Cr.			
		Dis-count.		Cash.				Dis-count.		Cash.	
		£	s.	d.	£	s.	d.	£	s.	d.	
Feb. 1	To Capital . . .				100	0	0	Feb. 9	By R. Taylor.		
12	" F. Peters . . .				25	0	0	15	" Goods	16	8
20	" Goods				5	5	0	28	" Balance c/d	115	16
28	" C. Griffin . . .	1	10	0	20	0	0				
		<u>1</u>	<u>10</u>	<u>0</u>	<u>150</u>	<u>5</u>	<u>0</u>			<u>150</u>	<u>5</u>
Mar. 1	To Balance b/d				113	16	6				

P.438.--22.

SALES BOOK.

		£	s.	d.
Feb. 4.	F. Peters	25	0	0
" 8.	C. Griffin	10	0	0
" 17.	C. Griffin	11	10	0
" 27.	C. Griffin	5	10	0
		<u>52</u>	<u>0</u>	<u>0</u>

PURCHASES BOOK.

		£	s.	d.
Feb. 3.	R. Taylor	40	0	0

JOURNAL.

		£	s.	d.	£	s.
Feb. 1.	Cash, <i>Dr.</i>	100	0	0		
	To J. Thomas' Capital Account, <i>Cr.</i>				<u>100</u>	<u>0</u>

<i>Dr.</i>	J. THOMAS' CAPITAL ACCOUNT.		<i>Cr.</i>
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		£	s.	d.		£	s.	d.	
Feb. 28.	To Balance c/d	139	17	0	Feb. 1.	By Cash	100	0	0
					" 28.	" Profit	39	17	0
		<u>139</u>	<u>17</u>	<u>0</u>			<u>139</u>	<u>17</u>	<u>0</u>
					Mar. 1.	By Balance b/d	139	17	0

<i>Dr.</i>	GOODS ACCOUNT.		<i>Cr.</i>
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		£	s.	d.		£	s.	d.	
Feb. 28.	To Purchases	40	0	0	Feb. 28.	By Sales	52	0	0
" 20.	" Cash	16	8	6	" 15.	" Cash	5	5	0
" 28.	" Gross Profit to P. and L.	41	7	0	" 28.	" Stock c/d	40	10	6
		<u>97</u>	<u>15</u>	<u>6</u>			<u>97</u>	<u>15</u>	<u>6</u>
Mar. 1.	To Stock b/d	40	10	6					

<i>Dr.</i>	R. TAYLOR.		<i>Cr.</i>
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		£	s.	d.		£	s.	d.	
Feb. 9.	To Cash	20	0	0	Feb. 3.	By Goods	40	0	0
" 28.	" Balance c/d	20	0	0					
		<u>40</u>	<u>0</u>	<u>0</u>			<u>40</u>	<u>0</u>	<u>0</u>
					Mar. 1.	By Balance b/d	20	0	0

P. 438.—22.

Dr.		F. PETERS.			Cr.				
Feb. 4.	To Goods . . .	£	s.	d.	Feb. 12.	By Cash . . .	£	s.	d.
		25	0	0			25	0	0

Dr.		C. GRIFFIN.			Cr.				
Feb. 8.	To Goods . . .	£	s.	d.	Feb. 28.	By Cash . . .	£	s.	d.
" 17.	" " . . .	10	0	0	" "	" Discount . . .	20	0	0
" 27.	" " . . .	11	10	0	" "	" Balance b/d . . .	1	10	0
		5	10	0			5	10	0
		27	0	0			27	0	0
Mar. 1.	To Balance b/d . . .	5	10	0					

Dr.		DISCOUNT ACCOUNT.			Cr.				
Feb. 28.	To Cash Book . . .	£	s.	d.	Feb. 28.	By P. and L. . .	£	s.	d.
		1	10	0			1	10	0

TRIAL BALANCE.										
					Balances.					
					Dr.		Cr.			
					£	s.	d.	£	s.	d.
Capital								100	0	0
Goods								0	16	6
Cash					113	16	6			
R. Taylor								20	0	0
C. Griffin					5	10	0			
Discount					1	10	0			
					120	16	6	120	16	6

P. 439.—23.

Dr.		PROFIT AND LOSS ACCOUNT.			Cr.				
Feb. 28.	To Discount . . .	£	s.	d.	Feb. 28.	By Gross Profit . . .	£	s.	d.
" "	By Net Profit to Capital a/c . . .	1	10	0			41	7	0
		39	17	0					
		41	7	0			41	7	0

P. 439.—23.

BALANCE SHEET.							
Liabilities.			Assets.				
	£	s.	d.		£	s.	d.
R. Taylor	20	0	0	Cash	113	16	6
Capital	139	17	0	Stock	40	10	6
				R. Griffin	5	10	0
	<u>159</u>	<u>17</u>	<u>0</u>		<u>159</u>	<u>17</u>	<u>0</u>

24.—The Cash Book is shown on opposite page.

JOURNAL.								
			Dr.			Cr.		
			£	s.	d.	£	s.	d.
Dec. 1.	Cash at Bank		85	17	6			
	Goods		127	15	3			
	W. Watson		36	6	3			
	To C. Hobson					31	6	3
	„ F. Fletcher					18	12	9
	„ Capital					200	0	0
			<u>249</u>	<u>19</u>	<u>0</u>	<u>249</u>	<u>19</u>	<u>0</u>

SALES BOOK.					
			£	s.	d.
Dec. 4.	W. Watson : Goods		10	11	0
„ 7.	D. Denison „		46	11	8
„ 16.	D. Denison „		6	13	0
			<u>63</u>	<u>15</u>	<u>8</u>

PURCHASES BOOK.					
			£	s.	d.
Dec. 14.	C. Hobson : Goods		23	16	7
„ 29.	F. Fletcher „		33	13	3
			<u>57</u>	<u>9</u>	<u>10</u>

P. 439.—24.

<i>Dr.</i>		CAPITAL ACCOUNT.			<i>Cr.</i>			
				Dec. 1.	By Balance . .	£	s.	d.
						200	0	0

<i>Dr.</i>		DRAWINGS ACCOUNT.			<i>Cr.</i>		
Dec. 24.	To Cash . . .	£	s.	d.			
		4	0	0			

<i>Dr.</i>		GOODS ACCOUNT.			<i>Cr.</i>				
Dec. 1.	To Balance . . .	£	s.	d.	Dec. 30.	By Cash . . .	£	s.	d.
		127	15	3			7	10	0
" 31.	" Purchases Book . . .	57	9	10	" 31.	" Sales Book . . .	63	15	8
" "	" Gross Profit . . .	37	12	2	" "	" Stock c/d . . .	151	11	7
		<u>222</u>	<u>17</u>	<u>3</u>			<u>222</u>	<u>17</u>	<u>3</u>
Jan. 1.	To Balance b/d . . .	151	11	7					

<i>Dr.</i>		W. WATSON.			<i>Cr.</i>				
Dec. 1.	To Balance . . .	£	s.	d.	Dec. 11.	By Cash . . .	£	s.	d.
		36	6	3			15	0	0
" 4.	" Goods . . .	10	11	0	" 19.	" Bank . . .	20	18	0
		<u>46</u>	<u>17</u>	<u>3</u>	" "	" Discount . . .	0	18	3

<i>Dr.</i>		C. HOBSON.			<i>Cr.</i>			
				Dec. 1.	By Balance . . .	£	s.	d.
				" 14.	" Goods . . .	31	6	3
						<u>23</u>	<u>16</u>	<u>7</u>

<i>Dr.</i>		F. FLETCHER.			<i>Cr.</i>				
Dec. 2.	To Bank . . .	£	s.	d.	Dec. 1.	By Balance . . .	£	s.	d.
		18	3	0			18	12	9
" "	" Discount . . .	0	9	9	" 29.	" Goods . . .	83	13	3
		<u>18</u>	<u>12</u>	<u>9</u>			<u>101</u>	<u>25</u>	<u>12</u>

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<i>Dr.</i>		D. DENISON.				<i>Cr.</i>		
Dec. 7.	To Goods . . .	£	s.	d.				
		46	11	8				
" 16.	" " . . .	6	13	0				
		<u>52</u>	<u>24</u>	<u>8</u>				

<i>Dr.</i>		SUNDRY EXPENSES.				<i>Cr.</i>			
Dec. 12	To Cash . . .	£	s.	d.	Dec. 31.	By P. and L.	£	s.	d.
		3	10	0			9	2	6
" 31.	" " . . .	5	12	6					
		<u>8</u>	<u>22</u>	<u>6</u>			<u>9</u>	<u>2</u>	<u>6</u>

<i>Dr.</i>		DISCOUNT ACCOUNT.				<i>Cr.</i>			
Dec. 31.	To Cash Book . . .	£	s.	d.	Dec. 31.	By Cash Book . . .	£	s.	d.
		0	18	3			0	9	9
					" "	" P. and L.	0	8	6
		<u>0</u>	<u>18</u>	<u>3</u>			<u>0</u>	<u>18</u>	<u>3</u>

TRIAL BALANCE.										
					Balances.					
					<i>Dr.</i>		<i>Cr.</i>			
					£	s.	d.	£	s.	d.
Capital								200	0	0
Drawings Account					4	0	0			
Goods					113	10	5			
W. Watson					10	11	0			
C. Hobson								55	2	10
F. Fletcher								33	13	3
D. Denison					53	4	8			
Sundry Expenses					9	2	6			
Discount Account					0	8	6			
Cash					4	7	6			
Bank					93	2	6			
					<u>288</u>	<u>16</u>	<u>1</u>	<u>288</u>	<u>16</u>	<u>1</u>

<i>Dr.</i>		PROFIT AND LOSS ACCOUNT.				<i>Cr.</i>			
Dec. 31.	To Expenses . . .	£	s.	d.	Dec. 31.	By Gross Profit . . .	£	s.	d.
		9	2	6			37	12	2
" "	" Discount . . .	0	8	6					
" "	" Net Profit . . .	28	1	2					
		<u>37</u>	<u>12</u>	<u>2</u>			<u>37</u>	<u>12</u>	<u>2</u>

P. 440.—25.

Dr.

CASH BOOK.

Cr.

		Discount.		Cash.		Bank.		Discount.		Cash.		Bank.	
		£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.
June 1.	To Balance . . .					89	0 0						
" 2.	" J. Smithson . .	0	13 4	31	0 0							4	15 0
" 7.	" Cash					35	0 0					50	10 0
" 19.	" W. Clarkson . .	0	15 0			17	15 0			12	0 0		
" 28.	" Cash Sale . . .			7	10 0					5	10 0		
		1	8 4									71	10 0
						141	15 0			52	10 0	141	15 0
	To Balance b/d . .			5	10 0								

By Bank
 " Rates
 " L. Thompson
 " Trade Expenses
 " P. Walker (Drawings a/c)
 " Balance c/d

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JOURNAL.									
		Dr.			Cr.				
		£	s.	d.	£	s.	d.		
June 1.	Goods	97	10	0					
	Cash	14	0	0					
	Bank	89	0	0					
	J. Smithson	31	13	4					
	W. Clarkson	18	10	0					
	To L. Thompson				15	13	4		
	" P. Walker, Capital Account				235	0	0		
		250	13	4	250	13	4		

SALES BOOK.				
		£	s.	d.
June 4.	W. Clarkson : Goods	25	10	0
		25	10	0

PURCHASES BOOK.				
		£	s.	d.
June 10.	L. Thompson : Goods	37	10	0
" 22.	L. Thompson "	12	15	0
		50	5	0

Dr.		P. WALKER'S CAPITAL ACCOUNT.			Cr.				
		£	s.	d.					
June 30.	To Drawings a/c	15	0	0	June 1.	By Balance	235	0	0
" "	" Balance c/d	242	6	9	" 30.	" Net Profit	22	6	9
		257	6	9			257	6	9
						By Balance b/d	242	6	9

Dr.		P. WALKER'S DRAWINGS ACCOUNT.			Cr.				
		£	s.	d.					
June 30.	To Bank	15	0	0	June 30.	By Capital a/c	15	0	0

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<i>Dr.</i>		GOODS ACCOUNT.			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 1.	To Stock . . .	97	10	0	June 28.	By Cash Sales . .	7	10	0
" 30.	" Purchases . .	50	5	0	" 30.	" Sales . . .	25	10	0
" "	" Gross Profit transferred to P. and L. . .	37	16	9	" "	" Stock . . .	152	11	9
		185	11	9			185	11	9

<i>Dr.</i>		RATES ACCOUNT.			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 15	To Bank . . .	4	15	0	June 30.	By Transfer to P. and L. . .	4	15	0

<i>Dr.</i>		TRADE EXPENSES			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 30.	To Cash . . .	72	0	0	June 30.	By Transfer to P. and L. . .	12	0	0

<i>Dr.</i>		DISCOUNT ACCOUNT.			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 30.	To Cash Book . .	1	8	4	June 30.	By Cash Book . .	2	13	4
" "	" Transfer to P. and L.	1	5	0			2	13	4
		2	13	4			2	13	4

<i>Dr.</i>		J. SMITHSON.			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 1.	To Balance . . .	31	13	4	June 2.	By Cash . . .	31	0	0
		31	13	4	" "	" Discount . . .	0	13	4
		31	13	4			31	13	4

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<i>Dr.</i>		W. CLARKSON.			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 1.	To Balance . . .	18	10	0	June 7.	By Bank . . .	17	15	0
" "	" Goods . . .	25	10	0	" "	" Discount . . .	0	15	0
					" 30.	" Balance c/d . . .	25	10	0
		44	0	0			44	0	0
July 1.	To Balance b/d . . .	25	10	0					

<i>Dr.</i>		L. THOMPSON.			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 26.	To Bank . . .	50	10	0	June 1.	By Balance . . .	15	13	4
" "	" Discount . . .	2	13	4	" 10.	" Goods . . .	37	10	0
" 30.	" Balance c/d . . .	12	15	0	" 22.	" " . . .	12	15	0
		65	18	4			65	18	4
					July 1.	By Balance b/d . . .	12	15	0

TRIAL BALANCE.									
				Balances.					
				<i>Dr.</i>		<i>Cr.</i>			
				£	s.	d.	£	s.	d.
P. Walker's Capital							235	0	0
P. Walker's Drawings				15	0	0			
Goods Account				114	15	0			
Rates Account				4	15	0			
Trade Expenses Account				12	0	0			
Discount Account							1	5	0
W. Clarkson				25	10	0			
L. Thompson							12	15	0
Cash				5	10	0			
Bank				71	10	0			
				249	0	0	249	0	0

<i>Dr.</i>		PROFIT AND LOSS ACCOUNT.			<i>Cr.</i>				
		£	s.	d.		£	s.	d.	
June 30.	To Rates . . .	4	15	0	June 30.	By Gross Profit . . .	37	10	9
" "	" Trade Expenses . . .	12	0	0	" "	" Discount . . .	1	5	0
" "	" Net Profit to Capital a/c . . .	22	6	9					
		39	1	9			39	1	9

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Dr.

CASH BOOK.

Cr.

	Discount.		Cash.		Bank.		Discount.		Cash.		Bank.	
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.
Mar. 1. To C. H. Smithson, Capital Account			1000	0 0					950	0 0		
" " " Cash . . .					950	0 0					731	5 0
" 25. " Mrs. B. Vero . . .			7	0 0					38	0 0		
" 29. " Cash Sales . . .			152	0 0							27	0 0
" " " Cash . . .							1	10 0				
					102	5 0			10	0 0		
									5	6 0		
											5	0 0
									9	10 0		
									102	5 0		
									43	19 0	289	0 0
									1	10 0	1052	5 0
April 1. To Balance b/d . . .			43	19 0	289	0 0						

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SALES BOOK.							
					£	s.	d.
Mar. 9.	Mrs. B. Vero	7	5	0
„ 19.	Mrs. A. Harker	3	3	0
					<u>10</u>	<u>8</u>	<u>0</u>

PURCHASES BOOK.							
					£	s.	d.
Mar. 13.	Lipton's Ltd.— Tea	28	10	0
„ 15.	J. C. Cooper— Sugar . . . . .	.	.	.	13	5	0
					<u>41</u>	<u>15</u>	<u>0</u>

Dr.		C. H. SMITHSON, CAPITAL ACCOUNT.				Cr.			
		£	s.	d.		£	s.	d.	
Mar 30.	To Balance c/d	1020	0	0	Mar. 1.	By Cash	1000	0	0
					„ 30.	„ Net Profit	20	0	0
		<u>1020</u>	<u>0</u>	<u>0</u>			<u>1020</u>	<u>0</u>	<u>0</u>
					April 1.	By Balance b/d	1020	0	0

Dr.		GOODS ACCOUNT.				Cr.			
		£	s.	d.		£	s.	d.	
Mar. 1.	To Cash	731	5	0	Jan. 29.	By Cash	152	0	0
„ 18.	„ „	10	0	0	„ „	„ Sales Book	10	8	0
„ 30.	„ Purchases Book	41	15	0	„ 30.	„ Stock	659	3	0
„ „	„ Gross Profit	38	11	0			<u>821</u>	<u>11</u>	<u>0</u>
		<u>821</u>	<u>11</u>	<u>0</u>					
April 1.	To Balance b/d	659	3	0					

Dr.		OFFICE FURNITURE ACCOUNT.				Cr.			
		£	s.	d.		£	s.	d.	
Mar. 1.	To Cash	38	0	0	Mar. 30.	By Balance c/d	38	0	0
April 1.	„ Balance b/d	38	0	0					

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<i>Dr.</i>		WAGES ACCOUNT.			<i>Cr.</i>				
Mar. 29.	To Cash . . .	£	s.	d.	Mar. 30.	By P. and L. . .	£	s.	d.
		5	6	0			5	6	0
		<u>5</u>	<u>6</u>	<u>0</u>			<u>5</u>	<u>6</u>	<u>0</u>

<i>Dr.</i>		RENT ACCOUNT.			<i>Cr.</i>				
Mar. 29.	To Bank . . .	£	s.	d.	Mar. 30.	By P. and L. . .	£	s.	d.
		5	0	0			5	0	0
		<u>5</u>	<u>0</u>	<u>0</u>			<u>5</u>	<u>0</u>	<u>0</u>

<i>Dr.</i>		TRADE EXPENSES ACCOUNT.			<i>Cr.</i>				
Mar. 29.	To Cash . . .	£	s.	d.	Mar. 30.	By P. and L. . .	£	s.	d.
		9	10	0			9	10	0
		<u>9</u>	<u>10</u>	<u>0</u>			<u>9</u>	<u>10</u>	<u>0</u>

<i>Dr.</i>		DISCOUNT ACCOUNT.			<i>Cr.</i>				
Mar. 31.	To Cash Book . . .	£	s.	d.	Mar. 31.	By Cash Book . . .	£	s.	d.
	„ „ „ P. and L. . .	0	5	0			1	10	0
		1	5	0					
		<u>1</u>	<u>10</u>	<u>0</u>			<u>1</u>	<u>10</u>	<u>0</u>

<i>Dr.</i>		MRS. B. VERO.			<i>Cr.</i>				
Mar. 9.	To Goods . . .	£	s.	d.	Mar. 29.	By Cash . . .	£	s.	d.
		7	5	0		„ „ „ Discount . . .	7	0	0
							0	5	0
		<u>7</u>	<u>5</u>	<u>0</u>			<u>7</u>	<u>5</u>	<u>0</u>

<i>Dr.</i>		MRS. A. HARKER.			<i>Cr.</i>				
Mar. 19.	To Goods . . .	£	s.	d.					
		3	3	0					
		<u>3</u>	<u>3</u>	<u>0</u>					

<i>Dr.</i>		LIPTON'S LTD.			<i>Cr.</i>				
Mar. 16.	To Bank . . .	£	s.	d.	Mar. 13.	By Goods . . .	£	s.	d.
	„ „ „ Discount . . .	27	0	0			28	10	0
		1	10	0					
		<u>28</u>	<u>10</u>	<u>0</u>			<u>28</u>	<u>10</u>	<u>0</u>

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Dr.	J. C. COOPER.		Cr.		
			£	s.	d.
	Mar. 15.	By Goods . . .	13	5	0

TRIAL BALANCE.					
			Balances.		
			Dr.	Cr.	
			£	s.	d.
Capital				1000	0 0
Goods			020	12	0
Office Furniture			38	0	0
Wages			5	6	0
Rent			5	0	0
Trade Expenses			9	10	0
Discount					1 5 0
Mrs. A. Harker			3	3	0
J. C. Cooper					13 5 0
Cash			43	19	0
Bank			289	0	0
			<u>1014</u>	<u>10</u>	<u>0</u>
				<u>1014</u>	<u>10 0</u>

Dr.		PROFIT AND LOSS ACCOUNT.			Cr.				
		£	s.	d.		£	s.	d.	
Mar. 30.	To Wages	5	6	0	Mar. 30.	By Gross Profit	33	11	0
" "	" Rent	5	0	0	" "	" Discount	1	5	0
" "	" Trade Expenses	9	10	0					
" "	" Net Profit	20	0	0					
		<u>39</u>	<u>16</u>	<u>0</u>			<u>39</u>	<u>16</u>	<u>0</u>

BALANCE SHEET.					
Liabilities.			Assets.		
			£	s.	d.
J. C. Cooper			13	5	0
Capital			1020	0	0
			<u>1033</u>	<u>5</u>	<u>0</u>
Cash			43	19	0
Bank			289	0	0
Mrs. A. Harker			3	3	0
Stock			659	3	0
Furniture			38	0	0
			<u>1033</u>	<u>5</u>	<u>0</u>

- P. 441.—27.** (1) Mrs. Harker, £3 3s. (2) J. C. Cooper, £13 5s.
 (3) £1020. (4) £20. (5) £43 19s. and £289.

“Capital” is a liability, for the business owes it to the capitalist.

28.

<i>Dr.</i>		CAPITAL ACCOUNT.			<i>Cr.</i>				
Dec. 10.	To Balance c/d .	£	s.	d.	Dec. 1.	By Cash . . .	£	s.	d.
		125	15	0		„ „ „ Net Profit . . .	120	0	0
							5	15	0
		<u>125</u>	<u>15</u>	<u>0</u>			<u>125</u>	<u>15</u>	<u>0</u>
					Dec. 10.	By Balance b/d .	125	15	0

<i>Dr.</i>		CASH ACCOUNT.			<i>Cr.</i>				
Dec. 1.	To Capital . . .	£	s.	d.	Dec. 1.	By Bank . . .	£	s.	d.
„ „	„ Goods . . .	120	0	0	„ 10.	„ Expenses . . .	100	0	0
		17	0	0	„ „	„ Balance c/d . . .	5	5	0
							31	15	0
		<u>137</u>	<u>0</u>	<u>0</u>			<u>187</u>	<u>0</u>	<u>0</u>
Dec. 10.	To Balance b/d .	31	15	0					

<i>Dr.</i>		BANK ACCOUNT.			<i>Cr.</i>				
Dec. 1.	To Cash . . .	£	s.	d.	Dec. 3.	By Goods . . .	£	s.	d.
		100	0	0	„ 10.	„ Balance c/d . . .	62	10	0
							37	10	0
		<u>100</u>	<u>0</u>	<u>0</u>			<u>100</u>	<u>0</u>	<u>0</u>
Dec. 3.	To Balance b/d .	37	10	0					

<i>Dr.</i>		GOODS ACCOUNT.			<i>Cr.</i>				
Dec. 3.	To Bank . . .	£	s.	d.	Dec. 4.	By Cash . . .	£	s.	d.
„ 6.	„ Harrison & Co.	62	10	0	„ 10.	„ J. Thomas . . .	17	0	0
„ 10.	„ Gross Profit .	18	0	0	„ „	„ Stock c/d . . .	25	0	0
		11	0	0			49	10	0
		<u>91</u>	<u>10</u>	<u>0</u>			<u>91</u>	<u>10</u>	<u>0</u>
Dec. 10.	To Balance b/d .	49	10	0					

<i>Dr.</i>		EXPENSES ACCOUNT.			<i>Cr.</i>				
Dec. 10.	To Cash . . .	£	s.	d.	Dec. 10.	By P. and L. . .	£	s.	d.
		5	5	0			5	5	0
		<u>5</u>	<u>5</u>	<u>0</u>			<u>5</u>	<u>5</u>	<u>0</u>

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Dr.		HARRISON & CO.			Cr.		
					£	s.	d.
				Dec. 6.	18	0	0
				By Goods . . .			

Dr.		J. THOMAS.			Cr.		
Dec. 10.	To Goods . . .	25	0				

Dr.		PROFIT AND LOSS ACCOUNT.			Cr.		
					£	s.	d.
Dec. 10.	To Expenses . . .	5	5	0	Dec. 10.	By Gross Profit . . .	11 0 0
" "	" Net Profit . . .	5	15	0			
		<u>11</u>	<u>0</u>	<u>0</u>		<u>11</u>	<u>0</u> <u>0</u>

BALANCE SHEET, DEC. 10.								
Liabilities.				Assets.				
		£	s.	d.		£	s.	d.
Harrison & Co.		18	0	0	J. Thomas	25	0	0
Capital		125	15	0	Stock	49	10	0
					Cash	31	15	0
					Bank	37	10	0
		<u>143</u>	<u>15</u>	<u>0</u>		<u>143</u>	<u>15</u>	<u>0</u>

29.

Dr.		MANUFACTURING ACCOUNT.			Cr.			
To Material		8185	0	0	By Sales, 10000 @ £2 2s.	21000	0	0
" Wages		6284	0	0	" Material unused	1717	0	0
" Power		1000	0	0				
" Wear and Tear		528	0	0				
" Charges		742	0	0				
" Profit		6000	0	0				
		<u>22717</u>	<u>0</u>	<u>0</u>		<u>22717</u>	<u>0</u>	<u>0</u>

(a) £6000.

(b) 40 %.

(c) 28½ %.

(d) 15 %.

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PURCHASES BOOK.				£	s.	d.
Jan. 15.	J. Brown & Co.—					
	Meat			59	16	2
" "	W. Thomas—					
	Fish, Game.			18	17	3
" "	R. Green—					
	Bread			7	9	4
" "	H. Gowe Ltd.—					
	Vegetables			6	18	3
" "	R. Joker—					
	Minerals			16	17	4
				<u>109</u>	<u>18</u>	<u>4</u>

Dr.		J. CUNNINGHAM : CAPITAL ACCOUNT.			Cr.				
Jan. 31.	To Balance c/d	£	s.	d.	Jan. 1.	By Cash	£	s.	d.
		669	17	2	" 31.	" Profit	600	0	0
							69	17	2
		<u>669</u>	<u>17</u>	<u>2</u>			<u>669</u>	<u>17</u>	<u>2</u>
					Feb. 1.	By Balance b/d	669	17	2

Dr.		TAKINGS ACCOUNT.			Cr.				
Jan. 31.	To P. and L.	£	s.	d.	Jan. 6.	By Cash	£	s.	d.
		294	17	7	" 13.	" "	94	11	2
					" 20.	" "	99	10	9
							100	15	8
		<u>294</u>	<u>17</u>	<u>7</u>			<u>294</u>	<u>17</u>	<u>7</u>

Dr.		PROVISIONS ACCOUNT.			Cr.				
Jan. 24.	To Cash	£	s.	d.	Jan. 31.	By Stock c/d	£	s.	d.
" 31.	" Purchases	140	18	2	" "	" P. and L.	50	0	0
		109	18	4			200	16	6
		<u>250</u>	<u>16</u>	<u>6</u>			<u>250</u>	<u>16</u>	<u>6</u>
Feb. 1.	To Balance b/d	50	0	0					

Dr.		WAGES AND EXPENSES ACCOUNT.			Cr.				
Jan. 27.	To Cash	£	s.	d.	Jan. 31.	By P. and I.	£	s.	d.
		18	18	11			18	18	11

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<i>Dr.</i>		RENT ACCOUNT.			<i>Cr.</i>				
Jan. 27.	To Cash . . .	£	s.	d.	Jan. 31.	By P. and L. . .	£	s.	d.
		10	0	0			10	0	0

<i>Dr.</i>		DISCOUNT ACCOUNT.			<i>Cr.</i>				
Jan. 31.	To P. and L. . .	£	s.	d.	Jan. 31.	By Cash Book . .	£	s.	d.
		4	15	0			4	15	0

<i>Dr.</i>		J. BROWN & CO.			<i>Cr.</i>				
Jan. 24.	To Bank . . .	£	s.	d.	Jan. 15.	By Provisions . .	£	s.	d.
" "	" Discount . .	56	17	0			59	16	2
		2	19	2					
		59	16	2			59	16	2

<i>Dr.</i>		W. THOMAS.			<i>Cr.</i>				
Jan. 24.	To Bank . . .	£	s.	d.	Jan. 15.	By Provisions . .	£	s.	d.
" "	" Discount . .	17	19	0			18	17	3
		0	18	3					
		18	17	3			18	17	3

<i>Dr.</i>		R. GREEN.			<i>Cr.</i>				
Jan. 24.	To Bank . . .	£	s.	d.	Jan. 15.	By Provisions . .	£	s.	d.
" "	" Discount . .	7	0	0			7	9	4
		0	9	4					
		7	9	4			7	9	4

<i>Dr.</i>		H. GOWE LTD.			<i>Cr.</i>				
Jan. 24.	To Bank . . .	£	s.	d.	Jan. 15.	By Provisions . .	£	s.	d.
" "	" Discount . .	6	10	0			6	18	3
		0	8	3					
		6	18	3			6	18	3

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<i>Dr.</i>	R. JOKER.		<i>Cr.</i>
	Jan. 15.	By Provisions	£ 16 s. 17 d. 4

TRIAL BALANCE.					
				Balances.	
				<i>Dr.</i>	<i>Cr.</i>
				£ s. d.	£ s. d.
Capital	.	.	.		600 0 0
Takings Account	.	.	.		294 17 7
Provisions	.	.	.	250 16 6	
Wages	.	.	.	18 18 11	
Rent	.	.	.	10 0 0	
Discount	.	.	.		4 15 0
R. Joker	.	.	.		16 17 4
Cash	.	.	.	25 0 6	
Bank	.	.	.	611 14 0	
				916 9 11	916 9 11

<i>Dr.</i>	PROFIT AND LOSS ACCOUNT.		<i>Cr.</i>
Jan. 31.	To Provisions	£ 200 s. 16 d. 6	Jan. 31.
" "	Wages	18 18 11	By Takings
" "	Rent	10 0 0	" " " Discount
" "	Profit to Capital a/c	69 17 2	£ 294 s. 17 d. 7
		299 12 7	4 15 0
		299 12 7	299 12 7

BALANCE SHEET.			
Liabilities.		Assets.	
		£ s. d.	£ s. d.
R. Joker	16 17 4	Cash	25 0 6
Capital	669 17 2	Bank	611 14 0
		Stock	50 0 0
		686 14 6	686 14 6

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PURCHASES BOOK.									
		Fruit.			Vegetables.				
		£	s.	d.	£	s.	d.		
Aug. 2.	Willingham & Co. Ltd.— Fruit	126	17	4					
„ 3.	John Upwell— Potatoes				59	16	0		
„ 8.	J. Allen— Asparagus				32	6	8		
„ 11.	J. Coe— Tomatoes	38	16	0					
		165	13	4	92	2	8		

SALES BOOK.									
		Fruit.			Vegetables.				
		£	s.	d.	£	s.	d.		
Aug. 12.	W. Almond— Asparagus				22	6	0		
„ „	W. Skimp— Tomatoes	43	7	0					
„ „	J. Turner— Asparagus				14	16	8		
		43	7	0	37	2	8		

Dr.		J. HOWE: CAPITAL ACCOUNT.						Cr.	
		£	s.	d.			£	s.	d.
Aug. 30.	To Balance c/d	362	16	0	Aug. 1.	By Bank	360	0	0
					„ 30.	„ Net Profit	2	16	0
		362	16	0			362	16	0
					Aug. 30.	By Balance b/d	362	16	0

Dr.		A. COLE: CAPITAL ACCOUNT.						Cr.	
		£	s.	d.			£	s.	d.
Aug. 30.	To Balance c/d	241	17	4	Aug. 1.	By Bank	240	0	0
					„ 30.	„ Net Profit	1	17	4
		241	17	4			241	17	4
					Aug. 30.	By Balance b/d	241	17	4

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<i>Dr.</i>		A. BARKER: CAPITAL ACCOUNT.			<i>Cr.</i>				
Aug. 30.	To Balance c/d . . .	£	s.	d.	Aug. 1.	By Bank . . .	£	s.	d.
		120	18	9		„ Net Profit . . .	120	0	0
							0	18	9
		<u>120</u>	<u>18</u>	<u>9</u>			<u>120</u>	<u>18</u>	<u>9</u>
					Aug. 30.	By Balance b/d . . .	120	18	9

<i>Dr.</i>		FRUIT ACCOUNT.			<i>Cr.</i>				
Aug. 30.	To Purchases Book . . .	£	s.	d.	Aug. 4.	By Cash . . .	£	s.	d.
	„ „ „ P. and L. . . .	165	13	4		„ 30. „ Sales Book . . .	132	14	0
		10	7	8			43	7	0
		<u>176</u>	<u>1</u>	<u>0</u>			<u>176</u>	<u>1</u>	<u>0</u>

<i>Dr.</i>		VEGETABLE ACCOUNT.			<i>Cr.</i>				
Aug. 30.	To Purchases Book . . .	£	s.	d.	Aug. 4.	By Cash . . .	£	s.	d.
	„ „ „ P. and L. . . .	92	2	8		„ 30. „ Sales Book . . .	65	4	0
		10	4	0			37	2	8
		<u>102</u>	<u>6</u>	<u>8</u>			<u>102</u>	<u>6</u>	<u>8</u>

<i>Dr.</i>		CARRIAGE ACCOUNT.			<i>Cr.</i>				
Aug. 6.	To Cash . . .	£	s.	d.	Aug. 30.	By P. and L. . . .	£	s.	d.
„ 20.	„ Bank . . .	1	2	7			3	18	10
„ 27.	„ „ . . .	1	19	7					
		0	16	8					
		<u>3</u>	<u>18</u>	<u>10</u>			<u>3</u>	<u>18</u>	<u>10</u>

<i>Dr.</i>		WAGES ACCOUNT.			<i>Cr.</i>				
Aug. 6.	To Cash . . .	£	s.	d.	Aug. 30.	By P. and L. . . .	£	s.	d.
„ 20.	„ Bank . . .	3	17	6			15	14	9
„ 27.	„ „ . . .	7	15	0					
		4	2	3					
		<u>15</u>	<u>14</u>	<u>9</u>			<u>15</u>	<u>14</u>	<u>9</u>

<i>Dr.</i>		RENT ACCOUNT.			<i>Cr.</i>				
Aug. 27.	To Bank . . .	£	s.	d.	Aug. 30.	By P. and L. . . .	£	s.	d.
		5	0	0			5	0	0

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Dr.		J. TURNER.			Cr.		
Aug. 12.	To Vegetables	£	s.	d.			
		14	16	8			

TRIAL BALANCE.

	Balances.					
	Dr.			Cr.		
	£	s.	d.	£	s.	d.
J. Howe, Capital				360	0	0
A. Cole, "				240	0	0
A. Barker, "				120	0	0
Fruit Account				10	7	8
Vegetable Account				10	4	0
Carriage Account	3	18	10			
Wages Account	15	14	9			
Rent Account	5	0	0			
Discount Account				9	14	0
J. Coe				38	18	0
W. Almond	22	6	0			
W. Skimp	43	7	0			
J. Turner	14	16	8			
Cash	12	17	11			
Bank	671	0	6			
	<u>789</u>	<u>1</u>	<u>8</u>	<u>789</u>	<u>1</u>	<u>8</u>

Dr. PROFIT AND LOSS ACCOUNT. Cr.

Dr.					Cr.				
	£	s.	d.		£	s.	d.		
Aug. 30.	To Carriage	3	18	10	Aug. 30.	By Gross Profit on Fruit	10	7	8
" "	" Wages	15	14	9	" "	" " Vegetables	10	4	0
" "	" Rent	5	0	0	" "	" " Discount	9	14	0
" "	" Net Profit—								
" "	J. Howe, $\frac{1}{2}$	2	16	0					
" "	A. Cole, $\frac{1}{2}$	1	17	4					
" "	A. Barker, $\frac{1}{2}$	0	18	9					
		<u>30</u>	<u>5</u>	<u>8</u>					
						<u>30</u>	<u>5</u>	<u>8</u>	

BALANCE SHEET.

Liabilities.			Assets.				
	£	s.	d.		£	s.	d.
Capital—				W. Almond	22	6	0
J. Howe	382	16	0	W. Skimp	43	7	0
A. Cole	241	17	4	J. Turner	14	16	8
A. Barker	120	18	9	Cash	12	17	11
J. Coe	38	16	0	Bank	671	0	6
	<u>764</u>	<u>8</u>	<u>1</u>		<u>764</u>	<u>8</u>	<u>1</u>

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JOURNAL.								
			Dr.			Cr.		
			£	s.	d.	£	s.	d.
July 3.	Bank		250	0	0			
	Cash		3	0	0			
	Stock		300	0	0			
	Furniture		70	0	0			
	To J. Beale & Co.					110	0	0
	" F. Hall & Sons					60	0	0
	" T. Fisher					90	0	0
	" Hugh Jones Ltd.					40	0	0
	" Capital					323	0	0
			623	0	0	623	0	0

PURCHASES BOOK.								
			£	s.	d.	£	s.	d.
July 4.	F. Hall & Sons—							
	240 yds. @ 8s. 3d. per doz. yds.		8	5	0			
	360 yds. @ 10s. 8d. " "		16	0	0			
						24	5	0
" 3.	J. Beale & Co.—							
	120 yds. flannelette @ 4s. 3d. per doz. yds.		2	2	6	2	2	6
						26	7	6

SALES BOOK.								
			£	s.	d.	£	s.	d.
July 8.	Miss H. Hayman—							
	10 yds. sheeting @ 1s. 5d. per yd.		0	14	2			
	1 doz. cottons		0	2	3			
	2 pairs curtains @ 16s. 11d. per pr.		1	13	10			
						2	10	3
						2	10	3

RETURNS OUTWARDS BOOK.								
			£	s.	d.			
July 8.	F. Hall & Sons—							
	8 yds. shirting @ 10s. 8d. per doz.		0	7	2			
			0	7	2			

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Dr.		CAPITAL ACCOUNT.			Cr.				
July 8.	To Balance c/d .	£	s.	d.	July 3.	By Balance b/d .	£	s.	d.
		329	3	4	" 8.	" Net Profit .	323	0	0
							6	3	4
		<u>329</u>	<u>3</u>	<u>4</u>			<u>329</u>	<u>3</u>	<u>4</u>
					" 8.	By Balance b/d .	329	3	4

Dr.		GOODS ACCOUNT.			Cr.				
July 3.	To Balance .	£	s.	d.	July 8.	By Sales .	£	s.	d.
" 8.	" Purchases .	300	0	0	" "	" Returns .	2	10	3
" "	" Gross Profit .	26	7	6	" 5.	" Cash .	0	7	2
		14	8	6	" 6.	" " .	27	10	0
					" 8.	" " .	16	5	0
					" "	" Stock .	32	15	0
		<u>340</u>	<u>16</u>	<u>0</u>			<u>261</u>	<u>8</u>	<u>7</u>
							<u>340</u>	<u>16</u>	<u>0</u>

Dr.		FURNITURE.			Cr.				
July 3.	To Balance .	£	s.	d.					
		70	0	0					

Dr.		J. BEALE & CO.			Cr.				
July 6.	To Bank .	£	s.	d.	July 3.	By Goods .	£	s.	d.
" "	" Balance c/d .	30	0	0	" "	" " .	110	0	0
		82	2	6			2	2	6
		<u>112</u>	<u>2</u>	<u>6</u>			<u>112</u>	<u>2</u>	<u>6</u>
					" 4.	By Balance b/d .	82	2	6

Dr.		F. HALL & SONS.			Cr.				
July 8.	To Returns .	£	s.	d.	July 3.	By Goods .	£	s.	d.
" "	" Balance c/d .	0	7	2	" 4.	" " .	80	0	0
		83	17	10			24	5	0
		<u>84</u>	<u>5</u>	<u>0</u>			<u>84</u>	<u>5</u>	<u>0</u>
					" 8.	" Balance b/d .	83	17	10

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<i>Dr.</i>		T. FISHER.			<i>Cr.</i>			
				July 3.	By Goods . . .	£	s.	d.
						00	0	0

<i>Dr.</i>		HUGH JONES LTD.			<i>Cr.</i>				
July 6.	To Bank . . .	£	s.	d.	July 3.	To Goods . . .	£	s.	d.
" "	" Discount . . .	39	0	0			40	0	0
		1	0	0			40	0	0
		40	0	0					

<i>Dr.</i>		MISS H. HAYMAN.			<i>Cr.</i>			
July 6.	To Goods . . .	£	s.	d.				
		2	10	3				

<i>Dr.</i>		TRADE EXPENSES.			<i>Cr.</i>				
July 3.	To Cash . . .	£	s.	d.	July 8.	By P. and L. . .	£	s.	d.
" "	" " . . .	0	5	0			2	0	2
" 5.	" " . . .	0	6	8					
" 7.	" " . . .	0	15	0					
		0	13	6					
		2	0	2			2	0	2

<i>Dr.</i>		WAGES.			<i>Cr.</i>				
July 8.	To Cash . . .	£	s.	d.	July 8.	By P. and L. . .	£	s.	d.
		7	5	0			7	5	0

<i>Dr.</i>		DISCOUNT.			<i>Cr.</i>				
July 8.	To P. and L. . .	£	s.	d.	July 8.	By Cash Book . . .	£	s.	d.
		1	0	0			1	0	0

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TRIAL BALANCE.		Balances.					
		Dr.			Cr.		
		£	s.	d.	£	s.	d.
Capital						323	0 0
Goods		247	0	1			
Furniture		70	0	0			
J. Beale						82	2 6
F. Hall & Sons						83	17 10
T. Fisher						90	0 0
Miss H. Hayman		2	10	3			
Trade Expenses		2	0	2			
Wages		7	5	0			
Discount						1	0 0
Cash		3	14	10			
Bank		247	10	0			
		<u>580</u>	<u>0</u>	<u>4</u>		<u>580</u>	<u>0 4</u>

Dr.		PROFIT AND LOSS ACCOUNT.				Cr.			
July 8.	To	£	s.	d.	July 8.	By	£	s.	d.
	Trade Expenses	2	0	2		Gross Profit	14	8	6
	Wages	7	5	0		Discount	1	0	0
	Net Profit	6	3	4					
		<u>15</u>	<u>8</u>	<u>6</u>			<u>15</u>	<u>8</u>	<u>6</u>

Dr.		BALANCE SHEET.				Cr.			
Liabilities.				Assets.					
		£	s.	d.			£	s.	d.
J. Beale & Co.		82	2	6	Cash		3	14	10
T. Fisher		90	0	0	Bank		247	10	0
F. Hall & Sons		83	17	10	Miss H. Hayman		2	10	3
Capital		329	3	4	Stock		261	8	7
		<u>585</u>	<u>3</u>	<u>8</u>	Furniture		70	0	0
							<u>585</u>	<u>3</u>	<u>8</u>

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		JOURNAL.					
		Dr.			Cr.		
		£	s.	d.	£	s.	d.
Jan. 1.	Machinery and Fittings	120	0	0			
	A. Coats	72	0	0			
	S. Wilcox	24	0	0			
	B. Vickers	8	0	0			
	Stock	296	0	0			
	Cash	15	0	0			
	To F. Nelson				96	0	0
	" B. Harrod				48	0	0
	" T. Arnold				24	0	0
	" Bank Overdraft				6	0	0
	" H. Coulthard, Capital Account				301	0	0
		<u>585</u>	<u>0</u>	<u>0</u>	<u>535</u>	<u>0</u>	<u>0</u>

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PURCHASES BOOK.								
		£	s.	d.	£	s.	d.	
Jan. 1.	T. Arnold— ½ ton tubes @ £26 ton	13	0	0	13	0	0	
	F. Nelson— 2 tons tyres @ £41 10s.	83	0	0	83	0	0	
					<u>96</u>	<u>0</u>	<u>0</u>	

SALES BOOK.								
		£	s.	d.	£	s.	d.	
Jan. 2.	B. Vickers— 1 ton tyres @ 40s. cwt.	40	0	0	40	0	0	
" 3.	S. Wilcox— 2 tons tyres @ 42s. ton	84	0	0	84	0	0	
					<u>124</u>	<u>0</u>	<u>0</u>	

RETURNS INWARDS BOOK.								
		£	s.	d.	£	s.	d.	
Jan. 4.	B. Vickers— ½ cwt. rubber @ 40s. cwt.	1	0	0	1	0	0	
					<u>1</u>	<u>0</u>	<u>0</u>	

RETURNS OUTWARDS BOOK.								
		£	s.	d.	£	s.	d.	
Jan. 6.	F. Nelson— Bags	0	6	8	0	6	8	
					<u>0</u>	<u>6</u>	<u>8</u>	

Dr. H. COULTHARD: CAPITAL ACCOUNT. Cr.									
		£	s.	d.			£	s.	d.
Jan. 6.	To Drawings	5	0	0	Jan. 1.	By Balance	361	0	0
" "	" Balance c/d	480	2	2	" 6.	" Net Profit	124	2	2
		<u>485</u>	<u>2</u>	<u>2</u>			<u>485</u>	<u>2</u>	<u>2</u>
					" 6.	By Balance b/d	480	2	2

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<i>Dr.</i>		S. WILCOX.			<i>Cr.</i>				
Jan. 1.	To Balance . . .	£	s.	d.	Jan. 3.	By Cash . . .	£	s.	d.
		24	0	0			22	16	0
" 3.	" Goods . . .	84	0	0	" "	" Discount . . .	1	4	0
					" 6.	" Balance c/d . . .	84	0	0
		<u>108</u>	<u>0</u>	<u>0</u>			<u>108</u>	<u>0</u>	<u>0</u>
" 6.	To Balance b/d . . .	84	0	0					

<i>Dr.</i>		B. VICKERS.			<i>Cr.</i>				
Jan. 1.	To Balance . . .	£	s.	d.	Jan. 4.	By Returns . . .	£	s.	d.
		8	0	0			1	0	0
" 2.	" Goods . . .	40	0	0	" 6.	" Balance c/d . . .	47	0	0
							<u>48</u>	<u>0</u>	<u>0</u>
		<u>48</u>	<u>0</u>	<u>0</u>					
" 6.	To Balance b/d . . .	47	0	0					

<i>Dr.</i>		F. NELSON.			<i>Cr.</i>				
Jan. 4.	To Returns . . .	£	s.	d.	Jan. 1.	By Balance . . .	£	s.	d.
		0	6	8			96	0	0
" 6.	" Balance . . .	178	13	4	" "	" Goods . . .	83	0	0
							<u>179</u>	<u>0</u>	<u>0</u>
		<u>179</u>	<u>0</u>	<u>0</u>	" 6.	By Balance . . .	178	13	4

<i>Dr.</i>		B. HARROD.			<i>Cr.</i>				
Jan. 5.	To Bank . . .	£	s.	d.	Jan. 1.	By Balance . . .	£	s.	d.
		18	0	0			48	0	0
" "	" Balance c/d . . .	30	0	0			<u>48</u>	<u>0</u>	<u>0</u>
					" 6.	By Balance b/d . . .	30	0	0
		<u>48</u>	<u>0</u>	<u>0</u>					

<i>Dr.</i>		T. ARNOLD.			<i>Cr.</i>				
Jan. 3.	To Bank . . .	£	s.	d.	Jan. 1.	By Balance . . .	£	s.	d.
		21	12	0			24	0	0
" "	" Discount . . .	2	8	0	" "	" Goods . . .	13	0	0
" 6.	" Balance c/d . . .	13	0	0			<u>37</u>	<u>0</u>	<u>0</u>
		<u>37</u>	<u>0</u>	<u>0</u>	" 6.	By Balance b/d . . .	13	0	0

P. 443.—33.

Dr. H. COULTHARD: DRAWINGS ACCOUNT. Cr.									
		£	s.	d.			£	s.	d.
Jan. 4.	To Bank . . .	5	0	0	Jan. 6.	By Capital a/c . . .	5	0	0

TRIAL BALANCE.										
					Balances.					
					Dr.		Cr.			
					£	s.	d.	£	s.	d.
H. Coulthard, Capital Account								361	0	0
Goods					236	4	8			
Machinery					132	0	0			
Wages					10	16	4			
Trade Expenses					9	12	4			
Discount					0	16	0			
S. Wilcox					84	0	0			
B. Vickers					47	0	0			
F. Nelson								178	13	4
B. Harrod								30	0	0
T. Arnold								13	0	0
Drawings					5	0	0			
Cash					28	7	0			
Bank					28	17	0			
					582	13	4	582	13	4

Dr. PROFIT AND LOSS ACCOUNT. Cr.										
		£	s.	d.			£	s.	d.	
Jan. 6.	To Wages	10	16	4	Jan. 6.	By Gross Profit	145	6	10	
" "	" Trade Expenses	9	12	4						
" "	" Discount	0	16	0						
" "	" Net Profit	124	2	2						
					145	6	10	145	6	10

BALANCE SHEET.											
Liabilities.					Assets.						
					£	s.	d.	£	s.	d.	
F. Nelson					178	13	4	Cash	28	7	0
B. Harrod					30	0	0	Bank	28	17	0
T. Arnold					13	0	0	S. Wilcox	84	0	0
Capital					480	2	2	B. Vickers	47	0	0
								Machinery	132	0	0
								Stock	381	11	6
					701	15	6		701	15	6

EXAMPLES. LXXIV.

SECTION XX. A.

SIMPLE INTEREST

- P. 449.** — 1. 1s. 8d. 2. 6s. 2d. 3. 19s. 9d. 4. 9s. 5d.
 5. £2 19s. 2d. 6. £19 14s. 10d. 7. £68 10s. 11d.
 8. £112 13s. 11d. 9. £5 14s. 6d. 10. £3 5s. 6d.
 11. £5 17s. 2d. 12. £3 12s. 1d. 13. 8d. 14. 5s. 6d.
 15. 2s. 8d. 16. 17s. 2d. 17. 9s. 2d. 18. 3s. 10d.
 19. £2 15s. 2d. 20. £3 19s. 21. £9 18s. 4d.
 22. £32 17s. 11d.
- P. 450.**—24. (10) £143. (11) £581 13s. 2d. (12) £519 12s. 1d.
 (20) £523 19s. (21) £640 13s. 4d. (22) £1283 14s. 7d.
 25. £82 13s. 9d. 26. £360. 27. £5 7s. 7½d. ; £2 15s. 1½d
 28. 95 days. 29. 2 years. 30. 135 days.
 31. 228 days. 32. 270 days. 33. 100 days.
 34. 5%. 35. 8%. 36. 7.5%. 37. 10.4%.
 38. 4%. 39. 5%. 40. £3598.
 41.
- | Days. | Interest. |
|-------|-------------|
| 1 | = 0.0109589 |
| 2 | = 0.0219178 |
| 3 | = 0.0328767 |
| 4 | = 0.0438356 |
| 5 | = 0.0547945 |
| 6 | = 0.0657534 |
| 7 | = 0.0767123 |
| 8 | = 0.0876712 |
| 9 | = 0.0986301 |
42. (90 days) £1 5s.
- P. 451.**—43. £23 4s. 3d. 44. £942376 (correct to £1).
 45. £6 2s. 6d. ; £7 ; £22 10s. Total, £35 12s. 6d.
 46. £2 4s. 6d. ; £62 10s. 47. £16 11s. 6d. 48. £12 16s. 7d.
 49. 560.96 dollars. 50. 2s. 6d. 51. 1s. 6d.
 52. £48 18s. 53. 13s. 5½d.
- P. 452.**—54. 5s. 10d. 55. Yen 83.5. 56. 11,763,256 (to nearest franc).
 57. £61074 8s.
 58. 143185 pesetas (correct to 1 peseta) ; £5675 10s. (very nearly).
 59. 106439 (nearly). 60. £25 0s. 5d. 61. 1584 francs.
 62. 3805 dollars (correct to 1 dollar). 63. 10812.5 pesetas.
- P. 453.**—64. £412 10s. 65. £64 7s. 6d.
 66. Interest is . 1013.698 dollars
 1536.985 ,,
 1073.992 ,, 67. £1027 10s.
 1676.712 ,, 68. £888.
 679.452 ,, 69. 2½%.
- Total interest, 5980.889 ,,

EXAMPLES. LXXV.

SECTION XX. B.

COMPOUND INTEREST

- P. 456.** -- 1. £9 2s. 8d. 2. £10 14s. 3d. 3. £19 11s. 8d. 4. £43 14s. 1d.
 5. £45 6s. 9d. 6. £23 5s. 9d. 7. £94 2s. 8d. 8. £4 2s. 8d.
 9. £21 6s. 11d. 10. £53 15s. 8d.
- P. 457.** -- 11. £18 9s. 2d. 12. £31 10s. 4d. 13. 4168·98 francs.
 14. £49 2s. 6d. ; £1 2s. 5d. 15. 7458·76 dollars. 16. 4168·98 lire.
 17. £30 19s. 9d. and 18s. 3d. 18. £9 12s. 8d. 19. £295 18s. 1d.
 20. £450 13 5 (1st) 21. £60 2s.
 446 5 5 (2nd) 22. £2073 12s.
 8 0 23. £978.
 8 0 24. 228·52 dollars.

EXAMPLES. LXXVI.

SECTION XXI. A.

CASH DISCOUNT

- P. 459.** -- 1. §§ 329-331. 2. £8 6s. 9d. 3. £11 19s. 5d.
 4. £3 5s. 1d. 5. £1 1s. 6. 18s. 0½d.
 7. £21 15s. 9d. 8. £82 12s. 10d. 9. £84.
 10. £11 16s. 1d. 11. £32 13s. 12. £64 8s. 3d. 13. 9s. 11d.
- P. 460.** -- 14. 16s. 0½d. 15. £1 13s. 4d. 16. £3 16s. 8d.
 17. £8 15s. 6d. 18. £12 14s. 8d. 19. £3 12s. 4d.
 20. £1 4s. 21. 19s. 6d. 22. £25 12s. 8d.
 23. £100 15s. 8d. 24. 100 guineas. 25. £48 19s. 6d.
 26. 16s. 4d. 27. £10 4s. 9d. 28. (a) 21s. 9d. ; (b) 21s. 3d.
 29. £1 6s. 8d. 30. 16s. 2d. 31. £31 5s. 32. 16⅔ %
 33. (1) 10s. (2) £4 12s. (3) £4 3s. (4) £2.
 34.

Week ending September 30, 19.....

	£	s.	d.
Amount brought forward			
Milk		6	4
Nursery milk		6	9
Cream		4	6
Fresh butter		12	8
Dorset butter		6	0
New-laid eggs		6	9
Cooking eggs		7	0
Total	2	10	0
Discount, 2½ %		1	3
	2	8	9

P. 461.—35.

January 12, 19—.

Messrs. BROWN, *Oil Merchants (Vendors),*

To THOS. OWEN & Co.

		£	s.	d.	£	s.	d.
8 5-gallon drums lamp oil	4s. 6d. per drum .	1	16	0			
3 40-gallon casks lamp oil	37s. 1d. per cask .	5	11	3			
3 10-gallon casks linseed oil	3s. 6d. per gallon	5	5	0			
2 8-gallon drums linseed (boiled) oil	3s. 6d. "	2	16	0			
3 gallons machine oil	1s. 10d. "	0	5	6			
8½ gallons gas-engine oil	2s. 6d. "	1	1	3			
12 2-gallon tins motor spirit	3s. each "	1	16	0			
5 gallons Bosphorus air-cooled motor oil	3s. 6d. per gallon	0	17	6			
12 gallons Colza (French) oil	3s. 3d. "	1	19	0			
6 14-lb. tins deep chrome paint	3½d. per lb.	1	4	6			
		22	12	0			
Cash discount, 7½%		1	13	11			
					20	18	1
Casks		0	6	0			
Drums		3	15	0			
Tins		0	9	0			
Jars, etc.		0	5	6			
Carriage		2	4	1			
					6	19	7
					27	17	8

36. The amounts are, in order—

- (1) 18s. 9d. (2) 11s. 8d. (3) 6s. 6d. (4) 11s. 5½d.
 (5) 7s. 7d. (6) 5s. 8d. (7) 17s. 6d. (8) 10s. 10d.
 (9) 11s. 5½d. (10) 11s. 3d. (11) 5s. 7½d.

	£	s.	d.	£	s.	d.
Total	5	18	3½			
Cash discount, 5%	0	5	11			
				5	12	4½
8 packages at 6d.	0	4	0			
Rail charges	0	12	6			
				0	16	6
				6	8	10½

P. 462.—37. 2½%.

EXAMPLES. LXXVII.

SECTION XXI. B.

TRADE DISCOUNT

- P. 464. — 1. See §§ 333 and 334. Yes. No, to wholesale.
 2. £4. 3. £6 3s. 4. £7 18s. 2d. 5. £5 5s.
 6. £14 1s. 9d. 7. £17 3s. 2d. 8. £63 9s. 6d. 9. £252 18s. 7½d.
 10. £38 6s. 4d. 11. £89 16s. 12. £8 15s. 13. £5.
 14. £10 10s. 15. £18 15s. 8d. 16. £459 17s. 6d.

- P. 464.**—17. £280 12s. 6d. 18. £7 10s. 19. £158 13s. 9d.
 20. £100 16s. 8d. 21. £25 14s. 9d.
- P. 465.**—22. 25 % 23. 55 % 24. 25 % 25. 33½ %
 26. 12½ % 27. 62 % 28. 25 % 29. 40 %
 30. 68 % 31. 45 % 32. £14 3s. 6d. 33. £1 10s. 8d.
 34. 1s. 8d. 35. 13s. 10½d. 36. 33½ % 37. £2 7s. 4½d.
 38. 10s. 6d. 39. 11½d. (nearly). 40. 70 %
 41. £1 11s. 3d. 42. 2s. 6d. 43. 5 % 44. £8 3s. 4d.
- P. 466.**—45.

Discount, 12½ % .

Subject to Discount.			Net.		
£	s.	d.	£	s.	d.
12	0	0	21	0	0
			23	2	6
26	18	6			
6	6	0			
45	4	6	44	2	6
5	13	1	39	11	5
			83	13	11

46.

Messrs. P. GREEN & SONS LTD. (*Vendors*),

To THOMAS JAMES.

Date, etc.

Amounts are, in order—

Discount, 20 % .

Subject to Discount.			Net.		
£	s.	d.	£	s.	d.
8	0	6			
20	11	9	3	3	0
6	3	0	3	12	0
6	6	0			
41	1	3	6	15	0
8	4	3	32	17	0
			39	12	0

Received with thanks

15/12/16

T. J. ROBSON

per pro P. GREEN & SONS.

P. 466.—47. (1) Question 35, p. 461. The total amount (less casks, drums, etc., and carriage, upon which no discount is allowed) is . . .

	£	s.	d.	£	s.	d.
Trade discount, 25 % . . .	22	12	0			
	5	13	0			
Cash discount, 5 % . . .	16	19	0			
	0	17	0			
Casks, drums, carriage, etc. . .	6	19	7	16	2	0
				6	19	7
				23	1	7

(2) Question 36, p. 461. The total amount (less packages and rail charges) is . . .

	£	s.	d.	£	s.	d.
Trade discount, 30 % . . .	5	18	3½			
	1	15	6			
Cash discount, 2½ % . . .	4	2	9½			
	0	2	1			
Packages, rail, etc. . . .	0	16	6	4	0	8½
				0	16	6
				4	17	2½

For receipts, see page 220.

48. 17 $\frac{1}{4}$ %.

P. 467.—49. 58½ %.

EXAMPLES. LXXVIII.

SECTION XXI. C.

BANKER'S AND TRUE DISCOUNT

P. 474. — 1. See §§ 338–344.

2. See Plates XIII. and XIV. T. Nunn replaces Sir John Falstaff, and J. Brook Messrs. Quickly.

3. See §§ 345 and 347, and Example 5, p. 473.

4. See § 342.

5. See Plate XIV. The amount due is £50 12s. 6d.

P. 475. — 6. He should certainly reckon true discount, for the difference between that and banker's discount is small only so long as the sum of money, the time the bill has to run, and the rate of interest are small.

7. £349 11s. 7d.

8. £488 6s. 9d.

9. £545 13s.

10. £861 1s. 10d.

11. £477 14s. 9d.

12. £574 13s. 8d.

13. £362 2s. 7d.

14. £728 11s. 9d.

15. £250 0s. 3d.

16. £988 15s. 7d.

17. £378 5s. 6d.

18. £743 9s. 7d.

19. 50996·75 francs.

20. 21782·4 dollars.

21. 10893 dollars.

22. 29134 drachmæ.

23. 14484·8 marks.

24. 79100 roubles.

25. 58112 gulden.

26. £249 0s. 10d.

27. £557 0s. 11d

28. 3986·95 francs.

- P. 476.**—29. 11873·4 roubles. 30. 7909·55 lire. 31. £345 19s. 9d.
 32. 49904·45 francs. 33. No; less profitable by about £5 7s.
 34. £5214 5s. 9d. 35. £16197 11s. 4d. 36. 4%.
 37. 5·82% p.a. 38. £93 15s. 2d. per £100 invested.
 39. £92 8s. 7d. 40. £39 18s. 6d.
 41. (1) £1 1s. 3d. (2) 2·25%.
- P. 477.**—42. 2·128%. 43. £730. 44. £1 17s. 8d.
 45. 7 months 12 days. 46. £861 1s. 10d. 47. 7s. 1d.
 48. £563 3s. 49. 4·03% p.a. (nearly). 50. £6565.
 51. £9500 commercial discount; £9523 16s. true discount.
 52. Pay at once. 53. 2·25%.
- P. 478.**—54. 300 days. 55. £483 8s. 9d. 56. £1000.
 57. 2·516% (i.e. 2½%). 58. About 24½ years. 59. £4310.
 60. 2·5095% (i.e. 2½%). 61. £3000.

EXAMPLES. LXXIX. (a)

SECTION XXII. A.

STOCKS

- P. 486.**—1. § 353. 2. §§ 355 and 356.
 3. (a) § 365. (b) Page 480, note 2. (c) § 355. (d) and (e) § 356.
 (f) (g) and (h) § 358.
 4. § 359 and foot-note. 5. § 366.
- P. 487.**—6. £150. 7. £335. 8. £580. 9. £1200.
 10. £609 18s. 11. £243 15s. 12. £351 12s. 13. £605 4s.
 14. £598 5s. 3d. 15. £3544 14s. 2d. 16. £700. 17. £1266 13s. 4d.
 18. £1297 14s. 2d. 19. £1600. 20. £1650.
 21. £3600. 22. £5400. 23. £3600. 24. £1600.
 25. £4800. 26. £456. 27. £912 10s.
 28. £885 16s. 29. £2576. 30. £3125.
 31. No; £25 too much. 32. £455. 33. £1200.
 34. £8000. 35. £35600. 36. £3600. 37. £1200.
 38. £3200. 39. 4·76%.
- P. 488.**—40. 6·48%.
 41. (1) £2 15s. 8d. (2) £2 16s. 6d. (3) £2 19s. 5d. (4) £2 18s. 1d.
 (5) £2 19s. 7d. (6) £3 3s. 1d. (7) £2 19s. 5d. (8) £2 9s. 9d.
 (9) £2 18s. 3d. (10) £2 9s. (11) £2 11s. 6d. (12) £2 15s. 3d.
42. At a premium, Bengal Railway, Canadian Pacific Railway, San Paulo Railway; the others are at a discount.
43. £60. 44. £6·25%. 45. Japanese 5% @ 91. 46. 9·17%.
 47. 27½. 48. £250. 49. £70. 50. £60.
 51. £40 19s. 52. £128. 53. £2 10s.
 54. £216. 55. £60 10s. 56. £8 10s.
 57. £52 10s. 58. £120. 59. £205 2s.
 60. £166 1s. 11d. 61. £213 3s. 62. £39 0s. 7d.

- P. 494.** — 8. £45000. 9. 40000. 10. £31250. 11. £14900.
 12. £42500. 13. § 858. 14. £20100. 15. 2200.
 16. 4000. 17. £34005. 18. £828000 ; 82800 shares.
 19. £462000 to be paid. 20. £1710. 21. £162 10s.
 22. £138. 23. £1357 10s. 24. 5s.
- P. 495.** — 25. £1612 10s. 26. 1743 shares ; 2s. 7½d. over.
 27. £21 17s. 6d. 28. £1100. 29. 15.
 30. £2 10s. profit. 31. £490. 32. 600. 33. 25 shares.
 34. 1560. 35. 25 shares ; 2s. 6d. over. 36. 12s. 6d.
 37. £500. 38. £550. 39. £1800.
 40. £2 17s. 6d. is the price, so that they stand at a premium of 287·5 %.
 41. 3s. 10d. or 19½ % . 42. £143 15s. 43. £70.
 44. £30 9s. 45. £57. 46. £166 13s. 4d.
- P. 496.** — 47.

	Jobber's Turn.	Broker's Price to Client.	
		For Selling.	For Buying.
(1)	$\frac{1}{8}$	12½	12½
(2)	$\frac{1}{8}$	36½	36½
(3)	$\frac{1}{4}$	4½	4½
(4)	6d.	25s.	26s.
(5)	3d.	8s. 9d.	9s. 6d.
(6)	$\frac{1}{4}$	44½	44½
(7)	$\frac{1}{8}$	18½	18½
(8)	1d.	1s. 2d.	1s. 5d.

48. £36187 10s. 49. £21406 5s. 50. £2660.
 51. £8206 5s. 52. £11629 15s. 6d.
 53. £562 10s., £56 5s. ; §§ 166 and 167, Plate VI., p. 220.
 54. £12 left ; income, £151 2s. 3d.
 55. £37 10s., jobber ; £75, broker.

REVISION QUESTIONS. III.

A. (1)

SECTION XVII. A. (1)

- P. 497.** — 1. 5s. 6d. 2. £5 17s. 6d. 3. 9375 sq. yds.
 4. £17 12s. 5. £5184.
 6. Increasing ; 2·136 per thousand in 1911 to 2·161 in 1912.
 7. £5000, £3500, £1500. 8. 40 hours. 9. £656 13s. 4d.

A. (2)

- P. 498.** — 1. 3,139,650 galls. (correct to 10 galls.).
 2. 110000 dollars ; less by 19000 dollars ; market improving.

- P. 504.** — 4. £71 7s. duty; 2·925 %. 5. 1s. 1d. 6. 3s. 8½d.
 7. 28 %. 8. 14 %. 9. 0·0045 % per degree.
 10. 1·96 %. “A steamer of 3000 tons will convey merchandise from Bilbao (Spain) to Middlesbrough or to West Hartlepool at the rate of 12s. 9d. a ton, and to the Tyne for 12s. 6d. per ton in May (1915).”

C.

SECTION XIX.

P. 504. — 1.

<i>Dr.</i>		CASH BOOK.						<i>Cr.</i>					
		Dis-count.			Cash.			Dis-count.			Cash.		
Feb.		£	s.	d.	£	s.	d.	Feb.		£	s.	d.	
1	To Capital a/c				120	0	0	5	By Goods		22	3	4
10	„ Goods				80	0	0	8	„ R. Russell		20	0	0
25	„ F. Shepherd	1	2	6	20	0	0	28	„ Trade Expenses		4	10	6
									„ Balance c/d		123	6	2
					<u>1</u>	<u>2</u>	<u>6</u>				<u>170</u>	<u>0</u>	<u>0</u>
Feb. 28	To Balance b/d				123	6	2						

PURCHASES BOOK.

Feb. 3.	R. Russell	£	s.	d.	£	s.	d.
„ 15.	C. Oliver	75	6	8	10	12	5
					<u>85</u>	<u>19</u>	<u>1</u>

SALES BOOK.

Feb. 6.	F. Shepherd	£	s.	d.	£	s.	d.
„ 19.	G. Markham	21	2	6	5	16	10
					<u>26</u>	<u>19</u>	<u>4</u>

For complete solution to this question, see Examples LXXIII. (c), No. 21.

P. 505. — 2. (a) § 278. (b) See Examples LXXIII. (c), No. 19.

3.

<i>Dr.</i>		CASH BOOK.						<i>Cr.</i>		
		£			s.			d.		
Nov. 1.	To F. Mathews, Capital	60	0	0	Nov. 3.	By Purchases	25	0	0	
„ 4.	„ Cash Sales	20	0	0	„ 10.	„ Gas, Rent, etc.	5	0	0	
„ 6.	„ Burgess & Co.	40	0	0	„	„ Balance c/d	90	0	0	
					<u>120</u>	<u>0</u>	<u>0</u>			
„ 10.	To Balance b/d	90	0	0						

P. 505.—3

JOURNAL.									
		£	s.	d.	£	s.	d.		
Nov. 2.	Goods, <i>Dr.</i> To Smith & Co., <i>Cr.</i>	50	0	0	50	0	0		
" 5.	Burgess & Co., <i>Dr.</i> To Goods, <i>Cr.</i>	50	0	0	50	0	0		
		100	0	0	100	0	0		

	<i>Dr.</i> F. MATHEWS: CAPITAL ACCOUNT.						<i>Cr.</i>		
		£	s.	d.		£	s.	d.	
					Nov. 1.	By Cash	60	0	0

	<i>Dr.</i> GOODS ACCOUNT.							<i>Cr.</i>	
		£	s.	d.		£	s.	d.	
Nov. 2.	To Smith & Co.	50	0	0	Nov. 4.	By Cash	20	0	0
" 3.	" Cash	25	0	0	" 5.	" Burgess & Co.	50	0	0

	<i>Dr.</i> GAS, RENT, ETC., ACCOUNT.							<i>Cr.</i>
		£	s.	d.		£	s.	d.
Nov. 10.	To Cash	5	0	0				

	<i>Dr.</i> SMITH & CO.							<i>Cr.</i>	
		£	s.	d.		£	s.	d.	
					Nov. 2.	By Goods	50	0	0

	<i>Dr.</i> BURGESS & CO.							<i>Cr.</i>	
		£	s.	d.		£	s.	d.	
Nov. 5.	To Goods	50	0	0	Nov. 6.	By Cash	40	0	0

TRIAL BALANCE.										
Balances.										
					<i>Dr.</i>					
					£	s.	d.	£	s.	d.
Capital Account								60	0	0
Goods Account					5	0	0			
Gas, Rent, etc., Account					5	0	0			
Smith & Co.								50	0	0
Burgess & Co.					10	0	0			
Cash					90	0	0			
					110	0	0	110	0	0

P. 505.—5.

JOURNAL.								
		£	s.	d.	£	s.	d.	
Purchases, <i>Dr.</i>	.	30000	0	0				
To Creditors, <i>Cr.</i>	.				30000	0	0	
Debtors, <i>Dr.</i>	.	45000	0	0				
To Sales, <i>Cr.</i>	.				45000	0	0	
		<u>75000</u>	<u>0</u>	<u>0</u>	<u>75000</u>	<u>0</u>	<u>0</u>	

<i>Dr.</i> W. CARRICK: CAPITAL ACCOUNT. <i>Cr.</i>									
		£	s.	d.			£	s.	d.
Dec. 31	To Balance c/d .	19000	0	0	Jan. 1	By Cash . .	10000	0	0
					Dec. 31	„ Profit . .	9000	0	0
		<u>19000</u>	<u>0</u>	<u>0</u>			<u>19000</u>	<u>0</u>	<u>0</u>
					Jan. 1	By Balance b/d .	19000	0	0

<i>Dr.</i> PURCHASES ACCOUNT. <i>Cr.</i>									
		£	s.	d.			£	s.	d.
Dec. 31	To Creditors .	30000	0	0	Dec. 31	By P. and L. .	30000	0	0

<i>Dr.</i> SALES ACCOUNT. <i>Cr.</i>									
		£	s.	d.			£	s.	d.
Dec. 31	To P. and L. .	45000	0	0	Dec. 31	By Debtors .	45000	0	0

<i>Dr.</i> CREDITORS ACCOUNT. <i>Cr.</i>									
		£	s.	d.			£	s.	d.
Dec. 31	To Cash . .	16000	0	0	Dec. 31	By Purchases .	30000	0	0
„	„ Discount .	1500	0	0					
„	„ Balance c/d .	12500	0	0			<u>30000</u>	<u>0</u>	<u>0</u>
		<u>30000</u>	<u>0</u>	<u>0</u>	Jan. 1	By Balance b/d .	12500	0	0

<i>Dr.</i> DEBTORS ACCOUNT. <i>Cr.</i>									
		£	s.	d.			£	s.	d.
Dec. 31	To Sales . .	45000	0	0	Dec. 31	By Cash . .	33000	0	0
					„	„ Discount .	2000	0	0
					„	„ Balance c/d .	10000	0	0
		<u>45000</u>	<u>0</u>	<u>0</u>			<u>45000</u>	<u>0</u>	<u>0</u>
Jan. 31	To Balance b/d .	10000	0	0					

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<i>Dr.</i>		DISCOUNT ACCOUNT.						<i>Cr.</i>				
Dec. 31	To Cash Book . . .	£	s.	d.	Dec. 31	By Cash Book . . .	£	s.	d.			
		2000	0	0		By P. and L. . .	1500	0	0			
							500	0	0			
		<u>2000</u>	<u>0</u>	<u>0</u>			<u>2000</u>	<u>0</u>	<u>0</u>			

<i>Dr.</i>		PREMISES, PLANT, AND MACHINERY.						<i>Cr.</i>				
Dec. 31	To Cash . . .	£	s.	d.								
		5000	0	0								
		<u>5000</u>	<u>0</u>	<u>0</u>								

<i>Dr.</i>		TRADE EXPENSES.						<i>Cr.</i>				
Dec. 31	To Cash . . .	£	s.	d.	Dec. 31	By P. and L. . .	£	s.	d.			
		2500	0	0			2500	0	0			
		<u>2500</u>	<u>0</u>	<u>0</u>			<u>2500</u>	<u>0</u>	<u>0</u>			

<i>Dr.</i>		SALARIES AND WAGES.						<i>Cr.</i>				
Dec. 31	To Cash . . .	£	s.	d.	Dec. 31	By P. and L. . .	£	s.	d.			
		3000	0	0			3000	0	0			
		<u>3000</u>	<u>0</u>	<u>0</u>			<u>3000</u>	<u>0</u>	<u>0</u>			

TRIAL BALANCE.											
						Balances.					
						<i>Dr.</i>			<i>Cr.</i>		
						£	s.	d.	£	s.	d.
Capital Account									10000	0	0
Purchases Account						30000	0	0			
Sales Account									45000	0	0
Creditors Account									12500	0	0
Debtors Account						10000	0	0			
Discount Account						500	0	0			
Premises, Plant, and Machinery						5000	0	0			
Trade Expenses						2500	0	0			
Salaries and Wages						3000	0	0			
Cash						18500	0	0			
						<u>67500</u>	<u>0</u>	<u>0</u>	<u>67500</u>	<u>0</u>	<u>0</u>

<i>Dr.</i>		PROFIT AND LOSS ACCOUNT.						<i>Cr.</i>				
Dec. 31	To Purchases . . .	£	s.	d.	Dec. 31	By Sales . . .	£	s.	d.			
	Trade Expenses . . .	30000	0	0			45000	0	0			
	Wages . . .	2500	0	0								
	Discount . . .	3000	0	0								
	Profit . . .	500	0	0								
		9000	0	0								
		<u>45000</u>	<u>0</u>	<u>0</u>			<u>45000</u>	<u>0</u>	<u>0</u>			

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BALANCE SHEET.

Liabilities.				Assets.			
		£	s. d.			£	s. d.
Creditors	.	12500	0 0	Cash	.	16500	0 0
Capital	.	19000	0 0	Debtors	.	10000	0 0
				Premises, Plant, etc.	.	5000	0 0
		<u>31500</u>	<u>0 0</u>			<u>31500</u>	<u>0 0</u>

6.

Dr.		CASH BOOK.						Cr.			
		Dis-count.		Bank.				Dis-count.		Bank.	
		£	s. d.	£	s. d.			£	s. d.	£	s. d.
Jan.	To M. Flockhart	40	0 0	500	0 0	Jan.	By Drawings .	20	0 0	50	0 0
							„ W. Murray			100	0 0
							„ Office			60	0 0
							„ Salaries				
							„ Balance c/d			290	0 0
		<u>40</u>	<u>0 0</u>	<u>500</u>	<u>0 0</u>			<u>20</u>	<u>0 0</u>	<u>500</u>	<u>0 0</u>
Feb.	To Balance b/d			290	0 0						
1											

PURCHASES BOOK.											
Jan. 31.	W. Murray	.	.	.	.	.	.	.	£	s.	d.
„ „	A. Troup	.	.	.	.	.	.	.	400	0	0
									300	0	0
									<u>700</u>	<u>0</u>	<u>0</u>

SALES BOOK.											
Jan. 31.	M. Flockhart	.	.	.	.	.	.	.	£	s.	d.
„ „	E. Barr	.	.	.	.	.	.	.	840	0	0
									320	0	0
									<u>1160</u>	<u>0</u>	<u>0</u>

JOURNAL.											
Jan. 31.	Bills Receivable, Dr.	£	s.	d.
	To M. Flockhart, Cr.	800	0	0
„ „	W. Murray, Dr.	280	0	0
	To Bills Payable, Cr.	280	0	0

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<i>Dr.</i>		DRAWINGS ACCOUNT.			<i>Cr.</i>		
Jan.	To Bank	£	s.	d.			
		50	0	0			

<i>Dr.</i>		W. MURRAY.			<i>Cr.</i>				
Jan.	To Bank	£	s.	d.	Jan.	By Goods	£	s.	d.
	„ Discount	100	0	0			400	0	0
	„ Bills Payable	20	0	0					
		280	0	0					
		400	0	0			400	0	0

<i>Dr.</i>		A. TROUP.			<i>Cr.</i>				
					Jan.	By Goods	£	s.	d.
							300	0	0

<i>Dr.</i>		GOODS ACCOUNT.			<i>Cr.</i>				
Jan.	To Purchases	£	s.	d.	Jan.	By Sales	£	s.	d.
		700	0	0			1160	0	0

<i>Dr.</i>		M. FLOCKHART.			<i>Cr.</i>				
Jan.	To Goods	£	s.	d.	Jan.	By Bank	£	s.	d.
		840	0	0		„ Discount	500	0	0
						„ Bills Receivable	40	0	0
							300	0	0
		840	0	0			840	0	0

<i>Dr.</i>		E. BARR.			<i>Cr.</i>		
Jan.	To Goods	£	s.	d.			
		320	0	0			

<i>Dr.</i>		BILLS RECEIVABLE.			<i>Cr.</i>		
Jan.	To M. Flockhart.	£	s.	d.			
		300	0	0			

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<i>Dr.</i>		BILLS PAYABLE.				<i>Cr.</i>			
					Jan.	By W. Murray	£	s.	d.
							280	0	0

<i>Dr.</i>		DISCOUNT ACCOUNT.				<i>Cr.</i>			
Jan.	To Cash Book	£	s.	d.	Jan.	By Cash Book	£	s.	d.
		40	0	0			20	0	0

<i>Dr.</i>		OFFICE SALARIES.				<i>Cr.</i>			
Jan.	To Bank	£	s.	d.					
		60	0	0					

TRIAL BALANCE.											
						Balances.					
						<i>Dr.</i>		<i>Cr.</i>			
						£	s.	d.	£	s.	d.
Drawings Account	.	.	.	.	.	50	0	0			
A. Troup	.	.	.	.	.				300	0	0
Goods Account	.	.	.	.	.				460	0	0
E. Barr	.	.	.	.	.	320	0	0			
Bills Receivable	.	.	.	.	.	300	0	0			
Bills Payable				280	0	0
Discount Account	20	0	0			
Office Salaries	60	0	0			
Bank	290	0	0			
						1040	0	0	1040	0	0

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<i>Dr.</i>		D. CHADWICK.				<i>Cr.</i>			
Jan. 1.	To Goods	£	s.	d.	Jan. 1.	By Goods	£	s.	d.
„ 30.	„ Cash	150	0	0	„ 31.	„ Cash	60	0	0
		60	0	0			150	0	0
		210	0	0			210	0	0

The Cash Book and Purchases and Sales Book entries are similar to those of the previous exercises ; see §§ 171-181.

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Dr.		BILLS RECEIVABLE.			Cr.		
					£	s.	d.
				Jan. 31.	By Cash	2500	0
						0	0

Dr.		SALES ACCOUNT.			Cr.		
					£	s.	d.
				Jan. 31.	By Cash	650	0
						0	0

Dr.		DISCOUNT ACCOUNT.			Cr.				
Jan. 31.	To Cash Book	£	s.	d.	Jan. 31.	By Cash Book	£	s.	d.
		400	0	0			800	0	0

Dr.		BILLS PAYABLE.			Cr.		
Jan. 31.	To Cash	£	s.	d.			
		4000	0	0			

Dr.		OFFICE EXPENSES.			Cr.		
Jan. 31.	To Cash	£	s.	d.			
		500	0	0			

9.

Item.	Side of	
	Balance Sheet.	Profit and Loss Account.
(1) Profits		Credit balance.
(2) Liabilities	Left hand side	Dr.
(3) Losses	Right " "	
(4) Assets	Left " "	Dr.
(5) Capital	" " "	
(6) Expenses Account	" " "	
(7) Sinking fund for a lease	Right " "	
(8) Debenture Issue	Left " "	
(9) Stock at end of period		
(10) Bills payable		

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Dr.

CASH BOOK.

Cr.

	Discount.		Cash.		Bank.		Discount.		Cash.		Bank.		
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	
Feb. 1. To Balance			24	3 6	312	8 9			100	0 0	207	11 0	
" 2. " Cash Sale			81	6 0							5	5 0	
" " " Cash					100	0 0					20	0 0	
" 6. " Bank			20	0 0				10	18 6				
" 9. " Bill Receivable					86	10 0							
" 18. " G. Thorp		15 11 6			295	18 6					70	8 6	
										25 9 6	18	10 0	
March 1. To Balance b/d	15	11 6	125	9 6	794	17 3	10	18 6	25	9 6	469	14 3	
			25	9 6	469	14 3				125	9 6	794	17 3

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JOURNAL—OPENING ENTRIES.									
		Dr.			Cr.				
		£	s.	d.	£	s.	d.		
Feb. 1.	Cash in Hand	24	3	6					
	Cash at Bank	312	8	9					
	Bill Receivable	86	10	0					
	G. Thorp.	21	6	8					
	W. Stott	59	5	0					
	Furniture	62	15	0					
	Goods	522	7	0					
	To J. Firth				218	9	6		
	" J. Holroyd				371	3	4		
	" B. Salt, Capital Account				499	3	7		
		<u>1088</u>	<u>16</u>	<u>5</u>	<u>1088</u>	<u>16</u>	<u>5</u>		
Feb. 1.	Bills Receivable, <i>Dr.</i>	£	s.	d.	£	s.	d.		
	To W. Stott, <i>Cr.</i>	59	5	6	59	5	6		
" 15.	J. Holroyd, <i>Dr.</i>	371	3	4					
	To Bills Payable, <i>Cr.</i>				371	3	4		
" 28.	Depreciation Account, <i>Dr.</i>	1	5	0					
	To Office Furniture, <i>Cr.</i>				1	5	0		

JOURNAL—CLOSING ENTRIES.									
		£	s.	d.	£	s.	d.		
Feb. 28.	Profit and Loss, <i>Dr.</i>	6	8	6					
	To Rates, <i>Cr.</i>				6	8	6		
	Goods Account, <i>Dr.</i>	50	10	0					
	To Profit and Loss, <i>Cr.</i>				50	10	0		
	Profit and Loss, <i>Dr.</i>	1	5	0					
	To Depreciation, <i>Cr.</i>				1	5	0		
	Profit and Loss, <i>Dr.</i>	4	13	0					
	To Discount, <i>Cr.</i>				4	13	0		
	Profit and Loss, <i>Dr.</i>	3	8	6					
	To Carriage, <i>Cr.</i>				3	8	6		
	Profit and Loss, <i>Dr.</i>	34	15	0					
	To Capital, <i>Cr.</i>				34	15	0		
		<u>101</u>	<u>0</u>	<u>0</u>	<u>101</u>	<u>0</u>	<u>0</u>		

SALES BOOK.									
		£	s.	d.					
Feb. 14.	G. Sharp—Goods	290	3	4					
" 25.	W. Stott "	62	12	8					
		<u>352</u>	<u>16</u>	<u>0</u>					

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		£	s.	d.
Feb. 12.	J. Holroyd—Goods	110	9	8
		<u>110</u>	<u>9</u>	<u>8</u>

		£	s.	d.
Feb. 28.	W. Stott—Goods	20	6	8
		<u>20</u>	<u>6</u>	<u>8</u>

<i>Dr.</i>		B. SALT : CAPITAL ACCOUNT.			<i>Cr.</i>				
Feb. 28.	To Drawings	£	s.	d.	Feb. 1.	By Balance	£	s.	d.
" "	" Balance c/d	18	10	0	" 28.	" Net Profit from P. and L. a/c	499	3	7
		515	8	7			34	15	0
		<u>533</u>	<u>18</u>	<u>7</u>			<u>533</u>	<u>18</u>	<u>7</u>
					Mar. 1.	By Balance b/d	515	8	7

<i>Dr.</i>		B. SALT : DRAWINGS ACCOUNT.			<i>Cr.</i>				
Feb. 28.	To Bank	£	s.	d.	Feb. 28.	By Capital a/c	£	s.	d.
		18	10	0			18	10	0

<i>Dr.</i>		GOODS ACCOUNT.			<i>Cr.</i>				
Feb. 1.	To Stock	£	s.	d.	Feb. 2.	By Cash	£	s.	d.
" 25.	" Cash	70	8	6	" 28.	" Sales Book	352	18	0
" 28.	" Purchases Book	110	9	8	" "	" Stock	339	19	10
" "	" Returns	20	6	8					
" "	" Gross Profit	50	10	0					
		<u>774</u>	<u>1</u>	<u>10</u>			<u>774</u>	<u>1</u>	<u>10</u>
Mar. 1.	To Stock	339	19	10					

<i>Dr.</i>		BILLS RECEIVABLE.			<i>Cr.</i>				
Feb. 1.	To Balance	£	s.	d.	Feb. 9.	By Bank	£	s.	d.
" "	" W. Stott	86	10	0	" 28.	" Balance c/d	86	10	0
		59	5	6			59	5	6
		<u>145</u>	<u>15</u>	<u>6</u>			<u>145</u>	<u>15</u>	<u>6</u>
Mar. 1.	To Balance b/d	59	5	6					

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<i>Dr.</i>		BILLS PAYABLE.			<i>Cr.</i>			
				Feb. 15.	By J. Holroyd .	£	s.	d.
						371	3	4

<i>Dr.</i>		RATES ACCOUNT.			<i>Cr.</i>			
				Feb. 28.	By Balance .	£	s.	d.
						6	8	6

<i>Dr.</i>		DEPRECIATION.			<i>Cr.</i>				
Feb. 28.	To Furniture .	£	s.	d.	Feb. 28.	By P. and L.	£	s.	d.
		1	5	0			1	5	0

<i>Dr.</i>		DISCOUNT ACCOUNT.			<i>Cr.</i>				
Feb. 28.	To Cash Book .	£	s.	d.	Feb. 28.	By Cash Book .	£	s.	d.
		15	11	6		By P. and L. .	10	18	6
							4	13	0
		15	11	6			15	11	6

<i>Dr.</i>		OFFICE FURNITURE ACCOUNT.			<i>Cr.</i>				
Feb. 1.	To Balance . .	£	s.	d.	Feb. 28.	By Depreciation .	£	s.	d.
	.. Bank . . .	62	15	0		.. Balance c/d .	1	5	0
		5	5	0			68	15	0
		68	0	0			68	0	0
Mar. 1.	To Balance b/d .	66	15	0					

<i>Dr.</i>		CARRIAGE (OUTWARDS) ACCOUNT.			<i>Cr.</i>				
Mar. 1.	To Bank . . .	£	s.	d.	Feb. 28.	By P. and L.	£	s.	d.
		3	8	6			3	8	6

<i>Dr.</i>		G. THORP.			<i>Cr.</i>				
Feb. 1.	To Balance . .	£	s.	d.	Feb. 18.	By Bank . . .	£	s.	d.
	.. Goods . . .	21	6	8		.. Discount .	295	18	6
		290	3	4			15	11	6
		311	10	0			311	10	0

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Dr.		W. STOTT.			Cr.				
Feb. 1.	To Balance . . .	£	s.	d.	Feb. 1.	By Bill Receivable	£	s.	d.
„ 25.	„ Goods . . .	59	5	6	„ 28.	„ Returns . . .	20	6	8
		62	12	8	„ „	„ Balance c/d . .	42	6	0
		121	18	2			121	18	2
Mar. 1.	To Balance b/d . .	42	6	0					

Dr.		J. FIRTH.			Cr.				
Feb. 12.	To Bank . . .	£	s.	d.	Feb. 1.	By Balance . . .	£	s.	d.
„ „	„ Discount . . .	207	11	0			218	9	6
		10	18	6					
		218	9	6			218	9	6

Dr.		J. HOLROYD.			Cr.				
Feb. 15.	To Bill Payable . .	£	s.	d.	Feb. 1.	By Balance . . .	£	s.	d.
„ 28.	„ Balance c/d . . .	371	3	4	„ 12.	„ Goods . . .	110	9	8
		110	9	8			481	13	0
		481	13	0	Mar. 1.	By Balance b/d . .	110	9	8

TRIAL BALANCE.										
					Balances.					
					Dr.		Cr.			
					£	s.	d.	£	s.	d.
B. Salt, Capital Account								499	3	7
„ Drawings Account					18	10	0			
Goods Account					289	9	10			
Bills Receivable					59	5	6			
Bills Payable								371	3	4
Depreciation					1	5	0			
Discount					4	13	0			
Office Furniture					66	15	0			
Carriage					3	8	6			
W. Stott					42	6	0			
J. Holroyd								110	9	8
Cash					25	9	6			
Bank					469	14	3			
					980	16	7	980	16	7

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<i>Dr.</i>		PROFIT AND LOSS ACCOUNT.						<i>Cr.</i>		
		£	s.	d.			£	s.	d.	
Feb. 28.	To Rates	6	8	0	Feb. 28.	By Gross Profit	50	10	0	
" "	" Depreciation	1	5	0						
" "	" Discount	4	13	0						
" "	" Carriage	3	8	6						
" "	" Net Profit	34	15	0						
		<u>50</u>	<u>10</u>	<u>0</u>			<u>50</u>	<u>10</u>	<u>0</u>	

BALANCE SHEET, FEBRUARY 28.									
<i>Liabilities.</i>					<i>Assets.</i>				
		£	s.	d.			£	s.	d.
Bills Payable		371	3	4	Cash		25	9	6
J. Holroyd		110	9	8	Bank		469	14	3
Rates		6	8	6	Bills Receivable		59	5	6
Capital		515	8	7	J. Firth		42	6	0
					Stock		339	19	10
					Furniture		66	15	0
		<u>1003</u>	<u>10</u>	<u>1</u>			<u>1003</u>	<u>10</u>	<u>1</u>

P. 507.—12. The Cash Book is shown on opposite page.

JOURNAL.									
		£	s.	d.		£	s.	d.	
Jan. 1.	Bank, <i>Dr.</i>	1000	0	0					
	To J. Elgood, Capital, <i>Cr.</i>					1000	0	0	
" 16.	J. Jones, <i>Dr.</i>	3	10	0					
	To Interest, <i>Cr.</i>					3	10	0	
" "	Bills Receivable, <i>Dr.</i>	703	10	0					
	To J. Jones, <i>Cr.</i>					703	10	0	
Feb. 20.	J. Jones, <i>Dr.</i>	703	13	6					
	To Bills Receivable, <i>Cr.</i>					703	10	0	
	To Expenses, <i>Cr.</i>					0	3	6	
	(being bill dishonoured and expenses)								
" 21.	J. Jones, <i>Dr.</i>	2	0	0					
	To Interest, <i>Cr.</i>					2	0	0	
Mar. 22.	Bill Receivable, <i>Dr.</i>	400	0	0					
	To J. Jones, <i>Cr.</i>					400	0	0	
		<u>2812</u>	<u>13</u>	<u>6</u>		<u>2812</u>	<u>13</u>	<u>6</u>	

PURCHASES BOOK.									
		£	s.	d.		£	s.	d.	
Jan. 4.	J. Day—								
	Dry Goods	650	0	0					
	Less 10%	65	0	0					
						585	0	0	
						<u>585</u>	<u>0</u>	<u>0</u>	

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Dr.

CASH BOOK.

Cr.

	Discount.	Cash.	Bank.	Discount.	Cash.	Bank.
			£ s. d.	£ s. d.		£ s. d.
Jan. 1. To J. Elgood, Capital . . .			1000 0 0			1000 0 0
Feb. 21. " J. Jones . . .			305 13 6			305 13 6
Mar. 22. " Bill Receivable .			400 0 0			400 0 0
			<u>1705 13 6</u>			<u>1705 13 6</u>
Mar. 22. To Balance b/d .			1149 18 6			1149 18 6
				<u>29 5 0</u>		<u>29 5 0</u>
						<u>1705 13 6</u>
						<u>1149 18 6</u>

Jan. 15. By J. Day . . .
Mar. 22. " Balance c/d . . .

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SALES BOOK.						
		£	s.	d.		
Jan. 16.	J. Jones— Dry Goods	700	0	0		
		<u>700</u>	<u>0</u>	<u>0</u>		

Dr.		J. ELGOOD: CAPITAL ACCOUNT.			Cr.	
		£	s.	d.		
					Jan. 1.	By Bank . . .
						<u>1000</u> <u>0</u> <u>0</u>

Dr.		J. JONES.			Cr.	
		£	s.	d.		
Jan. 16.	To Goods	700	0	0	Jan. 16.	By Bill Receivable
" "	" Interest	3	10	0	Feb. 21.	" Bank
Feb. 20.	" Bill Receivable	703	13	6	Mar. 22.	" Bill Receivable
" 21.	" Interest	2	0	0		
		<u>1409</u>	<u>3</u>	<u>6</u>		
						<u>1409</u> <u>3</u> <u>6</u>

Dr.		J. DAY.			Cr.	
		£	s.	d.		
Jan. 15.	To Bank	555	15	0	Jan. 4.	By Goods
" "	" Discount	29	5	0		
		<u>585</u>	<u>0</u>	<u>0</u>		
						<u>585</u> <u>0</u> <u>0</u>

Dr.		INTEREST.			Cr.	
		£	s.	d.		
					Jan. 16.	By J. Jones . . .
					Feb. 21.	" "
						<u>5</u> <u>10</u> <u>0</u>
						<u>3</u> <u>10</u> <u>0</u>
						<u>2</u> <u>0</u> <u>0</u>

Dr.		BILLS RECEIVABLE.			Cr.	
		£	s.	d.		
Jan. 16.	To J. Jones	703	10	0	Feb. 20.	By J. Jones . . .
" 21.	" "	400	0	0	Mar. 22.	" Bank
		<u>1103</u>	<u>10</u>	<u>0</u>		
						<u>703</u> <u>10</u> <u>0</u>
						<u>400</u> <u>0</u> <u>0</u>
						<u>1103</u> <u>10</u> <u>0</u>

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Dr.		EXPENSES.			Cr.		
					£	s.	d.
				Feb. 20.	By J. Jones.	0	3 6

Dr.		GOODS ACCOUNT.			Cr.				
		£	s.	d.		£	s.	d.	
Mar. 22.	To Purchases	585	0	0	Mar. 22.	By Sales	700	0	0

Dr.		DISCOUNT ACCOUNT.			Cr.		
					£	s.	d.
				Mar. 22.	By Cash Book	29	5 0

TRIAL BALANCE.										
				Balances.						
				Dr.		Cr.				
				£	s.	d.	£	s.	d.	
Capital	.	.	.				1000	0	0	
Interest Account	.	.	.					5	10	0
Expenses	.	.	.					0	3	6
Goods	.	.	.					115	0	0
Bank	.	.	.	1149	18	6				
Discount	.	.	.					29	5	0
				1149	18	6	1149	18	6	

D. (1)

SECTION XX.

- P. 508. - 1. 14s. 9d. 2. £500. 3. £194 4s. 8d.
 4. £1391 19s. 6d. 5. £175 5s. 6d.
 6. £166 16s. 3d. ; £157 1s. 8d. 7. 374·8 francs (Simple Interest).
 8. £8 16s. 8d. 9. £4000 @ 5%.

D. (2)

- P. 509. — 1. £630 16s. 4d. 2. £52 10s. 6d. ; § 322. 3. £104 4s. 9d.
 4. £54 6s. 5d. 5. 41930 francs (correct to 10 francs).
 6. £82. 7. £584 5s. 7d. 8. £44 18s. 1d.
 9. £1807 1s. 11d. 10. £200.

DATE OF ISSUE

This book must be returned
within 3, 7, 14 days of its issue. A
fine of ONE ANNA per day will
be charged if the book is overdue.

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