CHAPTER–1

Percentage

Definition—Per cent means for every hundred. Fifty per cent means fifty for every hundred. So a fraction whose denominator is 100, is called a percentage and the numerator of the fraction is known as the rate of percentage. It is generally written by %.

EXAMPLES

Example 1. What is the fraction which is equivalent to 3/10 per cent ?

Sol. $\frac{3}{10} \times \frac{1}{100} = \frac{3}{1000}$ **Ans.**

Example 2. If the rate of sugar is increased by 20%, how much per cent must a householder reduce his consumption of sugar so as not to increase his expenditure ?

Sol. The increased expenditure of sugar = 100 + 20 = 120.

But the householder wants to expend the same amount *i.e.* Rs. 100 in place in Rs. 120. Hence he has to reduce his expenditure by Rs. 20.

$\therefore$ On the expenditure of Rs. 120 the reduction amounts to Rs. 20.

$\therefore$ On the expenditure of Rs. 100 the reduction $= \frac{20}{120} \times 100\%$

$= \frac{100}{6}\% = \frac{50}{3}\% = 16{\cdot}67\%$ **Ans.**

EXERCISE 1

1. A base ball team has lost 7 games and has won 13 games. What per cent of the games played did they win ?

   (A) 35 (B) 65

   (C) 50 (D) 30

   (E) None of these

2. 60% of 35 is what per cent of 400 ?

   (A) $5\frac{1}{4}$ (B) $10\frac{1}{2}$

   (C) $12\frac{1}{2}$ (D) 6

   (E) None of these

3. If 1 out of every 50 people who play a certain games win a prize, what per cent of people lose ?

   (A) 1% (B) 2%

   (C) 99% (D) 98%

   (E) None of these

4. The air consists of 79·2% of Nitrogen, 20·7% of Oxygen, 0·08% of other light gases and the remaining gas is Argon. Find out the volume of the air consisting one cubic metre of Argon.

   (A) 500 cu. metre (B) 50 cu. metre

   (C) 5 cu. metre (D) 5000 cu. metre

   (E) None of these

5. In an examination 49·3% of total students appeared, passed successfully. If the number of successful candidates are 23128 how many students appeared (approx.) in the exam ?
   (A) 46913 (B) 45913
   (C) 47913 (D) 46000
   (E) None of these
6. A tank is filled 10% in one hour and 8% of the water is emptied in the next hour. If it is repeated again, find the percentage of tank filled with water.
   (A) 20% (B) 4%
   (C) 19·2% (D) 17·66%
   (E) None of these
7. If 20% of man's salary is paid as rent, 60% are his living expenses and 10% is paid in L.I.C. If he spends remaining Rs. 30 on the education of the children, find his salary.
   (A) Rs. 300 (B) Rs. 100/3
   (C) Rs. 3000 (D) Rs. 900
   (E) None of these
8. A litre of water is evaporated from 6 litre of sugar solution containing 4% of sugar. Find the percentage of sugar in remaining solution.
   (A) $3\frac{1}{3}$ (B) $4\frac{4}{5}$
   (C) 4 (D) 5
   (E) None of these
9. When the price of cloth were reduced by 25% the quantity of cloth sold increased by 20%. What was the effect on gross receipt of the shop ?
   (A) 5% increase (B) 5% decrease
   (C) No change (D) 10% increase
   (E) None of these
10. Chinmoy sold his radio set at 10% loss. If he had sold it for Rs. 45 more he would have made 5% profit. For how much did he sell the radio ?
   (A) Rs. 315 (B) Rs. 270
   (C) Rs. 300 (D) Rs. 345
   (E) None of these
11. At what rate the sum will be twice in 15 years ?
   (A) $13\frac{1}{2}\%$ (B) $6\frac{2}{3}\%$
   (C) 5% (D) 10%
   (E) None of these
12. The sum of Rs. 725 is borrowed at the beginning of a year at interest. After 8 months have passed Rs. $362\frac{1}{2}$ more is borrowed at a rate of interest double that which the former sum bears. At the end of the year, the sum of interest on both loans is Rs. 43·50. What is the first rate of interest per annum ?
   (A) 6% (B) 3·6%
   (C) 4·5% (D) 5%
   (E) None of these
13. The cost price of goods with a bankrupt is Rs. 25,500 and if the goods had realised in their full value, his creditors would have received 85 paise in the rupee. But 2/5 of the goods were sold at 17% and the remainder at 22% below their cost price. How many Paise in a rupee was received by the creditors ?
   (A) 82 paise (B) 68 paise
   (C) 67 paise (D) 65 paise
   (E) None of these
14. A carpenter undertakes to supply 2,000 tables at Rs. 17·25 each. He estimates that if 10% are defective which will be sold at 50%, then the profit will be 15% on his whole outlay. When the tables were supplied, 70% of the tables were found defective. What loss did carpenter incur ?
   (A) Rs. 7,800 (B) Rs. 16,075
   (C) 4,666·25 (D) Rs. 6,075
   (E) None of these
15. If Ramesh gets 10% more than Mohan, then Mohan gets.
   (A) 10% less than Ramesh
   (B) 10% more than Ramesh
   (C) $9\frac{1}{11}\%$ less than Ramesh
   (D) $9\frac{1}{11}\%$ more than Ramesh
   (E) None of these
16. Out of a total population of 5,000 people in a village the men increased by 10% and woman by 15%. thus the total population becomes 5,600 in a year. Find how many men were there in the village.
   (A) 2000 (B) 3000

(C) 4000 (D) 2500
(E) None of these

17. The population of a town increases 10% per year. If at the end of 1974 the population was 8,000, find out the population at the end of 1977.
(A) 968 (B) 9,680
(C) 10,648 (D) 880
(E) None of these

18. In a mixed school 20% of the scholars are infants under 8, and the number of scholars above 8 is $\frac{2}{3}$ of the number of scholars of 8, and amounts to 48. Find the number of scholars in the school.
(A) 72 (B) 120
(C) 80 (D) 150
(E) None of these

19. A man's working hours a day were increased 20% and his wages per hour were increased by 15%. By how much per cent were his daily earning increased ?
(A) 38%
(B) 35%
(C) 5%
(D) 40%
(E) None of these

20. $3\frac{1}{2}$% of a man's income is taken in tax and 12 $\frac{1}{2}$% of the remainder is saved. This leaves Rs. 4,053 to spend. What is the income ?
(A) Rs. 5000 (B) Rs. 4800
(C) Rs. 6408 (D) Rs. 4500
(E) None of these

CHAPTER–2

Profit and Loss

Cost price (C.P.) is the price at which a particular article is bought.

Selling price (S.P.) is that price at which a particular article is sold.

Profit = S.P. – C.P. Loss = C.P. – S.P.

The profit or loss percentage is always counted on the C.P.

Percentage of profit $= \frac{\text{Actual Profit} \times 100}{\text{Cost Price}}$ **%**

EXAMPLES

Example 1. Ram sold a cow for Rs. 136 at a loss of 15%. At what price should he have sold it to gain 15% ?

Sol. Let the cost price be Rs. 100 then for 15% loss the S.P. = 85 and for 15% profit it should be Rs. 115.

$\because$ Rs. 85 is the first S.P. then second S.P. = Rs. 115

$\therefore$ Rs. 136 is the first S.P. then second S.P. $= \frac{115 \times 136}{85} =$ Rs. 184 **Ans.**

Example 2. A sells a radio to B at a gain of 10% and B sells it to C at a gain of 5%. If C pays Rs. 462 for it. what did it cost to A ?

Sol. Let the cost price of A be Rs. 100

Then the cost price of B be Rs. 110

$$\text{Selling price of B} = \frac{105}{100} \times 110 = \text{Rs. } \frac{231}{2}$$

$$\text{C.P. of C} = \frac{231}{2}$$

But the cost price of C as given = Rs. 462.

If the cost price of C is Rs. $\frac{231}{2}$ then the C.P. of A = Rs. 100

If the cost price of C is Rs. 462 then the C.P. of A $= \frac{100 \times 2 \times 462}{231} =$ Rs. 400 **Ans.**

Example 3. A dealer allows 10% discount on the list price of a certain article and yet makes a profit of Rs. 25% on each article. Find the cost price of the article when list price is Rs. 50.

Sol. Let the cost price of article be Rs. 100

The for 25% profit, S.P. = Rs. 125

If list price is Rs. 100, S.P. = Rs. 90

$\because$ If S.P. is Rs.90 , list price = Rs. 100

$\therefore$ S.P. is Rs. 125, list price = $\frac{100 \times 125}{90} = \frac{1250}{9}$

If list price is Rs. $\frac{1250}{9}$, then C. P. = Rs. 100

If list price Rs. 50, then C.P. = $\frac{100 \times 50 \times 9}{1250}$ = Rs. 36 **Ans.**

Example 4. A person purchases 90 clocks and sells 40 cloks at a gain of 10% and 50 clocks at a gain of 20%. Had he sold all of them at a uniform profit of 15% he would have got Rs. 40 less. Find the cost price of each clock.

Sol. Let the C.P. of each clock be Rs. 100.

By the profit of 10% S.P. of 40 clocks = 110 × 40 = Rs. 4,400

By the profit of 20% S.P. of 50 clocks = 120 × 50 = Rs. 6,000

Total S.P. = Rs. 4400 + Rs. 6,000 = Rs. 10,400

C.P. of 90 clocks = 90 × 100 = Rs. 9000

By the profit of 15% S.P. of 90 clocks = 90 × 115 = Rs. 10,350

Difference = Rs. 10,400 – Rs. 10,350 = Rs. 50

If the difference is Rs. 50 then C.P. = Rs. 100

If the difference is Rs. 40 then C.P. = $\frac{100 \times 40}{50}$ = Rs. 80 **Ans.**

Example 5. A man buys 5 horses and 10 cows for Rs. 1,600. He sells horses at a profit of 15% and cows at a loss of 10%. If his over all profit was Rs. 90, what was the cost price of a horse and a cow ?

Sol. Let x be the cost price of a horse and y be the cost price of a cow

$\because$ C.P. of 5 horses = Rs. $5x$ and C.P. of 10 cows = Rs. $10y$

Hence $5x + 10y = 1{,}600$ …(i)

Since the profit is 15% on the horses

$\therefore$ Profit on the sale of Rs. $5x = \frac{15 \times 5x}{100}$ = Rs. $\frac{3x}{4}$

Similarly loss on the cows is 10%

So loss on the sale of Rs. $10y = \frac{10y \times 10}{100}$ = Rs. y

Again. (profit on the horses) – (Loss on cow) = Rs. 90

$\Rightarrow$ $\frac{3x}{4} - y = 90$

$\therefore$ $3x - 4y = 360$ …(ii)

Multiplying (i) by 3 and (ii) by 5 we get

$15x + 30y = 4{,}800$

$15x - 20y = 1{,}800$

$50y = 3{,}000$

$\therefore$ y = Rs. 60

Putting the value of y in Eq. (i) $5x = 1{,}600 - 600$

$\therefore$ x = Rs. 200 **Ans.**

EXERCISE 2

1. A car costs a dealer Rs. 50,000. The dealer raised the price by Rs. 13,000 and then deducted $\frac{1}{7}$ of the new price. What percentage of the original cost was the car sold for ?
   (A) 108% (B) 90%
   (C) 107% (D) 110%
   (E) None of these
2. If Mohan buys a chair at 75% of its value and sells it for 20% more than its value, his profit will be :
   (A) 45% (B) 60%
   (C) 20% (D) 75%
   (E) None of these
3. 15% loss on selling price is what percentage loss on cost ?
   (A) 17·64% (B) 20%
   (C) 30% (D) 13·04%
   (E) None of these
4. How much per cent should a tradesman add on the price of his goods in order that he may make 10% profit afrer allowing a rebate to the customer 4% of the bill ?
   (A) 14% (B) 14·5%
   (C) 15% (D) $14\frac{7}{12}\%$
   (E) None of these
5. If Ashok makes a profit of 25% on the selling price, what is his profit on cost price ?
   (A) 20% (B) 25%
   (C) $33\frac{1}{3}\%$ (D) 30%
   (E) None of these
6. If an harmonium is sold for Rs. 16 the percentage of loss is equal to its cost price. Find out the cost price of the harmonium.
   (A) Rs. 80 and Rs. 20
   (B) Rs. 25
   (C) Rs. 40
   (D) Rs. 50
   (E) None of these
7. Mr. Ram runs a clothing store. His overhead expenses are 32% and his profits are 12% of his sale. At what price should he sell a raincoat which costs him Rs. 10·50 ?
   (A) Rs. 13 (B) Rs. 15·75
   (C) Rs. 12 (D) Rs. 19
   (E) None of these
8. For cash payment a shopkeeper allows a discount of $2\frac{1}{2}\%$ on the marked price of his goods. Under the conditions he makes profit of 17% on his outlay. what would be his gain per cent on his outlay, if he had not allowed any discount ?
   (A) 20% (B) $14\frac{1}{2}\%$
   (C) $19\frac{1}{2}\%$ (D) 25%
   (E) None of these
9. A dishonest shopkeeper deceives by 15% at the time of purchase of the articles and also 15% at the time of the sale. Find out the percentage of profit.
   (A) 30% (B) 15%
   (C) 33% (D) $32\frac{1}{4}\%$
   (E) None of these
10. A milkman mixes some water to the milk and sells it at the purchase price earning 20% profit. Find out the weight of the water mixed in gm per kilogram of milk.
    (A) 200 gm (B) 100 gm
    (C) 250 gm (D) 50 gm
    (E) None of these
11. If I loss 12% by selling oranges at 14 for a rupee, how many oranges for a rupee should I sell to gain 12% ?
    (A) 14 (B) 11
    (C) 10 (D) 12
    (E) None of these
12. A dealer makes his goods 30% above cost price, but makes a reduction of $6\frac{1}{4}\%$ on the marked price for ready money. Find his gain per cent.
    (A) $21\frac{1}{2}\%$ (B) 22%
    (C) $23\frac{3}{4}\%$ (D) $26\frac{1}{7}\%$

(E) None of these

13. A tradesman by means of a false balance defrauds to the extent of 10% in buying goods and also defrauds 10% in selling. What per cent does he gain on his outlay by his dishonesty ?
(A) 10% (B) 11%
(C) 20% (D) 21%
(E) None of these

14. Mohan sells two horses for Rs. 1955 each. On one of them he gains 15% and on the other he losses 15%. Find his total gain or loss.
(A) gain of Rs. 90 (B) loss of Rs. 90
(C) No loss no profit (D) Profit of Rs. 150
(E) None of these

15. A grocer mixes 26 kg. of tea which costs him Rs. 2·00 a kg. with 30 kg. of tea which costs Rs. 3·60 a kg. and sells the mixture at Rs. 3 a kg. What is his total percentage of gain ?
(A) 8% (B) 5%
(C) 10% (D) No profit no loss
(E) None of these

16. A shopkeeper estimates his profit at $22\frac{1}{2}\%$ of the cost price. If his sale in one week were of Rs. 392, how much of this was his profit ?
(A) 72 (B) 70
(C) 18·2 (D) 88·2
(E) None of these

17. A house was sold for Rs. 12,600 at a profit of 5% on the cost price. What per cent would have been gained if it had been sold for Rs. 13,000 ?
(A) 20% (B) 9%
(C) 10% (D) $8\frac{1}{3}\%$
(E) None of these

18. A farmer bought a cow for a certain sum and sold it at a loss of 15% of the cost price. If he received Rs. 90 more he would have gained $7\frac{1}{2}\%$ on the cost price. How much did the cow cost him ?
(A) Rs. 440 (B) 400
(C) Rs. 1,200 (D) 600
(E) None of these

19. One type writer marked for sale at Rs. 480. Dealer allows discount of 10% and yet makes profit of 8%. What should his gain be if no discount were allowed ?
(A) Rs. 80 (B) Rs. 38·4
(C) Rs. 20 (D) Rs. 48
(E) None of these

20. A draper buys 100 shawls for Rs. 2,450. He sells 76 of them at Rs. 35 each, and the rest at half of that price. How much does he gain ? What is his gain per cent on the cost price ?
(A) Rs. $630, 25\frac{5}{7}\%$
(B) Rs. $50, 26\frac{26}{49}\%$
(C) Rs. $730, 29\frac{39}{49}\%$
(D) Rs. $832, 29\frac{1}{4}\%$
(E) None of these

CHAPTER–3

Ratio and Proportion

A ratio can exist only between two quantities of the same kind.

A ratio is obtained by dividing one quantity by the other of same kind. The result obtained is an abstract number (quantity without any unit) integer or fraction.

When two ratios are equal we say it is proportion.

If $\frac{a}{b}=\frac{c}{d}$ it means $\frac{a}{b}$ is in proportion with $\frac{c}{d}$ and can be written as *a : b : : c: d* where *a* and *d* are known as extremes and *b* and *c* are known as means.

If four quantities are in proportion then the product of means is equal to the product of extremes.

PROPORTIONAL DIVISION

The process by which a quantity may be divided into parts which bear a given ratio to one another, is called proportional division and the parts are known as proportional parts.

For example—Divide quantity y in the ratio $a : b : c$ then

$$\text{First part} = \frac{a}{(a+b+c)} \times y.$$

$$\text{Second part} = \frac{b}{(a+b+c)} \times y.$$

$$\text{Third part} = \frac{c}{(a+b+c)} \times y.$$

EXAMPLES

Example 1. Find out the two quantities whose difference is 30 and the ratio between them is 5/11.

Sol. The difference of quantities which are in the ratio 5 : 11 is 6. To make the difference 30, we should multiply them by 5.

Therefore, $5 : 11 = 5 \times 5 : 11 \times 5 = 25 : 55$ **Ans.**

Example 2. A factory employs skilled workers, unskilled workers and clerks in the ratio 8 : 5 : 1 and the wages of a skilled worker, an unskilled worker and a clerk are in the ratio 5 : 2 : 3 when 20 unskilled workers are employed the total daily wages fall amount to Rs. 318. Find out the daily wages paid to each category of employees.

Sol. Number of skilled worker : unskilled worker : clerks = 8 : 5 : 1 and the ratio of their respective wages = 5: 2 : 3

Hence the amount will be paid in the ratio

$$8 \times 5 : 5 \times 2 : 3 \times 1 = 40 : 10 : 3$$

Hence total amount distributed among unskilled workers

$$= \frac{318}{(40 + 10 + 3)} \times 10 = \text{Rs. } 60$$

But the number of unskilled workers is 20, so the daily wages of unskilled worker

$$= \frac{60}{20} = \text{Rs. } 3.$$

The wages of a skilled worker, an unskilled worker and a clerk are in the ratio = 5 : 2: 3

Multiplying the ratio by 5/2 and 3/2 we get = 7·50 : 3 : 4·50

So if an unskilled worker gets Rs. 3 a day then a skilled worker gets Rs. 7·50 per day a clerk Rs. 4·50 a day. **Ans.**

Example 3. Two numbers are in the ratio of 11 : 13. If 12 be subtracted from each, the remainders are in the ratio of 7 : 9. Find out the numbers.

Sol. Since the numbers are in the ratio of 11 : 13. Let the numbers be $11x$ and $13x$.. Now if 12 is subtracted from each, the numbers become $(11x - 12)$ and $(13x - 12)$. As they are in the ratio of 7 : 9

$\therefore$ $(11x - 12) : (13x - 12) :: 7 : 9$

$$(11x - 12)9 = (13x - 12)7$$
$$99x - 108 = 91x - 84$$
$$8x = 24 \text{ or } x = 3$$

Therefore the numbers are $11 \times 3 = 33$ and $13 \times 3 = 39$. **Ans.**

COMPOUND PROPORTION

These problems shall contain three or more different kinds of quantities involving two or more problems or simple proportion.

Rule—(a) Select all the quantities given in the problem such as man, work, hour and day etc.

(b) Put all the quantities in one line keeping the required quantity to the right hand side.

(c) Without considering the quantities in (a) write I, II, III, IV.

(d) Below III put the last quantity in which the answer is wanted. Below IV put x. Put a sign : of ratio between III and IV and a sign : : of proportion between II and III.

(e) Now find out by careful inspection whether the quantities to be found out is greater or less than the third term.

If greater put the lesser of the two as the first term; if less, put the greater of the two as first term and the other as second term.

Divide the product of all the terms below II and III by the product of all the two as below I.

Example 4. If 3 men and 4 boys complete a work in 7 days and 2 men and 3 boys do the same work in 10 days. in how many days will 3 men and 8 boys complete the same work ?

Sol. 3 men + 4 boys complete a work in 7 days

2 men + 3 boys complete a work in 10 days

Therefore $\frac{3 \text{ men} + 4 \text{ boys}}{2 \text{ men} + 3 \text{ boys}} = \frac{10}{7}$ (because there is inverse proportion in men and days)

$$21 \text{ men} + 28 \text{ boys} = 20 \text{ men} + 30 \text{ boys}$$
$$1 \text{ man} = 2 \text{ boys}$$

$$3 \text{ men} + 4 \text{ boys} = 6 \text{ boys} + 4 \text{ boys}$$
$$= 10 \text{ boys.}$$
$$3 \text{ men} + 8 \text{ boys} = 6 \text{ boys} + 8 \text{ boys} = 14 \text{ boys}$$

boys	days
10	7
14	x

As there is inverse proportion in boys and days.

$$\frac{10}{14} = \frac{x}{7}$$
$$x = 5 \text{ days}$$ **Ans.**

Example 5. The cost of lighting 200 bulbs for 6 days for 4 hours every day is Rs. 40. How many bulbs can be lighted for 15 days for 3 hours every day at the cost of Rs. 48 ?

Sol.

Days		Hours		Rs.		Bulbs
6 ↑		4 ↑		40 ↓		200 ↓
15		3		48		x
I		II		III		IV
15		6				
3	:	4	::	200	:	x
40		48				

$$\therefore \quad x = \frac{6 \times 4 \times 48 \times 200}{15 \times 3 \times 40} = 128 \text{ bulbs.}$$ **Ans.**

EXERCISE 3

1. Find out the ratio whose value is 2/3 and the antecedent is 18.
   (A) 18 : 27 (B) 2 : 3
   (C) 20 : 30 (D) 180 : 270
   (E) None of these
2. $\frac{2}{3} : \frac{5}{6} :: \frac{8}{7}$: what number ?
   (A) 17/14 (B) 10/7
   (C) 5/3 (D) 13/14
   (E) None of these
3. A : B = 2 : 3, B : C = 4 : 5, C : D = 6 : 7 find the ratio of A and D.
   (A) 4 : 13 (B) 16 : 35
   (C) 7 : 24 (D) 8 : 22
   (E) None of these
4. Two equal glasses are respectively 1/3 and 1/4 full of milk. They are then filled up with water and the contents are mixed in a tumbler. Find the ratio of milk and water in the tumbler.
   (A) 1 : 5 (B) 7 : 17
   (C) 3 : 9 (D) 2 : 5
   (E) None of these
5. If in 30 litre mixture of milk and water the ratio of milk and water is 7 : 3, find out the quantity of water to mix in order to make this ratio 3 : 7.
   (A) 40 litre (B) 10 litre
   (C) 30 litre (D) 20 litre
   (E) None of these
6. In a bag there are coins of 25 paisa, 10 paisa and 5 paisa in the ratio 1 : 2 : 3. If there are in all Rs. 30, how many 5 paisa coins ae there ?
   (A) 50 (B) 100
   (C) 150 (D) 200
   (E) None of these
7. Shyam has a sister who is half of his age. When Shyam double, what will be the ratio of his age to his sister's age ?
   (A) 6/5 (B) 4/3
   (C) 5/2 (D) 3/2
   (E) None of these

8. On a certain railway the first and second class fares are 7 paisa and 3 paisa per kilometre respectively. A man who travelled 100 km. spent Rs. 3·40 in going part of distance by first class and the in second class. How many kilometres did he travel in first class ?
   (A) 30 km (B) 48·5 km
   (C) 90 km (D) 51·5 km
   (E) None of these
9. Ratio of A's age to B's first equal to 4 : 3. A will be 26 years old after 6 years, how old is B now ?
   (A) $10\frac{1}{2}$ years (B) 21 years
   (C) 12 years (D) 15 years
   (E) None of these
10. 25 men with 10 boys can do in 6 days as much work as 21 men with 30 boys can do in 5 days. How many boys must help 40 men to do the same work in 4 days ?
   (A) 5 boys (B) 40 boys
   (C) 20 boys (D) 10 boys
   (E) None of these
11. A contractor took a contract for building 12 kilometre road in 15 days and empolyed 100 labours on the work. After 9 days he found that only 5 kilometre road had been constructed. How many more labours should be employed to ensure that the work may be completed with in the given time ?
   (A) 120 (B) 90
   (C) 110 (D) 100
   (E) None of these
12. What number has 5 to 1 ratio to the number 10 ?
   (A) 42 (B) 55
   (C) 50 (D) 62
   (E) None of these
13. 15 men do a work in 20 days. In how many days will 20 men do the full work ?
   (A) 30 days (B) 15 days
   (C) 40 days (D) 20 days
   (E) None of these
14. Three persons start business and make profit of Rs. 1180. If their capitals are as $\frac{1}{5} : \frac{1}{6} : \frac{1}{8}$, how should the profit be divided ?
   (A) Rs. 500, 380, 300
   (B) Rs. 490, 390, 300
   (C) Rs. 480, 400, 300
   (D) Rs. 470, 420, 290
   (E) None of these
15. A, B and C purchased the mangoes in a ratio 5 : 3 : 2. If the difference of mangoes of A and C is 60, find out the total number of mangoes purchased by them.
   (A) 200 (B) 150
   (C) 250 (D) 300
   (E) None of these
16. A company makes a profit of Rs. 450. Out of this 20% is paid for taxes and the rest be divided among its partners A, B and C in proportion of $1 : 1\frac{1}{2} : 2$. Find the share of each.
   (A) 120, 80, 160 (B) 160, 80, 120
   (C) 80, 120, 160 (D) 120, 160, 80
   (E) None of these
17. A garrison of 2,200 men has provision for 16 weeks at the rate of 45 gm. per day per man. How many men must leave so that the same provision may last for 24 weeks at 33 gm. per day per man ?
   (A) 200 (B) 1125
   (C) 2000 (D) 250
   (E) None of these
18. If 5 men can do a piece of work in 20 days, in how many days will 10 men and 5 boys do the same work if 1 man does as much work as 2 boys ?
   (A) 8 (B) 10
   (C) 12 (D) 36
   (E) None of these
19. In 21 cows eat as much as 15 oxen, how many cows will eat as much as 25 oxen ?
   (A) 30 (B) 35
   (C) 25 (D) 36
   (E) None of these
20. There are three containers of equal capacity. First container is half full, the second is one third full and the third is empty. If all the water in the containers is divided equally among the containers, what part of the third container will be full ?
   (A) 1/3 (B) 2/9
   (C) 5/18 (D) 1/6
   (E) None of these

CHAPTER–4

Partnership

Definition—Partnership is a method by which two or more persons put their money together in order to carry on a certain business and divide the profit or loss according to their capital and time. These persons are known as partners.

EXAMPLES

Example 1. A, B and C enter into partnership. A contributes one-third of the capital while B contributes as much as A and C together contribute. If the profit at the end of the year amounts to Rs. 840 what would each receive ?

Sol. As A contributes one-third of the capital

$$\therefore \quad \text{A's profit} = \frac{840}{3} = \text{Rs. } 280$$

Now as B contributes as much as A and C

So Profit of B = Profit of A + Profit of C

= Rs. 280 + Profit of C

$\Rightarrow$ Profit of B – Profit of C = Rs. 280 …(1)

and Profit of B + Profit of C = Rs. 840 – Rs. 280 …(2)

Adding 2 Profit of B = Rs. 840

$\therefore$ Profit of B = Rs. 420

Hence Profit of C = 840 – 420 – 280 = Rs. 140. **Ans.**

Example 2. A is working and B is a sleeping partner in a business. A puts in Rs. 5,000 and B puts in Rs. 6,000. A receives $12\frac{1}{2}\%$ of the profit for managing the business and the rest is divided in proportion of their capitals. What does each get out of a profit of Rs. 880 ?

Sol. The amount which A receives for managing

$$= 12\tfrac{1}{2}\% \text{ of Rs. } 880 = \frac{25}{2 \times 100} \times 880 = \text{Rs. } 110$$

$$\text{The amount left} = 880 - 110 = \text{Rs. } 770$$

$$\text{The amount left is to be divided in the ratio} = 5{,}000 : 6{,}000 = 5 : 6$$

$$\text{Out of the amount left, A's share} = \frac{5}{11} \times 770 = \text{Rs. } 350$$

$$\text{Out of the amount left, B's share} = \frac{6}{11} \times 770 = \text{Rs. } 420$$

$\therefore$ Total share received by A = 110 + 350 = Rs. 460

and share received by B = Rs. 420 **Ans.**

EXERCISE 4

1. 40 cattle can graze a grassland for 60 days. The number of cattle that will graze a grassland 2 times as large in 40 days is :
   (A) 120 (B) 20
   (C) 90 (D) 80
   (E) None of these
2. Three men A, B and C subscribe Rs. 4,700 for a business. A subscribes Rs. 700 more than B and B Rs. 300 more than C. How much will each receive out of the profit of Rs. 846 ?
   (A) Rs. 270, 396, 180
   (B) Rs. 396, 180, 270
   (C) Rs. 396, 270, 180
   (D) 296, 370, 180
   (E) None of these
3. A starts business with a capital of Rs. 1,400. Five months later B joins and further two months later C joins them. What amount of capital is put in by B and C, if at the end of the year their shares of profit are as 4 : 3 : 2 ?
   (A) Rs. 1,800, 1,680
   (B) Rs. 1,680, 1,800
   (C) Rs. 1,700, 1,780
   (D) Rs. 1,780, 1,700
   (E) None of these
4. A and B enter into partnership with capitals as 5 : 6. At the end of 8 months A withdraws. If they receive profit in the ratio of 5 : 9 find how long B's capital was used.
   (A) 4 months (B) 8 months
   (C) 12 months (D) 6 months
   (E) None of these
5. A and B enter into partnership. A supplies whole of the capital amounting to Rs. 45,000 with the condidtion that the profits are to be equally divided and that B pays A interest on half of the capital at 10% per annum but receives Rs. 120 per month for carrying on the concern. Find total yearly profit, when B's income is one half of A's income.
   (A) Rs. 7,150 (B) Rs. 3,060
   (C) Rs. 9,180 (D) Rs. 1,440
   (E) None of these
6. Two partners invest Rs. 12,500 and 8,500 respectively in their business and arrange that 60% of the profit should be divided equally between them and the remaining profit treated as interest on the capital. If one partner's sahre is Rs. 300 more than that of the other, find the whole amount of the profit.
   (A) Rs. 4,000 (B) 5,000
   (C) Rs. 3,837·50 (D) Rs. 3,937·50
   (E) None of these
7. Hari and Ram enter into a partnership with capital of Rs. 15,000 and Rs. 12,000 respectively. The total profit was Rs. 8,000. Hari had put his capital for 4 months and he received Rs. 5,000 as his profit. For how many months had Ram put his capital ?
   (A) 6 months (B) 3 months
   (C) 9 months (D) 12 months
   (E) None of these
8. A grazes 10 sheep for 3 weeks. B grazes 15 sheep for 4 weeks in a field. How should they divide a rent for Rs. 60 ?
   (A) 1 : 2 (B) 3 : 4
   (C) 2 : 1 (D) Rs. 40 : 20
   (E) None of these
9. A, B and C rent a piece of ground for Rs. 60·50 A puts in 5 sheep for $4\frac{1}{2}$ months, B, 8 sheep for 5 months, and C, 9 sheeps for 6 $\frac{1}{2}$ months. What share of rent must each pay ?
   (A) Rs. 11·25, 20, 29·25
   (B) Rs. 20·35, 21·50, 10·75
   (C) Rs. 30·20, 10·50
   (D) Rs. 21, 32, 7·50
   (E) None of these
10. A, B and C invested Rs. 500, 630 and 700. If A gets Rs. 75 as profit, what will C get ?
    (A) Rs. $57\frac{3}{4}\%$ (B) Rs. 105
    (C) Rs. 90 (D) Rs. 126
    (E) None of these

CHAPTER–5

Average

To find average of any number of quantities of the same kind is to add all the items together and then divide the sum by the number of items.

$$\textbf{Average} = \frac{\textbf{Sum of all items}}{\textbf{No. of items}}$$

EXAMPLES

Example 1. A batsman has a certain average runs for 16 innings. In the 17th inning he made a score of 85 runs thereby his average is increased by 3. What is his average after 17th inning ?

Sol. The average for 17th inning has been increased by 3. The total increase in the runs for 17th inning $17 \times 3 = 51$

But the batsman scores 85. Average runs in his 16th innings = $85 - 51 = 34$.

Hence the average of runs after 17th inning = $34 + 3 = 37$ **Ans.**

Example 2. A man has 7 children. When their average age was 12 years, the child who was 6 years of age, died. What was the average age of surviving children 5 years after the death of the above child ?

Sol. Average age of 7 children = 12 years

Total age of 7 children = 12×7

= 84 years

Total age of 6 children after the death of a child aged 6years = $84 - 6 = 78$

Hence the average age of the surviving children = $\frac{78}{6} = 13$ years

After 5 yrs. = $13 + 5$

= 18 years **Ans.**

EXERCISE 5

1. The average of the following five numbers is 8. Find the missing number in 7, 5, ? 3, 12.
   (A) 14 (B) 8
   (C) 13 (D) 12
   (E) None of these
2. The average weight of A, B and C is 45 kg that of A and B is 40 kg and of B and C is 43 kg. What is the weight of B ?
   (A) 17 kg (B) 26 kg
   (C) 20 kg (D) 31 kg
   (E) None of these
3. The average of the first three numbers is double of the fourth number. If the average of all the four numbers is 12, find the 4th number.
   (A) 16 (B) 48/7
   (C) 20 (D) 18
   (E) None of these

4. Anil took 4 tests during first year. His average on them was 76. He took 3 tests during the second year. His average on them was 81. What was his over all average for both years ?
   (A) 542/7 (B) 539/7
   (C) 536/7 (D) 547/7
   (E) None of these
5. A cyclist rides 24 km at 16 km per hour and a further 36 km at 15 km per hour. Find his average speed for the journey.
   (A) 15·38 km per hour
   (B) 16 km per hour
   (C) 15·5 km per hour
   (D) 16.38 km per hour
   (E) None of these
6. A certain factory employed 600 men and 400 women and the average wage was Rs. 2·55 per day. If a woman got 50 p. less than a man, what were their daily wages ?
   (A) Man Rs. 2·75, woman Rs. 2·25
   (B) Man Rs. 3·25, woman Rs. 2·75
   (C) Man Rs. 3, woman Rs. 2·50
   (D) Man Rs. 2·50 woman Rs. 2
   (E) None of these
7. If a train maintains an average speed of 40 km an hour it arrives at its destination punctually. if however the average speed is 35 kn an hour it arrives 15 minutes late. Find the length of the journey in km.
   (A) 40 (B) 70
   (C) 30 (D) 80
   (E) None of these
8. The average weight of three men A, B, C is 84 km and fourth man D joins them the average weight of the four becomes 80 km. If E whose wt. is 3 kg more than D replaces A, then the average wt. of B, C, D and E becomes 79 kg. Find the weight of A.
   (A) 75 kg (B) 80 kg
   (C) 70 kg (D) 85 kg
   (E) None of these
9. A man walks from P to Q at the rate of 5 km an hour and returns from Q to P at the rate of 3 km an hour. What is the average rate in km per hour for the whole journey ?
   (A) 4 (B) 15/4
   (C) 1/4 (D) 9/2
   (E) None of these
10. A ship 40 km from shore springs a leak which admits $3\frac{3}{4}$ quintals of water in 12 minutes. 60 quintals would suffice to sink the ship, But its pump can throw out 12 quintals of water in one hour. Find the average rate of sailing so that it may reach the shore just it begins to sink.
    (A) 4 km/h (B) 4·5 km/h
    (C) 5 km/h (D) 6 km/h
    (E) None of these

CHAPTER–6

Simple Interest

Interest is the money paid for the use of money borrowed.

The sum borrowed is called the principal. The sum of interest and principal is called the amount.

If the interest is paid as it falls due, it is called the simple interest (S. I.)

If P is the principal, R is the rate, T is time and S. I. the simple interest, then

$$\text{S. I.} = \frac{P \times R \times T}{100} \qquad P = \frac{\text{S.I.} \times 100}{R \times T}$$

$$R = \frac{\text{S.I.} \times 100}{P \times T} \qquad T = \frac{\text{S.I.} \times 100}{P \times R}$$

EXAMPLES

Example 1. A sum of money amounts to Rs. 944 in 3 years at a simple interest. If the rate of interest be raised by 25% the sum amounts to 980 during the same period. Find the sum and the rate of interest.

Sol. $\because$ Rs. 980 – Rs. 944 = 36.

$\therefore$ 25% of interest = Rs. 36

$\therefore$ $100\% = \frac{36 \times 100}{25}$

$= \text{Rs. } 144$

Hence the interest of three years = Rs. 144.

Therefore, Principal = 944 – 144 = Rs. 800

$$\text{Rate} = \frac{144 \times 100}{800 \times 3} = 6\%$$ **Ans.**

Example 2. Mahajan lends out Rs. 9 on the condition that the loan is payable in 10 months by 10 equal instalmets of Re. 1. Find the rate per cent per annum.

Sol. Let the interest be Rs. x per month per rupee.

$\therefore$ Interest on Rs. 9 for 1 month = $9x$

Interest on Rs. 8 for 1 month = $8x$

Interest on Rs. 7 for 1 month = $7x$

Interest on Rs. 6 for 1 month = $6x$

Interest on Rs. 5 for 1 month = $5x$

Interest on Rs. 4 for 1 month = $4x$

Interest on Rs. 3 for 1 month = $3x$

Interest on Rs. 2 for 1 month = $2x$

Interest on Rs. 1 for 1 month = $1x$

Hence Total interest = $45x$

But according to the problem this must be Re. 1

$\therefore \quad 45x = 1 \Rightarrow x = \frac{1}{45}$

Interest for 1 month on Re. 1 = $\frac{1}{45}$

Interest for 12 month on Rs. 100 = $\frac{100 \times 12}{45}$ %

$= \frac{80}{3}\% = 26\frac{2}{3}\%$. **Ans.**

Example 3. A man deposits Rs. 5,600 in a bank at $\frac{3}{4}$ % annual interest. After 6 months he withdraws Rs. 3,200 together with interest and after 6 months he withdraws the remaining money. How much does he get as interest ?

Sol. S.I. or Rs. 5,600 for 6 months $= \frac{5{,}600 \times \frac{1}{2} \times 15/4}{100} = \text{Rs. } 105$

He withdraw Rs. 3,200 together with interest, the remaining amount

$= 5600 - 3200 = \text{Rs. } 2400$

S.I. on Rs. 2,400 at the rate of 15/4 for $\frac{1}{2}$ years

$= \frac{2400 \times \frac{1}{2} \times 15/4}{100} = \text{Rs. } 45$

Total interest = 45 + 105

= Rs. 150. **Ans.**

EXERCISE 6

1. What must will amount to Rs. 720 in 2 years 6 months at 5% per annum simple interest ?
   (A) Rs. 540 (B) Rs. 640
   (C) Rs. 600 (D) Rs. 700
   (E) None of these
2. A certain sum given on simple interest became double in 20 yrs. In how many years will it be four times ?
   (A) 40 years (B) 20 years
   (C) 60 years (D) 80 years
   (E) None of these
3. Find out the capital required to earn a monthly interest of Rs. 600 per month as 6% simple interest.
   (A) Rs. 1,00,000
   (B) Rs. 1,20,000
   (C) Rs. 1,10,000
   (D) Rs. 1,30,000
   (E) None of these
4. A man derives his income from an investment of Rs. 2,000 at a certain rate of interest and Rs. 1,600 at 2% higher. The whole interest in 3 yrs. is Rs. 960. Find the rate of interest.
   (A) $8\frac{1}{2}\%$ (B) $8\frac{1}{3}\%$
   (C) 8% (D) $8\frac{2}{3}\%$
   (E) None of these
5. A sum of Rs. 1,550 was lent partly at 5% and partly at 8% simple interest. The total interest

received after 3 yrs. was Rs. 300. The ratio of money lent at 5% to 8% is :

(A) 5 : 8 (B) 8 : 5

(C) 31 : 6 (D) 16 : 15

(E) None of these

6. Rs. 793 is divided into three parts as such that their amount after 2, 3, amd 4 yrs. may be equal, the rate of interest being 5%. Find ratio between these parts.

(A) 10 : 15 : 20

(B) $\frac{1}{110} : \frac{1}{115} : \frac{1}{120}$

(C) $\frac{1}{10} : \frac{1}{15} : \frac{1}{20}$

(D) 110 : 115 : 120

(E) None of these

7. A trader marks two prices on his goods one for the cash payment and the other at the credit of 1 month. What will be the ratio between the two prices if the rate of simple interest is 4% per annum ?

(A) 25 : 26 (B) 300 : 301

(C) 12 : 13 (D) 20 : 21

(E) None of these

8. A man buys a house and pays Rs. 8,000 cash and Rs. 9,600 at 5 years credit at 4% per annum simple interest. Find the cash price of the house.

(A) Rs. 16,000 (B) Rs. 17,600

(C) Rs. 9,600 (D) Rs. 15,000

(E) None of these

9. Find the simple interest on Rs. 600 from 3rd March to 15th May of a year at 6% p.a.

(A) Rs. 3·60 (B) Rs. 10·80

(C) Rs. 14·40 (D) Rs. 7·20

(E) None of these

10. A sum of Rs. 2,600 is lent in two parts so that the interest on the first part for a period of 3 years at 5% may be equal to the interest on the second part for 6 years at 4%. The second part is equal to :

(A) Rs. 1,600 (B) Rs. 1,300

(C) Rs. 1,000 (D) Rs. 1,200

(E) None of these

CHAPTER–7

Compound Interest

Money is said to be lent at compound interest (C. I.) if the interest is not paid as soon as falls due, but is added to the Principal after a fixed period, so that the amount at the end of period becomes the principal for the next period. If A is the amount, C.I. is the compound interest, P is the principal, R is the rate, and *t* is the time, then

$$\mathbf{A = P\left(1 + \frac{R}{100}\right)^t}$$

$$\mathbf{C.I. = P\left[\left(1 + \frac{R}{100}\right)^t - 1\right]}$$

Note : 1. If intrest is paid half yearly; time is doubled, and the rate is halved.

2. Compound interest for one year is equal to the simple interest for one year.

EXAMPLES

Example 1. The simple interest on certain sum of money for 3 years at 4% is Rs. 303·60. Find the compound interest on the same sum for the same period at the same rate ?

Sol. ∵ S.I. = Rs. 303·60, R = 4%, t = 3 years.

$$\therefore \quad P = \frac{303{\cdot}60 \times 100}{4 \times 3} = \text{Rs. } 2530$$

$$\therefore \quad C.I. = P\left[\left(1 + \frac{R}{100}\right)^t - 1\right]$$

$$= 2530\left[\left(1 + \frac{4}{100}\right)^3 - 1\right]$$

$$= 2530\left[\left(\frac{26}{25}\right)^3 - 1\right]$$

$$= 2530\left[\frac{17576 - 15625}{15675}\right]$$

$$= 2530\left[\frac{1951}{15625}\right]$$

$$= \text{Rs. } 315{\cdot}90 \qquad \textbf{Ans.}$$

Example 2. A sum of money put out at compound interest amounts in one year to Rs. 4050 and in three years to Rs. 4723·92. Find the original sum and the rate of interest.

Sol. $$4723{\cdot}92 = P\left(1+\frac{R}{100}\right)^3 \quad \ldots(i)$$

and $$4050 = P\left(1+\frac{R}{100}\right) \quad \ldots(ii)$$

Dividing (i) by (ii)

$$\Rightarrow \quad \frac{4723{\cdot}92}{4050} = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \quad \frac{472392}{405000} = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \quad \frac{2\times4\times9\times9\times27\times27}{2\times25\times81\times10\times10} = \left(1+\frac{R}{100}\right)^2$$

Taking the square root of both sides

$$\Rightarrow \quad \frac{2\times9\times27}{5\times9\times10} = 1+\frac{R}{100}$$

$$\Rightarrow \quad \frac{27}{25} = 1+\frac{R}{100}$$

$$\Rightarrow \quad \frac{2}{25} = \frac{R}{100}$$

$$\therefore \quad R = \frac{2\times100}{25} = 8\%$$

Putting the value of R in equation (ii), we get,

$$\Rightarrow \quad 4050 = P\left(1+\frac{8}{100}\right)$$

$$= P\times\frac{27}{25}$$

$$\therefore \quad P = \frac{4050\times25}{27}$$

$$= \text{Rs. } 3750$$ **Ans.**

Example 3. A sum of Rs. 13040 is borrowed at $3\frac{3}{4}\%$ per annum. Compound interest is to be repaid in two equal yearly instalments. Find the amount of each instalment.

Sol. Let yearly instalment be Rs. x

Now the amount in 1 year at the rate of $3\frac{3}{4}\%$

$$= 13040\left(1+\frac{15}{4\times100}\right)$$

$$= \text{Rs. } 13529$$

$\therefore$ Remaining money after the payment of 1 instalment = (Rs. $13529 - x$)

Amount of (Rs. 13529 – x) in one year at the rate of interest of $3\frac{3}{4}\%$

$$= (13529 - x)\left(1 + \frac{15}{4 \times 100}\right)$$

$$= (13529 - x)\frac{83}{80}$$

Now $\frac{83}{80}(13529 - x) = x \Rightarrow (80 + 83)x = 83 \times 13529 \Rightarrow x = \frac{83 \times 13529}{163}$

$\therefore$ x = Rs. 6889. **Ans.**

EXERCISE 7

1. Kamal borrows Rs. 500 from a bank. If the bank charges interest at 6% per annum, how much amount shall he pay after 2 years ?
   (A) Rs. 560·00 (B) Rs. 561·80
   (C) Rs. 572·70 (D) Rs. 512·40
   (E) None of these
2. A sum of money placed at compound interest doubles itself in 4 years. In how many years will it amount to 8 times ?
   (A) 6 years (B) 8 years
   (C) 12 years (D) 10 years
   (E) None of these
3. Find the compound interest of Rs. 10,000 in 9 months at 4% per annum interest payable quarterly.
   (A) Rs. 300 (B) Rs. 310
   (C) Rs. 303 (D) Rs. 303·01
   (E) None of these
4. Some money was lent on 4% C.I. If the difference in interest of second and the first year is Rs. 88, find out the sum.
   (A) Rs. 50,000
   (B) Rs. 60,000
   (C) Rs. 65,000
   (D) Rs. 55,000
   (E) None of these
5. The population of a town is 50,000. It decreases by 20 per thousand per year. Find out the population after 2 years.
   (A) 46,000 (B) 46,200
   (C) 48,020 (D) 48,320
   (E) None of these
6. If the population of a town at present is 10648 and the rate of increment is 10% per year. What was the population before 3 years ?
   (A) 10,000 (B) 9,000
   (C) 11,000 (D) 8,000
   (E) None of these
7. A father left a will of Rs. 16,400 for his two sons aged 17 and 18 years. They must get equal amounts when they are 20 years at 5% compound interest. Find the present share of the younger son.
   (A) Rs. 8,000 (B) Rs. 8,400
   (C) Rs. 8,200 (D) Rs. 10,000
   (E) None of these
8. The compound interest on a sum of money for 2 years is Rs. 410 and the simple interest on the same sum for the same period and at the same rate is Rs. 400. Find the rate of interest.
   (A) 4% (B) 3%
   (C) 5% (D) 6%
   (E) None of these

CHAPTER–8

Discount, Stock and Shares

Discount is the general term applied to the rebate made in the amount of a bill in consideration of a cash payment.

True discount and present worth—Let the rate of interest be 5% per annum then Rs. 100 put out to interest will amount to Rs. 105 in a year.

Now suppose A has to pay Rs. 105 at the end of a year and if B accepts Rs. 100 as present payment of Rs. 105 due after a year, then a reduction of Rs. 5 is made in consideration of cash payment is called the ***true discount*** on Rs. 105 and 100 is called the ***present worth.***

(i) The sum due = present worth + True discount.

(ii) True discount = Interest on present worth.

Shares—To start with the industries big capital is needed. Then the capital is divided into large number of equal shares and the public is asked to buy one or more shares of the company and become its share holder.

The profit of the company after a certain period is divided among the share holders in proportion to the share held by them. These profits. are called ***Dividends.***

If a share of Rs. 10 fetched Rs. 10 cash the share is said to be ***at par***. If share of Rs. 10 standing at Rs. 9 is said to be at ***1 discount*** *or* ***1 below par*** and the share of Rs. 10 standing at Rs. 11 is at ***1 premium*** *or* ***1 above par***.

Stock—The capital of the company is known as ***Stock.***

Stock can be sold or purchased like shares.

EXERCISE 8

1. A Rs. 400 note drawn upon 12th Aug. 1962 for 90 days is deposited at the bank on 17th Sept. 1962. The bank charges a $6\frac{1}{2}\%$ discount. What will be the amount received by the depositor ? (A year may be taken of 360 days).
   (A) Rs. 395·20 (B) Rs. 396·10
   (C) Rs. 397·40 (D) Rs. 394·95
   (E) None of these
2. What is the cash value of Rs. 4500 stock at Rs. 86·75 ?
   (A) Rs. 4000·50 (B) Rs. 3900·25
   (C) Rs. 3903·75 (D) Rs. 3894·25
   (E) None of these
3. A man invested Rs. 14400 in the hundred rupees shares of a company at 20% premium. If the company declares 5% dividend at the end of the year how much does he get ?
   (A) 720 (B) 600

(C) 500 (D) 650

(E) None of these

4. How much income shall be received by investing Rs. 1,260 in 3% stock at 84 ?

(A) Rs. 50 (B) Rs. 55

(C) Rs. 40 (D) Rs. 45

(E) None of these

5. A man invests Rs. 27000 partly in 6% stock at Rs. 126 and partial in 5% stock at Rs. 120. If his income is the same from both stocks find the two investments.

(A) 1300 and 1400

(B) 1250 and 1450

(C) 12600 and 14400

(D) 1360 and 1340

(E) None of these

6. I invest Rs. 12,805 in the 4% stock at Rs. $98\frac{1}{4}$%. When they have risen to Rs. $102\frac{5}{8}$%, I sell and reinvest the proceeds at Rs. $105\frac{5}{8}$% in $4\frac{1}{2}$%. Find the change in my income (Brokerage being 25 paisa per share).

(A) Rs. 47 increase (B) Rs. 50 increase

(C) Rs. 48 increase (D) Rs. 45 increase

(E) None of these

7. A person finds that if he invests his money in the $4\frac{1}{2}$% stock at Rs. 96, his income will be greater by Rs. 100 than if he invests in the 4% stock at Rs. 88. Find the money which he invests.

(A) Rs. 35,200 (B) Rs. 1,05,600

(C) Rs. 70,400 (D) Rs. 17,600

(E) None of these

8. If the rate of dividend is 5%, find the income by purchasing 20 shares of Rs. 50 each at Rs. 50

(A) Rs. 60 (B) Rs. 50

(C) Rs. 40 (D) Rs. 30

(E) None of these

CHAPTER–9

Work and Time

In each of the questions related to work and time, first of all the work done in 1 day is calculated. Then time taken to do total work is calculated by dividing 1 by the work done in one day. In other words.

Work done in 1 day $= \dfrac{1}{\text{Total number of days rquired to complete the work}}$

and total number of days required to complete the work $= \dfrac{1}{\text{work done in 1 day}}$

If a person completes a work in 10 days, then his work for 1 day $= \dfrac{1}{10}$ **and if a person does** $\dfrac{1}{10}$ **work in one day, then he will complete the whole work in** $1 \div \dfrac{1}{10} = 10$ **days.**

Note—1. If A completes a work in x days and B in y days then ratio of works done by in 1 day will be $y : x$.

2. If A does twice of the work done by B, then the ratio between the works done by A and B will be 2 : 1.

If the number of days to complete the work is less than the number of people required to complete the work will be more. In other words the ratio in which the number of people will increase, the number of days decreased will be in the ratio. For example, if 5 people complete a work in 4 days, then number of days required by 1 person to complete will be $4 \times 5 = 20$ days.

EXAMPLES

Example 1. 16 boys take 12 days to complete a work while 12 men do the same work in 8 days 16 men began to work. After 3 days 6 men left but 4 boys joined them. In how many days will be the remaining work be completed ?

Sol. 16 boys do in 12 days 1 work

$\therefore$ 1 boy will do in 1 day $= \dfrac{1}{16 \times 12} = \dfrac{1}{192}$

Similarly 1 man will do in 1 day $= \dfrac{1}{12 \times 8} = \dfrac{1}{96}$

$\therefore \quad \dfrac{\text{Work of 1 boy}}{\text{Work of 1 man}} = \dfrac{\frac{1}{192}}{\frac{1}{96}} = \dfrac{1}{2}$

$\Rightarrow$ Work of 2 boys = Work of 1 man

$\therefore$ (16 – 6) men + 4 boys = 10 men + 2 men = 12 men

and work done by 16 men in 3 days $= \frac{1}{96} \times 16 \times 3 = \frac{1}{2}$

$\therefore$ Remaining work $= 1 - \frac{1}{2} = \frac{1}{2}$

$\because$ 12 men do 1 work in $= 8$ days

$\therefore$ 12 men do $\frac{1}{2}$ work in $= \frac{8 \times 12 \times 1}{12 \times 2} = 4$ days **Ans.**

Example 2. 16 men can do a piece of work in 16 dyas. 4 days after they started the work, 8 more men joined them. How many days will they now take to complete the remaining work ?

Sol. Work done by 16 men in 16 days $= 1$

$\therefore$ Work done by 16 men in 4 days $= \frac{4}{16} = \frac{1}{4}$

Remaining work $= 1 - \frac{1}{4} = \frac{3}{4}$

Total no. of men now $= 16 + 8 = 24$

$\because$ 16 men do 1 work in $= 6$ days

$\therefore$ 24 men do $\frac{3}{4}$ work in $= \frac{16 \times 16 \times 3}{24 \times 4} = 8$ days **Ans.**

Example 3. Ramesh can do a work in 20 days. He worked alone for 10 days. Remaining work was completed with the help of Dinesh in 2 days. In how many days will the work be completed by both together ?

Sol. Work of Ramesh for 1 day $= \frac{1}{20}$

$\therefore$ Workd of Ramesh for 10 dyas $= \frac{1}{20} \times 10 = \frac{1}{2}$

Remaining work $= 1 - \frac{1}{2} = \frac{1}{2}$

$\because$ $\frac{1}{2}$ work is done by (Ramesh + Dinesh) $= 2$ days

$\therefore$ 1 work is done by (Ramesh + Dinesh) $= 2 \times 2 = 4$ days **Ans.**

Example 4. A water tank is filled by a pipe P alone in 30 minutes and by pipe Q alone in 40 minutes. Pipe R can empty the same tank in 25 minutes. If all the three pipes are opened together, how long will they take to fill the tank ?

Sol. Part of tank filled by P in 1 minute $= \frac{1}{30}$

Part of tank filled by Q in 1 minute $= \frac{1}{40}$

Part emptied by R in 1 minute $= \frac{1}{25}$

$\therefore$ Tank filled by (P + Q + R) in 1 minute $= \frac{1}{30} + \frac{1}{40} - \frac{1}{25} = \frac{20 + 15 - 24}{600} = \frac{11}{600}$

$\because$ $\frac{11}{600}$ part is filled in $= 1$ minute

$\therefore$ Full tank is filled in $= \frac{600}{11} = 54\frac{6}{11}$ minutes **Ans.**

Example 5. Sohan completes $\frac{1}{10}$th of the work daily. If Sohan and Deepak together complete the work in 6 days, then in how many days will Deepak alone take to complete the work ?

Sol. Work of Sohan for 1 day $= \frac{1}{10}$

and work of (Sohan + Deepak) for 1 day $= \frac{1}{6}$

$\therefore$ Work of Deepak for 1 day $= \frac{1}{6} - \frac{1}{10} = \frac{1}{15}$

$\because$ $\frac{1}{15}$ work is done by Deepak in $= 1$ day

$\therefore$ 1 work is done by Deepak in $=$ 15 days **Ans.**

EXERCISE 9

1. 14 persons can complete a work in 16 days. 8 persons started the work 12 days after they started the work 8 more persons joined them. How many days will they take to complete the remaining work ?
   (A) 12 (B) 7
   (C) 9 (D) 5
   (E) None of these
2. 15 men can complete a work in 10 days while 20 boys can complete the same work in 15 days. How many days will 10 men and 10 boys together take to complete the same work ?
   (A) 10 (B) 8
   (C) 12 (D) 9
   (E) None of these
3. 14 workers can make 1400 toys in 5 days. One day after they strated the work 14 more workers joined them. How many days will they take to complete the remaining work ?
   (A) 2 (B) 3
   (C) 4 (D) $3\frac{1}{2}$
   (E) None of these
4. 14 men can complete a work in 12 days. 4 days after they started the work, 2 more men joined them. How many days will they take to complete the remaining work ?
   (A) 9 (B) 5
   (C) 6 (D) 7
   (E) None of these
5. Rohan and Sunil separately can complete a work in 8 hours and 4 hours respectively. How much time will they take when working together ?
   (A) $2\frac{2}{3}$ hours (B) $1\frac{1}{3}$ hours
   (C) 3 hours (D) 2 hours
   (E) None of these
6. Ganesh, Ram and Sohan together can do a work in 16 dyas. If Ganesh and Ram together can do the same work in 24 days then, how long will take Sohan alone to do the same work ?
   (A) 42 days (B) 24 days
   (C) 36 days (D) 48 days
   (E) None of these
7. A and B together can do a work in 8 days. If A alone can do it in 12 days, then in how many days can B alone do it ?
   (A) 12 (B) 20
   (C) 24 (D) 28
   (E) None of these
8. A and B together can do a work in 24 days. B alone does its $\frac{1}{3}$ part in 12 days. How long will A alone take to do the remaining work ?
   (A) 48 (B) 36
   (C) 24 (D) 72
   (E) None of these
9. Ram, Dilip and Shekhar can complete a work in 20 days. If Ram and Dilip together can complete the same work in 30 days, then how long will Shekhar take to complete it ?
   (A) 60 (B) 62
   (C) 40 (D) 56
   (E) None of these
10. A and B separately can complete a work in 6 days and 3 days respectively. If they work together, then in how many days will they complete the work.
    (A) 4 (B) 3
    (C) 2 (D) 5
    (E) None of these

CHAPTER–10

Speed, Time and Distance

Main Formulae

1. Distance = Speed × Time **2. Speed = $\frac{\text{Distance}}{\text{Time}}$** **3. Time = $\frac{\text{Distance}}{\text{Speed}}$**

Note—While using the formulae given above, main consideration is of their units.

(i) If distance is given in kilometre, then speed should be in km/hr and time in hours.

(ii) If distance is given in metre, then speed should be in m/sec and time in seconds.

(iii) If speed is given in km/hr, then in order to convert it, in m/sec, it is multiplied by $\frac{5}{18}$.

For example, 18 km/hr = $18 \times \frac{5}{18} = 5$ m/sec

(iv) If speed is given in m/sec, then in order to convert it, in km/hr, it is multiplied by $\frac{18}{5}$.

For example, 10 m/sec = $10 \times \frac{18}{5} = 36$ km/hr

Relative speed

(i) If two trains are going in the same direction, then their relative speed is equal to the difference of their speeds.

(ii) If two trains are going in opposite direction, then their relative speed is equal to the sum of their speeds.

Ratio—(i) If the ratio between the speeds of two moving objects be $a : b$, then the ratio between the times in covering the same distance will be $b : a$.

(ii) If two objects A and B moving in opposite directions from two different place and reach at the common place in t_1 and t_2 hours respectively

Then $\frac{\text{Speed of A}}{\text{Speed of B}} = \sqrt{\frac{t_2}{t_1}}$ *i.e.*, speed is inversely proportional to time.

Average speed

If a moving object travels from A to B at the speed of x km/hr and from B to A at the speed of y km/hr, then

Its average speed for the whole journey = $\frac{2xy}{(x+y)}$ km/hr.

Some Instructions in concern with train

1. When a train is clearing a pole or a man, then distance covered by the train is equal to its length.

2. When a train passes a platform or a bridge or a tunnel, then distance covered is equal to the sum of its length and the length of the platform or bridge or tunnel.
3. When a moving train crosses another train, then distance covered is euqal to the sum of the lengths of both the trains.
4. x_1 metre long train is moving with y_1 metre/sec and x_2 metre long another train is moving with y_2 metre/sec.
   (i) If both the trains are running in the same direction then time taken by fast train to cross the slow train

$$= \frac{x_1 + x_2}{y_1 \sim y_2}$$

$$= \frac{\text{Sum of the lengths of both trains}}{\text{Difference of their speeds}}$$

(ii) If the trains are running in opposite directions then time taken to pass one another

$$= \frac{x_1 + x_2}{y_1 + y_2}$$

$$= \frac{\text{Sum of the lengths of both trains}}{\text{Some of their speeds}}$$

Example— A train 100 metre long is running at the speed of 21 km/hr and another train 150 metre long is running at the speed of 36 km/hr in the same direction. How long will the faster train take to pass the first train ?

Sol. : Sum of the lengths of both the trains $= x_1 + x_2 = 100 + 150$

$= 250$ m

Difference of their speeds $= y_1 \sim y_2 = 21 \sim 36$

$= 15$ km/hr

$= 15 \times \frac{5}{18}$ m/sec

$= \frac{25}{6}$ m/sec

$\therefore$ Required time $= \frac{250}{\frac{25}{6}} = 60$ seconds **Ans.**

Question with office concern

A person walking at x km/hr reaches his office t_1 minutes late. If he walks at y km/hr, he reaches there t_2 minutes earlier, then

The distance of the office from his house $= \frac{x \times y}{y - x} \times \frac{t_1 + t_2}{60}$ km.

Example— A person walking at $2\frac{1}{2}$ km/hr, reaches his office 6 minutes late. If he walks $3\frac{1}{2}$ km/hr, he reaches there 6 minutes earlier. How far is the office from his house ?

Sol. : Required distance $= \frac{2\frac{1}{2} \times 3\frac{1}{2}}{3\frac{1}{2} - 2\frac{1}{2}} \times \frac{6+6}{60}$ km

$= \frac{\frac{5}{2} \times \frac{7}{2}}{1} \times \frac{12}{60}$ km

$= \frac{35}{4} \times \frac{1}{5} = \frac{7}{4}$ km $= 1\frac{3}{4}$ km **Ans.**

Boats and Stream

(i) If a boat or a swimmer moves against the stream, then it is called **upstream** and if it moves in the direction of stream, then it is called **Downstream.**

(ii) When the speed of a boat or a swimmer is given, then we mean, the speed of the boat or swimmer in still water.

Main Formulae

If the speed of a swimmer or a boat be x km/hr and the speed of the stream by y km/hr, then

(i) Speed of the boat or swimmer in down stream = u km/hr
$= (x + y)$ km/hr

(ii) Speed of the boat or swimmer in upstream = v km/hr
$= (x - y)$ km/hr

(iii) Speed of the boat or swimmer in still water = $\frac{1}{2}$(Speed of the boat upstream + speed of the boat downstream)
$= \frac{1}{2}(u + v)$

(iv) Speed of the stream = $\frac{1}{2}$(Speed of boat downstream – speed of boat upstream)
$= \frac{1}{2}(u - v)$

EXAMPLES

Example 1. A car takes 5 hours to cover a distance of 300 km. How much should the speed in km/hr be maintained to cover the same distance in $\frac{4}{5}$th of the previous time ?

Sol. Distance = 300 km

Time = $\frac{4}{5}$ of 5 = 4 hours

$\therefore$ Required speed = $\frac{\text{Distance}}{\text{Time}} = \frac{300}{4}$

= 75 km/hr **Ans.**

Example 2. Lakshman covers a distance of 6 km in 45 minutes. If he covers half the distance in $\frac{2}{3}$rd of the time then, what speed should he maintain to cover the remaining distance in remaining time?

Sol. Total distance = 6 km

$\therefore$ Half distance = 3 km

Total time = 45 minutes

$\therefore$ Time taken to cover the distance of 3 km = $45 \times \frac{2}{3} = 30$ minutes

$\therefore$ Remaining time = 45 – 30 = 15 minutes
$= \frac{1}{4}$ hour

and remaining distance = $6 - 3 = 3$ km

$\therefore$ Required speed = $\frac{3}{\frac{1}{4}} = 12$ km/hr **Ans.**

Example 3. A man coveres a distance of 160 km at 64 km/hr and next 160 km at 80 km/hr. What is his average speed for his whole journey of 320 km ?

Sol. Total time = $\frac{160}{64} + \frac{160}{80}$

= 4·5 hours

and total distance = 160 + 160

= 320 km

$\therefore$ Average speed = $\frac{320}{4{\cdot}5} = 71{\cdot}11$ km/hr **Ans.**

Short cut Method :

$$\text{Average speed} = \frac{2 \times \text{First speed} \times \text{Second speed}}{(\text{First speed} + \text{Second speed})}$$

$$= \frac{2 \times 64 \times 80}{(64 + 80)}$$

$$= \frac{10240}{144}$$

$= 71{\cdot}11$ km/hr **Ans.**

Example 4. What will be the length of the train P when it is running at 60 km/hr and crosses another train Q running in opposite direction, in 18 seconds ? In order to answer this question which of the statements (a) and (b) is/are sufficient ?

(a) Length of the train Q is 80 metre

(b) Speed of the train Q is 90 km/hr

Sol. Both statements (a) and (b) together are necessary

$\because$ The trains are running in opposite directions

$\therefore$ Relative speed = $90 + 60 = 150$ km/hr

$$= \frac{150 \times 5}{18}$$

$$= \frac{125}{3} \text{ m/sec.}$$

If the length of the train P be x metre.

Then $x + 80 = \frac{125}{3} \times 18$

$\Rightarrow$ $x + 80 = 750$

$\therefore$ $x = 750 - 80 = 670$ m **Ans.**

Example 5. A boat takes 3 hour to go from P to Q downstream and from Q to P upstream. What is the speed of the boat in still water ? To know the answer of this question, the knowledge of which of the statements (a) and (b) is/are sufficient ?

(a) The distance between P and Q is 6 km.

(b) The speed of the river is 2 km/hr.

Sol. Both statements (a) and (b) together are necessary to the question.

Let the speed of the boat in still water be x km/hr.

$\therefore$ Speed of the boat down stream $= (x + 2)$ km/hr

and speed of the boat upstream $= (x - 2)$ km/hr

$\because$ $$3 = \frac{6}{x+2} + \frac{6}{x-2}$$

$\Rightarrow$ $$\frac{3}{6} = \frac{1}{x+2} + \frac{1}{x-2}$$

$\Rightarrow$ $$\frac{1}{2} = \frac{x-2+x+2}{(x+2)(x-2)}$$

$\Rightarrow$ $$4x = x^2 - 4$$

$\Rightarrow$ $$x^2 - 4x - 4 = 0$$

$\therefore$ $$x = (2 \pm 2\sqrt{2}) = 2(1 \pm \sqrt{2})$$

Now x can be calculated. **Ans.**

EXERCISE 10

1. A railway train crosses another train which is running in opposite direction with speed of 80 km/hr, in 12 seconds. To find the speed of the first train, the knowledge of which of the two statements (a) and (b) is/are sufficient ?

   (a) Length of the first train.

   (b) Length of the second train.

   (A) Either (a) or (b) alone is sufficient
   (B) Only (b) is sufficient
   (C) (a) and (b) both together are needed
   (D) (a) and (b) together is also not sufficient
   (E) Only (a) alone is sufficient

2. A boat takes 3 hour to go from P to Q downstream and from Q to P upstream. What is the speed of the boat in still water ? To know the answer of this question the knowledge of which of the statements (a) and (b) is/are sufficient ?

   (a) The speed of the current is 1 km/hr.

   (b) The distance between P and Q is 4 km.

   (A) (a) and (b) together are not sufficient
   (B) (a) and (b) together are needed
   (C) (a) alone is sufficient
   (D) (b) alone is sufficient
   (E) Either (a) or (b) is sufficient

3. A train running with a uniform speed crosses a platform in 20 seconds. To determine the speed of the train, the knowledge of which of the statements (a) and (b) is/are sufficient ?

   (a) Length of the train
   (b) Length of the platform
   (A) Only (a) is sufficient
   (B) Only (b) is sufficient
   (C) Either (a) or (b) is sufficient
   (D) (a) and (b) together are also not sufficient
   (E) (a) and (b) both together are necessary

4. A train is running at the speed of 84 km per hour. If it passes a man walking in opposite direction at the speed of 6 km/hr in 4 seconds, what is the length of the train in metre ?

   (A) 75 (B) 180
   (C) 200 (D) 150
   (E) None of these

5. If a 100 metre long train which is moving at 50 km. per hour, crosses another train which is 120 metre long and moving in opposite direction in 6 seconds, what is the speed of the second train ?

   (A) 132 km/hr (B) 83 km/hr
   (C) 60 km/hr (D) 50 km/hr
   (E) None of these

6. A train running at a speed of 120 km/hr crosses another train running in opposite direction in 9 seconds. To find out the length of the first train, the knowledge of which of the statements (P) and (Q) is/are sufficient ?
(P) Speed of the second train
(Q) Length of the second train
(A) Only (P) is sufficient
(B) (Q) alone is sufficient
(C) Either (P) or (Q) is sufficient
(D) (P) and (Q) together are also not sufficient
(E) (P) and (Q) together are necessary

7. A boat travels from P to Q along the current and from Q to P against the current in 3 hours. If the speed of the boat in still water is 4 km/hr then, what is the distance between P and Q ?
(A) 8 km (B) 6 km
(C) 12 km (D) Data inadequate
(E) None of these

8. A train running at 90 km/hr crosses a pole in 10 seconds. What is the length of the train ?
(A) 250 m (B) 150 m
(C) 900 m (D) Data inadequate
(E) None of these

9. Train A, crosses another train B running in opposite direction in 9 seconds. What is the speed of the train A ? To know the answer of this question the knowledge of which of the following statement is/are sufficient ?
(i) Speed of the train B
(ii) Length of the train A
(iii) Length of the train B
(A) (i) alone is sufficient
(B) (ii) and (iii) together are necessary
(C) (i), (ii) and (iii) together are necessary
(D) (i), (ii) and (iii) together are not sufficient
(E) (i) and (ii) are sufficient ?

10. 150 metre long train takes 10 seconds to pass a man who is going in the same direction at the speed of 2 km/hr. What is the speed of the train ?
(A) 52 km/hr (B) 56 km/hr
(C) 84 km/hr (D) Data inadequate
(E) None of these

CHAPTER–11

Unitary Method

The method in which the value of a unit is first found is called the Unitary Method. Therefore, in solving any question by this method the value of 1 unit is first found and then the value of those units is found which is to be found.

The following points are to be kept in mind while solving the questions by this method :

1. The term in which the answer is to be calculated, is always put to the right hand side.
2. The term to the right hand side is never put in the denominator.
3. If on reducing to the unit, a smaller result is expected, then the right hand term is divided by the left hand term.
4. If on reducing to the unit, a greater result is expected, then the right hand term is multiplied by the left hand term.

EXAMPLES

Example 1. The price of one dozen pens is Rs. 540. What will be the price of 319 such pens ?

Sol. $\because$ Price of 12 pens = Rs. 540

$\Rightarrow$ Price of 1 pen $= \frac{540}{12}$

$\therefore$ Price of 319 pens $= \frac{540 \times 319}{12} =$ Rs. 14355 **Ans.**

Example 2. A chair costs Rs. 341 and a table costs Rs. 852. What will be the approximate cost of 5 dozens of chairs and 4 dozens of tables ?

Sol. 5 dozens = $12 \times 5 = 60$

and 4 dozen = $12 \times 4 = 48$

$\because$ Cost of 1 chair = Rs. 341

$\Rightarrow$ Cost of 60 chairs = $341 \times 60 =$ Rs. 20460

and cost of 1 table = Rs. 852

$\Rightarrow$ Cost of 48 tables = $852 \times 48 =$ Rs. 40896

$\therefore$ Cost of 5 dozens of chairs and 4 dozens of tables

= $20460 + 40896 =$ Rs. 61356 **Ans.**

Example 3. A tank can be filled by 20 buckets each of capacity 13·5 litre. If the capacity of each bucket be 9 litre, how many bucket will fill the same tank ?

Sol. $\because$ To fill the tank the number of buckets each of capacity 13·5 litre required is 20.

$\Rightarrow$ To fill the tank the number of buckets each of capacity 1 litre required is

$= 20 \times 13{\cdot}5$

$\therefore$ To fill the tank the number of buckets each of capacity 9 litre required is

$= \frac{20 \times 13{\cdot}5}{9} = 30$ buckets. **Ans.**

Example 4. If 4 men or 7 women do a work in 60 days, in how many days will 8 men and 7 women finish the same work ?

Sol. $\because$ Work of 4 men = work of 7 women

$\therefore$ Work of 1 man = work of $\frac{7}{4}$ women

$\therefore$ Work of 8 men = work of $\frac{7}{4} \times 8 = 14$ women

$\therefore$ Work of 8 men and 7 women = work of $(14 + 7) = 21$ women

$\because$ 7 women complete the work in 60 days.

$\Rightarrow$ 1 woman complete the work in (60×7) days.

$\therefore$ 21 women will complete the work in $= \frac{60 \times 7}{21} = 20$ days **Ans.**

EXERCISE 11

1. If the weight of 13 metre long rod is 23·4 kg, what is the weight of 6 metre long rod ?
   (A) 7·2 kg (B) 10·8 kg
   (C) 12·4 kg (D) 18·0 kg
   (E) None of these
2. If the cost of three dozens mangoes is Rs. 245, what will be the approximate cost of 353 mangoes ?
   (A) Rs. 2,200 (B) Rs. 2,000
   (C) Rs. 2,400 (D) Rs. 2,600
   (E) None of these
3. If the cost of $\frac{1}{4}$th of kg is Rs. 0·60, then what is the cost of 200 gm.
   (A) 42 paise (B) 48 paise
   (C) 40 paise (D) 50 paise
   (E) None of these
4. The cost of 2 tables is equal to the cost of 5 chairs. If the difference of the cost of one table and one chair is Rs. 1,200, then the cost of one chair is ?
   (A) Rs. 500 (B) Rs. 400
   (C) Rs. 800 (D) Rs. 600
   (E) None of these
5. When a 192 metre long rod is cut down into small pieces of length 3·2 metre each. Then how many pieces are available ?
   (A) 52 (B) 68
   (C) 62 (D) 58
   (E) None of these
6. 357 mangoes cost Rs. 1517·25, then what is the cost of 49 dozen of mangoes ?
   (A) Rs. 2,500 (B) Rs. 2,600
   (C) Rs. 3,000 (D) Rs. 2,200
   (E) None of these
7. Cost of 7000 bricks is Rs. 5740. Cost of luggage to carry the bricks to the building place is Rs. 805. What is the cost at per thousand bricks ?
   (A) Rs. 900 (B) Rs. 800
   (C) Rs. 935 (D) Rs. 750
   (E) None of these
8. Five dozen toys are packed in a box and 98 boxes are kept in one tempo. How many tempoes can lift 2,9400 toys in one round ?
   (A) 4 (B) 5
   (C) 7 (D) 6
   (E) None of these
9. Cost of $\frac{1}{4}$th dozen of bananas is Rs. 2·38, then what is the approximate cost of 42 dozen of bananas ?
   (A) Rs. 430 (B) Rs. 540
   (C) Rs. 380 (D) Rs. 400
   (E) None of these
10. Cost of 1 chair is Rs. 214 and cost of one table, is Rs. 937, then what is the approximate cost of 6 dozen chairs and 4 dozen tables ?
    (A) Rs. 60,000 (B) 58,000
    (C) 55,000 (D) 62,000
    (E) None of these

CHAPTER–12

Problems Based on Ages

Generally problems based on ages are asked in all competitive examinations. These questions are solved with the help of Algebra. Therefore, the knowledge of equations is essential for this. But simple formulae are also helpful in solving some problems.

Essential points :

1. If the present age of A is x years, the age of A, n years ago was $(x - n)$ years and the age of A after n years will be $(x + n)$ years.
2. The present ages of A and B are x years and y years respectively. If the age of A is 3 times the age of B, then the equation will be as follows :

$$x = 3y$$

or, $$x - 3y = 0$$

EXAMPLES

Example 1. The ratio between the present ages of Naveen and Prabhat is 4 : 5. If after 5 years the ratio of the present age of Prabhat and the age of Prabhat at that time is 7 : 8, what will be the ratio between the present age of Naveen and Naveen's age after 4 years ?

Sol. Let the present age of Naveen be $4x$ years

$\therefore$ Present age of Prabhat $= 5x$ years

$\because$ $\dfrac{5x}{5x+5} = \dfrac{7}{8}$

$\Rightarrow$ $40x = 35x + 35$

$\Rightarrow$ $40x - 35x = 35$

$\Rightarrow$ $5x = 35$

$\therefore$ $x = 7$

$\therefore$ Present age of Naveen $= 4 \times 7 = 28$ years.

and age of Naveen after 4 years $= 28 + 4 = 32$ years

$\therefore$ Reqd. ratio $= \dfrac{28}{32} = 7 : 8$ **Ans.**

Example 2. Pushpa was married 6 years ago. Her present age is $1\frac{1}{4}$ times of the age at the time of her marriage. Her son's age is $\frac{1}{10}$th of her present age. What is the present age of her son ?

Sol. Let the present age of Pushpa be x years

$\because$ $x = (x - 6)\dfrac{5}{4}$

$\Rightarrow$ $4x = 5x - 30$

$\Rightarrow \quad x = 30$

$\therefore$ Her son's age $= \frac{x}{10} = \frac{30}{10} = 3$ years **Ans.**

Example 3. Atul is 30 years younger than his uncle today. 5 years ago Atul was $\frac{1}{4}$th as old as his uncle. How old will Atul's uncle be 5 years from today ?

Sol. Let the present age of the uncle be x years

$\because$ Atul's present age $= (x - 30)$ years

and uncle's age 5 years ago $= (x - 5)$ years

$\therefore$ Atul's age 5 years ago $= (x - 30 - 5)$ years $= (x - 35)$ years

$\because \quad (x - 5)\frac{1}{4} = x - 35$

$\Rightarrow \quad 4x - 140 = x - 5$

$\Rightarrow \quad 4x - x = -5 + 140$

$\Rightarrow \quad 3x = 135$

$\therefore \quad x = \frac{135}{3} = 45$ years

$\therefore$ Age of uncle after 5 years $= 45 + 5 = 50$ years **Ans.**

Example 4. Age of Satish who is 40 years old, is $\frac{4}{7}$ times of Madan and Madan is older than Ajay by 50 years. If Vijay's age is just between the age of Ramesh and Ajay and Ramesh is 30 years old, what is age of Vijay ?

Sol. Satish's age $= \frac{4}{7}$ of the age of Madan

$\therefore \quad 40 = \frac{4}{7}$ of the age of Madan

$\therefore$ Madan's age $= \frac{40 \times 7}{4} = 70$ years

$\therefore$ Ajay's age $= 70 - 50 = 20$ years

$\therefore$ But Ramesh's age $= 30$ years

$\therefore$ Vijay's age $= \frac{20 + 30}{2} = 25$ years **Ans.**

Example 5. If from the present age of Guljar 6 years is subtracted and the remainder is divided by 18, the result is the present age of his grandson Anup. If Anup is 2 years younger to Mahesh and Mahesh at present is 5 years old, what is the present age of Guljar ?

Sol. Let the present ages of Guljar and Anup be x years and y years respectively.

$\because$ According to the first condition

$$\frac{x - 6}{18} = y$$

$\therefore \quad x = 18y + 6 \quad \ldots(1)$

According to the second condition

$$y = 5 - 2$$

$\therefore \quad y = 3 \quad \ldots(2)$

$\therefore \quad x = 6 + 54 = 60$

$\therefore$ The present age of Guljar is 60 years. **Ans.**

EXERCISE 12

1. The ratio between the present ages of Sudhir and Madan is 4 : 5. If after five years the ratio of their ages becomes 5 : 6, what is the present age of Sudhir ?
   (A) 18 years (B) 20 years
   (C) 22 years (D) 21 years
   (E) None of these
2. 5 years ago, the age of Lata was two times the age of Arun. 10 years hence from today the age of Lata will be $\frac{4}{3}$ times the age of Arun. What is the present age of Lata ?
   (A) 20 years (B) 22 years
   (C) 24 years (D) 18 years
   (E) None of these
3. The ratio between the present ages of Kunal and Ganesh is 3 : 5. If 4 years hence Kunal will be younger than Ganesh by 12 years, what is the present age of Kunal ?
   (A) 17 years (B) 19 years
   (C) 22 years (D) 16 years
   (E) None of these
4. If a son is younger than his father by 25 years and the father was 45 years old 4 years ago, what will be the total age of the father and son after 5 years ?
   (A) 82 years (B) 88 years
   (C) 83 years (D) 78 years
   (E) None of these
5. The sum of the ages of Yogesh, Prakash and Sameer is 93 years. 10 years ago the ratio of their ages was 2 : 3 : 4. What is the present age of Sameer ?
   (A) 32 years (B) 24 years
   (C) 34 years (D) 42 years
   (E) None of these
6. After 6 years Pradhan's age will be $\frac{3}{7}$ times the age of his father. 10 years ago the ratio in the age of Pradhan and his father was 1 : 5. What is the present age of Pradhan's father ?
   (A) 40 years
   (B) 50 years
   (C) 56 years
   (D) Data is inadequate
   (E) None of these
7. The age ratio in the ages of A and B, 1 year ago was 3 : 4. While it will be 5 : 6 after 1 year. What is the present age of B ?
   (A) 3 years
   (B) 4 years
   (C) 6 years
   (D) Data is inadequate
   (E) None of these
8. The ratio in the ages of Vimal and Aruna is 3 : 5 and the sum of their ages is 80 years. What will be the ratio in their ages after 10 years ?
   (A) 3 : 2 (B) 3 : 5
   (C) 2 : 3 (D) 1 : 2
   (E) None of these
9. The age of Sushil 6 years ago was three times the age of Snehal. 6 years hence the age of Sushil would be $\frac{5}{3}$ times that of Snehal. What is the present age of Snehal.
   (A) 14 years (B) 22 years
   (C) 18 years (D) 21 years
   (E) None of these
10. The ratio in the present ages of Ramesh and Jayesh is 3 : 2. Four years ago Ramesh's age was more than Jayesh's age by 6 years. What is the present age of Jayesh ?
    (A) 18 years
    (B) 12 years
    (C) 6 years
    (D) Data is inadequate
    (E) None of these

CHAPTER–13

Problems Based on Fraction

Fraction— The relation to represent some part of the body to the whole body is known *Fraction*.

For Example—$\frac{4}{5}$ means 4 parts taken out of 5 equal parts of body.

One-quarter part of the body = $\frac{1}{4}$ of it

One-third part of the body = $\frac{1}{3}$ of it

Half part of the body = $\frac{1}{2}$ of it

Three-fourth part of the body = $\frac{3}{4}$ of it

Whole part of the body = 1 of it

One-seventh part of the body = $\frac{1}{7}$ of it

and One-fifth part of the body = $\frac{1}{5}$ of it

Numerator—The upper part of a fraction is known as numerator of the fraction.

Denominator—The lower part of a fraction is known as denominator of the fraction.

EXAMPLES

Example 1. Prakash gave one-fourth of his money to Sameer in turn gave half of what he received to Jayesh. If the difference between the money left with Prakash and the money received by Jayesh is of Rs. 500, what did Sameer get from prakash ?

Sol. Let the money initially with Prakash be Rs. x

$\therefore$ Money received by Sameer from Prakash = Rs. $\frac{x}{4}$

and money received by Jayesh = $\frac{1}{2} \times \frac{x}{4}$

= Rs. $\frac{x}{8}$

$\therefore$ Money left with Prakash = $x - \frac{x}{4}$

= Rs. $\frac{3x}{4}$

$\because \quad \frac{3x}{4} - \frac{x}{8} = 500$

$\Rightarrow \quad \frac{5x}{8} = 500$

$\therefore \quad x = 500 \times \frac{8}{5}$

$= \text{Rs. } 800$

$\therefore$ Money received by Sameer from Prakash $= \frac{x}{4}$

$= \frac{800}{4}$

$= \text{Rs. } 200$ **Ans.**

Example 2. Prashant gave 30% of his money to Tarun. Tarun in turn gave $\frac{2}{3}$rd of what he received to Jayesh. Jayesh gave Rs. 100 from the money he received to a taxi driver, then he is left with Rs. 300. What was the money with Prashant initially ?

Sol. Let the money initially with Prashant be Rs. x.

$\therefore$ Money received by Tarun from Prashant $=$ 30% of x

$= \text{Rs. } \frac{3x}{10}$

and money received by Jayesh from Tarun $= \frac{2}{3} \times \frac{3x}{10}$

$= \text{Rs. } \frac{x}{5}$

$\because \quad \frac{x}{5} - 100 = 300$

$\Rightarrow \quad \frac{x}{5} = 300 + 100$

$= 400$

$\therefore \quad x = 400 \times 5$

$= \text{Rs. } 2000$ **Ans.**

Example 3. $\frac{1}{4}$th part of the money of Nikhil is equal to $\frac{1}{6}$th part of the money of Yogesh. If total sum of money of both is equal to Rs. 600 then. What is the difference of their money ?

Sol. Let the money with Nikhil be Rs. x

$\therefore \quad$ Total money of both $=$ Rs. 600

$\therefore \quad$ Money with Yogesh $=$ Rs. $(600 - x)$

$\because \quad \frac{1}{4}$ of $x = \frac{1}{6}$ of $(600 - x)$

$\Rightarrow \quad 6x = 2400 - 4x$

$\Rightarrow \quad 6x + 4x = 2{,}400$

$\therefore \quad x = \frac{2{,}400}{10} = \text{Rs. } 240$

$\therefore \quad$ Money with Yogesh $= 600 - 240 = \text{Rs. } 360$

$\therefore \quad$ Reqd. difference $= 360 - 240 = \text{Rs. } 120$ **Ans.**

Example 4. 70 cm long wire is cut into two parts such that first part is equal to $\frac{2}{5}$th of the second part. What is the length of the small wire ?

Sol. Let the length of the second part be x cm

$\therefore$ Length of the first part $= \frac{2x}{5}$ cm

$\because$ $x + \frac{2x}{5} = 70$

$\Rightarrow$ $\frac{7x}{5} = 70$

$\therefore$ $x = \frac{70 \times 5}{7} = 50$

$\therefore$ Length of the small wire $= 70 - 50$

$= 20$ cm **Ans.**

Example 5. In an office there are 114 tables and 129 chairs. If $\frac{1}{6}$ of the tables and $\frac{1}{3}$ of the chairs are broken, how many people work in the office when each person requires one table and one chair ?

Sol. No. of tables broken $= \frac{1}{6} \times 114 = 19$

and no. of chairs broken $= \frac{1}{3} \times 129 = 43$

$\therefore$ No. of tables in working order $= 114 - 19 = 95$

and no. of chairs in working order $= 129 - 43 = 86$

$\because$ 1 chair and 1 table are required by each person

$\therefore$ Reqd. number of working persons $= 86$ **Ans.**

EXERCISE 13

1. A tank is filled with $\frac{3}{4}$ part of it with water. If 5 litre of water is added to it, the tank is filled with $\frac{4}{5}$ part of it. What is the capacity of the tank ?
   (A) 100 litre (B) 120 litre
   (C) 50 litre (D) 110 litre
   (E) None of these

2. $\frac{1}{3}$ part of the marks obtained by Gauri in History are equal to the marks obtained by her in Geography. If her total marks in these both subjects are equal to 160, how many marks did she get in Geography ?
   (A) 50 (B) 62
   (C) 45 (D) 40
   (E) None of these

3. Arun buys a shirt for Rs. 180. He buys a kurta whose cost is $\frac{2}{3}$ of the cost of the shirt and also a saree whose cost is $2\frac{1}{2}$ times of the cost of the shirt for his wife. How much did he spend for all these items ?
   (A) Rs. 450 (B) Rs. 500
   (C) Rs. 600 (D) Rs. 380
   (E) None of these

4. Out of 150 donors, $\frac{1}{3}$ are men and remaining are women. Each male donor donates Rs. 2,000 per year and each female donor donates $\frac{1}{5}$ of that amount. What is the total yearly collection through donations ?
   (A) Rs. 1,50,000 (B) Rs. 1,50,250

(C) Rs. 1,40,350 (D) Rs. 1,40,200
(E) None of these

5. A 63 cm long wire is to cut into two pieces such that one piece will be $\frac{2}{5}$ as long as the other. How many centimetre will the shorter piece be ?
(A) 16 cm (B) 45 cm
(C) 22 cm (D) 18 cm
(E) None of these

6. The width of a rectangular hall is $\frac{3}{4}$ of its length. If the area of the hall is 300 sq. m, what is the difference between its length and breadth ?
(A) 4 m (B) 5 m
(C) 15 m (D) 8 m
(E) None of these

7. Prabodh gave a portion of his money to Subodh. Subodh in turn gave one-third of what he received to Amal and Amal gave one-half of what he received to Prabir. If Prabir got Rs. 5, how much money did Prabodh have ?
(A) Rs. 520
(B) Rs. 480
(C) Rs. 660
(D) Data is inadequate
(E) None of these

8. $\frac{1}{5}$th of the girls and $\frac{1}{8}$th part of the boys participated in a social camp. Which part of the total students of the college took part ?
(A) $\frac{13}{40}$
(B) $\frac{13}{80}$
(C) $\frac{2}{13}$
(D) Data is inadequate
(E) None of these

9. One-fifth of Gopal's expenditure is equal to one-half of his savings. If his monthly income is Rs. 5,600 how much amount does he save per month ?
(A) Rs. 1,350 (B) Rs. 1,500
(C) Rs. 1.680 (D) Rs. 1,400
(E) None of these

10. Ragni gave $\frac{1}{2}$ part of her money to Jaya and Jaya gave $\frac{1}{4}$ part of that money to Savita. If Savita got Rs. 450 from Jaya, then how much money Jaya get from Ragni ?
(A) Rs. 1,800
(B) Rs. 2,000
(C) Rs. 1,860
(D) Data is inadequate
(E) None of these

CHAPTER–14

Problems Based on Numbers

To solve the questions based on numbers, the number is to be written in algebraic form. For the example let the number be x.

The numerator of a fraction is written in the following form—

Three-fourth of a number $= x \times \frac{3}{4} = \frac{3x}{4}$.

Two-third of a number $= x \times \frac{2}{3} = \frac{2x}{3}$.

Double of a number $= 2x$.

Thrice of a number $= 3x$.

20% of a number $= \frac{x \times 20}{100} = \frac{x}{5}$

and 120% of a number $= \frac{120x}{100} = \frac{6x}{5}$.

30% of $\frac{3}{4}$ of one-third of a number $= x \times \frac{1}{3} \times \frac{3}{4} \times \frac{30}{100}$.

Three consecutive odd numbers are x , $(x + 2)$ and $(x + 4)$, or $(x – 2)$, x and $(x + 2)$, where x is an odd number.

Similarly three consecutive even numbers are x, $(x + 2)$ and $(x + 4)$ or $(x – 2)$, x and $(x + 2)$ where x is an even number.

Main Formulae :

(i) $(x – y)^2 = (x + y)^2 – 4xy$ (ii) $(x + y)^2 = (x – y)^2 + 4xy$

(iii) $(x + y)^2 = x^2 + 2xy + y^2$ (iv) $(x – y)^2 = x^2 – 2xy + y^2$ and

(v) $xy = \frac{1}{4}[(x + y)^2 – (x – y)^2]$

EXAMPLES

Example 1. The difference between the middle number of three consecutive odd numbers and the middle number of three consecutive even numbers is 7. What will be the difference between the total of these odd numbers and the total of those three even numbers ?

Sol. Let three consecutive odd numbers be x, $x + 2$and $x + 4$ and let three consecutive even numbers by y, $y + 2$ and $y + 4$

$\because$ $(x + 2) – (y + 2) = 7$

$\therefore$ $x – y = 7$

$\therefore$ Sum of three consecutive odd numbers $= x + x + 2 + x + 4$

$= 3x + 6$

and sum of three consecutive even numbers $= y + y + 2 + y + 4 = 3y + 6$

$\therefore$ Reqd. difference $= (3x + 6) - (3y + 6) = 3x - 3y$

$= 3(x - y) = 3 \times 7 = 21$ **Ans.**

Short-cut Method :

Let three consecutive odd numbers be $y - 2$, y and $y + 2$ respectively

$\therefore$ Total of these odd numbers $= 3y$

Let three consecutive even numbers be $x - 2$, x and $x + 2$ respectively

$\therefore$ Total of these even numbers $= 3x$

$\because$ $x - y = 7$

$\therefore$ $3x - 3y = 21$ **Ans.**

Example 2. When 40% of first number is added to the second number the second number becomes 1·2 times of itself. What is the ratio between the first and second numbers ?

Sol. Let the first and second numbers be x and y respectively.

$\because$ $x \times \frac{40}{100} + y = 1{\cdot}2y$

$\Rightarrow$ $\frac{2}{5} \times x = 1{\cdot}2y - y$

$\Rightarrow$ $2x = 0{\cdot}2y \times 5 = y$

$\therefore$ $\frac{x}{y} = \frac{1}{2}$

$\therefore$ $x : y = 1 : 2$ **Ans.**

Example 3. The difference of two numbers of two digit each is 24 while the sum of these two numbers is 102. What is the larger number ?

Sol. $\because$ Larger number $= \frac{\text{Sum of two numbers + Difference of two numbers}}{2}$

$= \frac{102 + 24}{2} = \frac{126}{2} = 63$ **Ans.**

Example 4. The sum of three consecutive even numbers is 28 more than the average of these three numbers. What is the first of these three numbers ?

Sol. Let the three consecutive even numbers be x, $(x + 2)$ and $(x + 4)$

$\because$ $x + (x + 2) + (x + 4) = \frac{x + (x + 2) + (x + 4)}{3} + 28$

$\Rightarrow$ $(3x + 6) \times 3 = 3x + 6 + 84$

$\Rightarrow$ $9x + 18 = 3x + 90$

$\Rightarrow$ $6x = 72$

$\therefore$ $x = \frac{72}{6} = 12$ **Ans.**

Example 5. The product of two numbers is 24 times the difference of these two numbers. If the sum of these numbers is 14, what is the larger number ?

Sol. Let the larger number be x and the smaller be y

$\because$ $xy = 24(x - y)$ …(1)

and $x + y = 14$ …(2)

But $(x - y)^2 = (x + y)^2 - 4xy$

$\Rightarrow \quad (x-y)^2 = (14)^2 - 96(x-y)$

$\Rightarrow \quad (x-y)^2 + 96(x-y) - 196 = 0$

$\Rightarrow \quad (x-y)^2 + 98(x-y) - 2(x-y) - 196 = 0$

$\Rightarrow \quad (x-y)\,[x-y+98] - 2[x-y+98] = 0$

$\Rightarrow \quad (x-y+98)\,(x-y-2) = 0$

$\therefore \quad (x-y) = 2 \text{ or } -98$

When $x+y = 14$

and $x-y = 2$

$\therefore \quad x = 8$

Hence the larger number is 8 **Ans.**

EXERCISE 14

1. The sum of three consecutive add numbers is 20 more than the first number of these. What is the middle number ?
   (A) 7 (B) 8
   (C) 12 (D) 9
   (E) None of these
2. The sum of three numbers is 174. The ratio of second number to the third number is 9 : 16 and the ratio of first to the third number is 1 : 4. What is the second number ?
   (A) 52
   (B) 45
   (C) 54
   (D) Data is inadequate
   (E) None of these
3. When 30% of one number is added to second number, the second number increases by one-fifth. What is the ratio of the first number to the second number ?
   (A) 5 : 6 (B) 3 : 2
   (C) 2 : 3 (D) 1 : 2
   (E) None of these
4. The difference between a two-digit number and the number obtained by interchanging the position of the digits is 45. What is the difference between the digits of that number ?
   (A) 4 (B) 5
   (C) 6 (D) 7
   (E) None of these
5. If on subtracting 28 from a number, the remainder is one-third of the number. What is 50% of the number ?
   (A) 23 (B) 24
   (C) 22 (D) 36
   (E) None of these
6. If one-third of a number is 10 more than one-fourth of the same number, what is 60% of that number ?
   (A) 144 (B) 24
   (C) 18 (D) 72
   (E) None of these
7. The difference between a number of two-digit and the number obtained by interchanging its digits is 63. What is the difference between its digits ?
   (A) 5 (B) 6
   (C) 7 (D) 8
   (E) None of these
8. If the difference between the digits of a two digit number is 3 and the product of the digits is 18, what is the sum of the digits of that number ?
   (A) 8 (B) 9
   (C) 7 (D) 6
   (E) None of these
9. If the sum of the digits of a two-digit number is 9 and the difference of those digits is 3, what is the product of the digits of the same number ?
   (A) 9 (B) 36
   (C) 18 (D) 72
   (E) None of these
10. If one-fourth of $\frac{3}{5}$ of two-third of number is 34, what is 20% of the number ?
    (A) 68 (B) 36
    (C) 86 (D) 63
    (E) None of these

CHAPTER–15

Alligation

Rule of alligation—If two different things, one of which is cheaper than the other, are mixed in a certain ratio to obtain a new mixture, the C.P. of the unit value of this new mixture is called the **average price** or **mean price.**

$$\therefore \quad \frac{\text{Quantity of cheaper}}{\text{Quantity of dearer}} = \frac{\text{(C.P. of dearer) – (Mean Price)}}{\text{(Mean price) – (C.P. of cheaper)}}$$

$$\Rightarrow \quad \text{C.P. of unit quantity of cheaper} \qquad \text{C.P. of unit quantity of dearer}$$

$$(c) \qquad\qquad (d)$$

$$\text{Mean price } (m)$$

$$(d-m) \qquad\qquad (m-c)$$

Cheaper quantity : dearer quantity

$$= (d-m) : (m-c)$$

Some other Important Formulae

1. In what ratio should two commodities of Rs. A per kg and Rs. B per kg respectively be mixed so that the resulting mixture may cost Rs. C per kg ?

$$\text{Reqd. ratio} = \frac{C \sim B}{C \sim A} = \frac{\text{Mean price} \sim \text{Second price}}{\text{Mean price} \sim \text{First price}}$$

Example— A tea merchant blends two types of tea costing Rs. 15 per kg and Rs. 20 per kg each repectively. In what ratio should these two types of tea be mixed so that the resulting mixture may cost Rs. 16·50 per kg ?

Sol. :

$$15 \qquad\qquad 20$$

$$16{\cdot}50$$

$$3{\cdot}50 \qquad\qquad 1{\cdot}50$$

$\therefore$ Reqd. ratio $= \frac{3{\cdot}50}{1{\cdot}50}$

$= \frac{35}{15}$

$= 7 : 3$ **Ans.**

2. When water is mixed in milk or any liquid in such a way that the resulting mixture may give a profit of $x\%$ when sold at the C.P. of the milk of liquid only then the ratio of water and milk is given by—

$$\text{Water : Milk} = x : 100$$

Example—In what ratio should water be mixed in the spirit so that there is a gain of $16\frac{2}{3}\%$ when the resulting mixture is sold at the C.P. of the spirit only ?

Sol. : Water : Spirit $= 16\frac{2}{3} : 100$

$= \frac{50}{3} : 100$

$= 1 : 6$ **Ans.**

EXAMPLES

Example 1. 21 litre of a mixture of 95% purity is obtained when two solutions are mixed. If the purity of one solution be 90% and of the purity of other be 97%, then how much solution of purity 97% is taken ?

Sol. Ratio in solution of 90% and 97% $= \frac{97 - 95}{95 - 90}$

$= \frac{2}{5} = 2 : 5$

Reqd. quantity of second solution $= \frac{5 \times 21}{(2 + 5)}$

$= 15$ litre **Ans.**

Example 2. 9 litre are drawn from a cask full of water and it is then filled with milk. 9 litre of mixture are drawn and the cask is again filled with milk. The quantity of water now left in the cask is to that of the milk in at is as 16 : 9. How much mixture does the cask hold ?

Sol. Let there be x litre of mixture in the cask

$\because$ $\frac{\text{Water left in the cask after 2 operations}}{\text{Whole quantity of milk in the cask}} = \left(\frac{x - 9}{x}\right)^2$

$\Rightarrow$ $\frac{16}{(16 + 9)} = \left(\frac{x - 9}{x}\right)^2$

$\Rightarrow$ $\frac{4}{5} = \frac{x - 9}{x}$

$\Rightarrow$ $4x = 5x - 45$

$\therefore$ $x = 45$ litre **Ans.**

Example 3. A mixture of 20 kg of sprit and water contains 10% of water. How much water must be added to make 25% of the resulting mixture ?

Sol. Quantity of water to be added

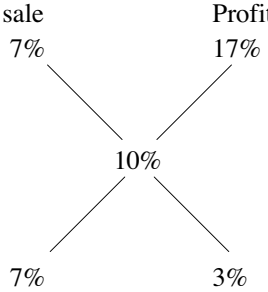
$$= \frac{(\text{Value of reqd. \%} - \text{value of present \%})}{(100\% - \text{value of reqd. \%})} \times \text{Quantity of solution}$$

$$= \frac{(25 - 10)}{(100 - 25)} \times 20$$

$$= \frac{15 \times 20}{75} = 4 \text{ kg} \qquad \textbf{Ans.}$$

Example 4. A trader had 100 kg of Sugar. Some part of it he sold at 7% of profit and the rest at 17% of profit. If he got 10% of profit in all, then how much did he sell at 17% of profit ?

Sol.



$\because$ Quantity of first sugar : Quantity of Second sugar = 7 : 3

$\therefore$ Quantity of 2nd sugar sold $= \frac{3 \times 100}{10} = 30$ kg. **Ans.**

Example 5. In 60 litre of adultrated milk the ratio of milk and water is 2 : 1. How much water should be added in it so that the ratio of milk and water be 1 : 2.

Sol. Quantity of water to be added $= \frac{\text{Reqd. ratio} - \text{Present ratio}}{1 - \text{reqd. ratio}} \times \text{Quantity of mixture}$

$$= \left(\frac{\frac{2}{1+2} - \frac{1}{2+1}}{1 - \frac{2}{1+2}} \right) \times 60$$

$$= \frac{\frac{2}{3} - \frac{1}{3}}{1 - \frac{2}{3}} \times 60 = 60 \text{ litre} \qquad \textbf{Ans.}$$

EXERCISE 15

1. A trader bought 50 kg of wheat of Rs. 7 per kg. and 20 kg. of wheat at Rs. 8 per kg. He mixed the two and sold the mixture at Rs. 10 per kg What is his profit ?
   (A) Rs. 510 (B) Rs. 700
   (C) Rs. 190 (D) Rs. 290
   (E) None of these

2. Alok bought 30 kg of rice at Rs. 8·50 per kg and 20 kg of rice at Rs. 8·00 per kg. If he has to make a 20% profit, at approximately what rate per kg should he sell the rice ?
   (A) Rs. 9·00 (B) Rs. 12·00
   (C) Rs. 8·50 (D) Rs. 8·00
   (E) None of these

3. A trader bought 20 kg of wheat at Rs. 6·50 per kg and 30 kg of wheat at Rs. 7 per kg. He sold the mixture at a profit of Rs. 60. At what price did he sell per kg of the mixture of wheat ?
   (A) Rs. 6·80 (B) Rs. 7·00
   (C) Rs. 8·00 (D) Rs. 60·00
   (E) None of these
4. How much water should be added to 175 litre of milk at Rs. 8·00 per litre so as to have a mixture worth Rs. 7·00 per litre ?
   (A) 27 litre (B) 35 litre
   (C) 25 litre (D) 24 litre
   (E) None of these
5. How much wheat at Rs. 4·00 a kg should be mixed with 42 kg of wheat at Rs. 6·00 a kg so as to have a mixture worth Rs. 4·80 a kg ?
   (A) 63 kg (B) 53 kg
   (C) 52 kg (D) 60 kg
   (E) None of these
6. Two alloys of gold and copper are prepared by mixing in the ratio of 7 : 2 and 7 : 11. A third alloy is made after mixing the equal quantities of two alloys. The ratio of gold and copper is third alloy is :
   (A) 7 : 12 (B) 14 : 13
   (C) 7 : 5 (D) 2 : 11
   (E) None of these
7. A man buys milk at a certain price and after mixing it with water sells it again at the same price. How many ml of water he mixes in a litre of milk if he makes a profit of 20% ?
   (A) 200 ml (B) 250 ml
   (C) 150 ml (D) 20 ml
   (E) None of these
8. A mixture of 40 litres of milk and water contains 10% of water. How much water must be added to make the water 20% of the resulting mixture ?
   (A) 10 litre (B) 7 litre
   (C) 5 litre (D) 3 litre
   (E) None of these
9. Pure gyee costs Rs. 100 per kg. After adulterating it with vegetable oil costing Rs. 50 per kg, a shopkeeper sells the mixture at Rs. 96 per kg, thereby making a profit of 20%. In what ratio does be mix the two ?
   (A) 1 : 2 (B) 3 : 2
   (C) 3 : 1 (D) 2 : 3
   (E) None of these
10. By mixing two qualities of pulses in the ratio 2 : 3 and selling the mixture at the rate of Rs. 22 per kg, a shopkeeper makes a profit of 10%. If the cost of the smaller quantity be Rs. 14 per kg, the cost per kg of the larger quantity is :
    (A) Rs. 23 (B) Rs. 24
    (C) Rs. 25 (D) Rs. 26
    (E) None of these

CHAPTER–16

Area

Main Formulae :

1. Area of the rectangle = length × breadth
2. Area of square = (side of the square)^2
   $= \frac{1}{2}$ (Diagonal)^2
3. Area of four walls of a room = 2 × height (length + breadth)
4. Area of right angled triangle = $\frac{1}{2}$ × base × height
5. Area of isosceles right angled triangle = $= \frac{1}{2}$ (side)^2
6. Area of an equilateral triangle = $\frac{\sqrt{3}}{4}$ (side)^2
7. Area of scalene triangle = $\sqrt{s\,(s-a)\,(s-b)\,(s-c)}$
   Where s = half of the sum of all the three sides and a, b, & c are the three sides of the triangle.
8. Area of parallelogram = base × height
9. Area of rhombus = $\frac{1}{2}$ × (product of the diagonals)
10. Area of trapezium $= \frac{1}{2}$ × (sum of parallel sides) × perpendicular distance between them.
11. Whole surface of cube = 6(side)^2
12. Whole surface of cuboid = $2(l \times b + l \times h + b \times h)$
13. Area of circle = π(radius)^2
14. Area of angular ring = $\pi(r_1^2 - r_2^2)$ where r_1 and r_2 are external and internal radii respectively.

Units of Measuring Length :

1 milimetre	=	0·001 metre
1 centimetre	=	0·01 metre = 10 milimetre
1 decimetre	=	0·1 metre = 10 centimetre
1 metre	=	10 decimetre
1 decametre	=	10 metre
1 hectometre	=	10 decametre = 100 metre
1 kilometre	=	10 hectometre = 1000 metre

Units of Measuring Area :

1 are	=	100 sq. metre
1 hectare	=	10000 sq. metre
1 sq. metre	=	100 sq. decimetre
1 sq. decimetre	=	100 sq. centimetre
1 sq. centimetre	=	100 sq. milimetre

EXAMPLES

Example 1. A rectangular field of 60 metre length and 40 metre wide is to be surrounded by a road 5 metre wide. If the cost of making 1 sq. metre road is Rs. 500, what would be the cost of the entire road.

Sol. Area of the road = Area of EFGH – Area of ABCD

= 70 × 50 – 60 × 40

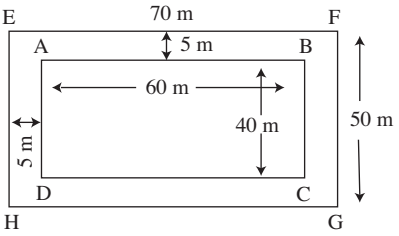
= 3500 – 2400 = 1100 m^2

If the cost of making 1 sq. metre is Rs. 500

∴ The cost of making 1100 m^2

= 500 × 1100

= Rs. 5,50,000 **Ans.**



Short-cut Method :

∵ Area of the road = 2 × width of the road [$(l + b)$ + 2 × width of the road]

= 2 × 5[(60 + 40) + 2 × 5] = 10[100 + 10] = 1100 m^2

∴ Cost of entire road = 1100 × 500 = Rs. 550000 **Ans.**

Example 2. In numerical value the perimeter of a rectangular field is 1040 less than its area. If the breadth is doubled, in numerical value the perimeter becomes 2200 less than its area. What is the numerical value of the length of the field ?

Sol. Let the length and breadth of the field be x and y respectively

∴ Perimeter = $2(x + y)$ and area = xy

∵ $xy - 2(x + y) = 1040$ …(i)

and $2xy - 2(x + 2y) = 2200$ …(ii)

On solving the equations (i) and (ii)

we get $x = 60$ **Ans.**

Example 3. The length of a rectangular plot is 75% of its breadth. If the perimeter of the plot be 1050 m, what is its area ?

Sol. Let the breadth of the plot be x m

∴ $$\text{Length} = \frac{75}{100} \times x = \frac{3x}{4} \text{ m}$$

∵ $$1050 = 2\left(x + \frac{3x}{4}\right)$$

∴ $x = 300$ m

∴ $$\text{Area of the plot} = 300 \times \frac{3 \times 300}{4} = 67500 \text{ m}^2$$ **Ans.**

Example 4. The length of a plot is 4 times of its breadth. If a play ground of area 1200 m^2, occupies $\frac{1}{3}$ area of the plot, what is the length of the plot ?

Sol. Let the breadth of the plot be x metre

∴ Length of the plot = $4x$ metre

∴ Area of the plot = $4x \times x = 4x^2$

But area of the plot is 3 × 1200

∵ $4x^2 = 3600$

$\Rightarrow \quad x^2 = \frac{3600}{4} = 900$

$\Rightarrow \quad x = 30$

$\therefore$ Length of the plot $= 4 \times 30 = 120$ m **Ans.**

Example 5. If the length of a rectangular plot is increased by 40%, by what per cent should its width be increased so that its area may increase by 75% ?

Sol. Let the increase in width be x%

$\because$ % Increase in area $= \frac{(100 + \text{\% increase in length}) \times (100 + \text{\% increase in breadth})}{100} - 100$

$\Rightarrow \quad 75 = \frac{(100 + 40) \times (100 + x)}{100} - 100$

$\Rightarrow \quad 75 + 100 = \frac{140 \times (100 + x)}{100}$

$\Rightarrow \quad \frac{175 \times 100}{140} = 100 + x$

$\Rightarrow \quad 125 = 100 + x$

$\therefore \quad x = 125 - 100 = 25$ **Ans.**

EXERCISE 16

1. If the length and breadth of a rectangular plot are increased by 50% and 20% respectively, how many times will be the new area of the old area ?
   (A) $1\frac{4}{5}$ (B) 2
   (C) $3\frac{2}{5}$ (D) $4\frac{1}{5}$
   (E) None of these
2. The area of a square is equal to the area of a rectangle. The side of the square is 6 cm and the breadth of the rectangle is 2 cm less than the side of the square. What is the length of the rectangle ?
   (A) 10 cm (B) 8 cm
   (C) 6 cm (D) 9 cm
   (E) None of these
3. The length of a rectangular plot is 30% more than its breadth. If the area of the plot be 20·8 m^2, what is the length of the plot ?
   (A) 5·2 m (B) 6·8 m
   (C) 5·8 m (D) 5 m
   (E) None of these
4. If the area of a rectangular plot is increased by 30% while its breadth remains unaltered, what will be the ratio between the area of such formed figure and the area of the original figure ?
   (A) 1 : 3 (B) 10 : 13
   (C) 3 : 1 (D) 4 : 7
   (E) None of these
5. Area of a square is equal to the area of a circle. If the radius of the circle is 14 cm, what is the app. length of a square ?
   (A) 20 cm (B) 25 cm
   (C) 15 cm (D) 30 cm
   (E) None of these
6. The breadth of a rectangular field is 75% of its length. If the diagonal of the field is 100 m, what it the area of the field ?
   (A) 4500 m^2 (B) 4200 m^2
   (C) 4550 m^2 (D) 4800 m^2
   (E) None of these
7. A rectangular plot is 50 m long and 20 m broad. Inside it there is a path of 7 m wide all round it. What is the area of the path ?
   (A) 216 sq. m (B) 1000 sq. m
   (C) 1216 sq. m (D) 784 sq. m
   (E) None of these

8. The length of a rectangular field is 50% more than its breadth. If the cost of fencing at Rs. 60 per metre is Rs. 12000, what is the length of the field ?
   (A) 60 m (B) 40 m
   (C) 80 m (D) 20 m
   (E) None of these
9. The length and breadth of a plot are 35 m and 16 m respectively. If the rate of fencing is Rs. 7 per metre, what is cost of its fencing ?
   (A) Rs. 3920 (B) Rs. 602
   (C) Rs. 714 (D) Rs. 357
   (E) None of these
10. Area of a rectangular field is 5732 m^2. If its length is 60% more than its breadth, what is its app. breadth ?
   (A) 90 m (B) 30 m
   (C) 80 m (D) 60 m
   (E) None of these

CHAPTER–17

Interpretation of Data

These types of questions are provided along with the table or graph. Some questions related to these tables or graphs are given below them. Each question is followed by a number of possible answers. The candidate has to find out the correct answer from the possible answers. In order to find out the correct answer, the candidate should study the given table or graph carefully. The given examples will illustrate the idea clearly.

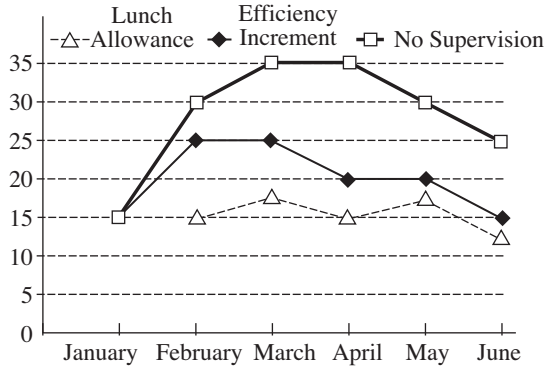
EXAMPLES

Example 1.

Directions (Q. 1–5) : *Study the following graph to answer the given questions—*

The graph depicts the impact on production when three groups of employees were given three different types of incentive schemes during the period **February to June.**

Impact of Incentives on Production of Items
(Number of items in '000)



1. The approximate impact (*i.e.,* increase in production) of 'No Supervision' from Jan. to February was approximately what per cent to that of 'Efficiency Increment' on production ?
   (A) 110 (B) 260 (C) 320 (D) 95
   (E) None of these
2. For which of the following pairs of months the total production of all the three groups together is exactly the same ?
   (A) January & June (B) February & April (C) March & April (D) February & March
   (E) None of these
3. Which of the following is the increase in average production after 'No Supervision' scheme was introduced from February ?
   (A) 16,000 (B) 10,000 (C) 20,000 (D) 31,000
   (E) None of these

4. Which of the incentives showed the most dramatic impact in June ?
   (A) No supervision (B) All the three
   (C) Lunch Allowance & No supervision (D) Lunch Allowance
   (E) Efficiency Increment & No supervision
5. How many items were produced after the introduction of 'Efficiency Increment' by that group till June ?
   (A) 1,20,000 (B) 1,00,000 (C) 1,05,000 (D) 1,50,000
   (E) None of these

Solution :

1. (E) Increase from Jan, to Feb. in 'No Supervision'.
   $= 30 - 15 = 15$ thousand
   Increase from Jan, to Feb. in 'Efficiency Increment'
   $= 25 - 15 = 10$ thousand
   $\therefore$ Reqd. percentage $= \frac{15}{10} \times 100\% = 150\%$ **Ans.**
2. (B) Total production of all the three groups in Feb.
   $= 15 + 25 + 30 = 70$ thousand
   and total production of all the three groups in April
   $= 15 + 20 + 35 = 70$ thousand **Ans.**
3. (E) Production in Feb. in 'No supervision' $= 30$ thousand
   and average production in 'No supervision' from Feb. to June
   $= \frac{30 + 35 + 35 + 30 + 25}{5} = 31$ thousand
   Reqd. increase $= 31 - 30 = 1$ thousand **Ans.**
4. (B) $\therefore$ In the month of June the decrease of each is 5000
5. (C) Total production from Feb. to June in
   'Efficiency Increment' $= (25 + 25 + 20 + 20 + 15)$ thousand $= 1,05,000$ **Ans.**

Example 2.

Directions (Q. 6–10) : *Study the following table carefully and answer the questions based on it.*

Types of Toys

Production (in thousand) of Five Different Types of Toys and Percentage defect over the years.

Year	A		B		C		D		E	
	Production	% Defect	Production	% Defect	Production	% Defect	Production	% Defect	Production	% Defect
1991	76	5	58	11	39	5	59	9	28	8
1992	82	6	46	9	37	9	62	8	36	4
1993	65	8	49	8	45	6	47	12	42	15
1994	70	12	52	12	42	13	54	4	31	9
1995	85	9	64	14	38	11	57	7	49	11
1996	80	11	54	10	40	8	68	5	38	7
	458		323		241		347		224	

6. What was the total number of defective B type toys in 1995 and defective D types toys in 1993 ?
   (A) 13290 (B) 14600 (C) 11120 (D) 14260
   (E) None of these
7. The average production in the given years of which of the following types of the toys was highest ?
   (A) B (B) E (C) A (D) C
   (E) None of these

8. What was the average number of defect free toys of all type in 1994 ?
   (A) 45680 (B) 42790 (C) 38700 (D) 44790
   (E) None of these
9. Among the given years in which years, the average percentage defect of all the five types of toys was lowest ?
   (A) 1992 (B) 1995 (C) 1993 (D) 1996
   (E) None of these
10. What was the difference in the numebr of defect-free B type toys between 1992 and 1993 ?
   (A) 3220 (B) 7700 (C) 2730 (D) 3860
   (E) None of these

Solution :

6. (B) No. of defective B type of toys in 1995 + No. of defective D type toys in 1993.

$$= \frac{64000 \times 14}{100} \times \frac{47000 \times 12}{100}$$

$$= 8960 + 5640 = 14600$$ **Ans.**

7. (C) Average production of 'A' type of toys $= \frac{(76 + 82 + 65 + 70 + 85 + 80)}{6} \times 1000$

$$= \left[\frac{458 \times 1000}{6}\right] = \left[458 \times \frac{1000}{6}\right]$$

Average production of 'B' type of toys $= (58 + 46 + 49 + 52 + 64 + 54) \times \frac{1000}{60}$

$$= 323 \times \frac{1000}{6}$$

Average production of 'C' type of toys $= (39 + 37 + 45 + 42 + 38 + 40) \times \frac{1000}{6}$

$$= 241 \times \frac{1000}{6}$$

Average production of 'D' type of toys $= (59 + 62 + 47 + 54 + 57 + 68) \times \frac{1000}{6}$

$$= 347 \times \frac{1000}{6}$$

Average production of 'E' type of toys $= (28 + 36 + 42 + 31 + 49 + 38) \times \frac{1000}{6}$

$$= 224 \times \frac{1000}{6}$$

Hence it is clear from above that the average production of 'A' type of toys was maximum. **Ans.**

8. (D) Total number of defect free toys in the year 1994.

$$= \left[\frac{70 \times (100 - 12)}{100} + \frac{52(100 - 12)}{100} + \frac{42(100 - 13)}{100} + \frac{54(100 - 4)}{100} + \frac{31(100 - 9)}{100}\right] \times 1000$$

$$= [(70 \times 88) + (52 \times 88) + (42 \times 87) + (54 \times 96) + (31 \times 91)] \times \frac{1000}{100}$$

$$= [6160 + 4576 + 3654 + 5184 + 2821] \times 10$$

$$= 22395 \times 10 = 223950$$

Average $= \frac{223950}{5} = 44790$ **Ans.**

9. (A) Average percentage of all five types of defective toys in 1991

$$= (5 + 11 + 5 + 9 + 8) \times \frac{1}{5} = 38 \times \frac{1}{5}$$

Average percentage of all five types of defective toys in 1992

$$= (6 + 9 + 9 + 8 + 4) \times \frac{1}{5} = 36 \times \frac{1}{5}$$

Average percentage of all five types of defective toys in 1993

$$= (8 + 8 + 6 + 12 + 15) \times \frac{1}{5} = 49 \times \frac{1}{5}$$

Average percentage of all five types of defective toys in 1994

$$= (12 + 12 + 13 + 4 + 9) \frac{1}{5} = 50 \times \frac{1}{5}$$

Average percentage of all five types of defective toys in 1995

$$= (9 + 14 + 11 + 7 + 11) \times \frac{1}{5} = 52 \times \frac{1}{5}$$

Average percentage of all five types of defective toys in 1996

$$= (11 + 10 + 8 + 5 + 7) \times \frac{1}{5} = 41 \times \frac{1}{5}$$

Hence, average percentage of all five types of defective toys in 1992 was minimum. **Ans.**

10. (A) Reqd. difference $= \left[\frac{46(100 - 9)}{100} \sim \frac{49(100 - 8)}{100}\right] \times 1000$

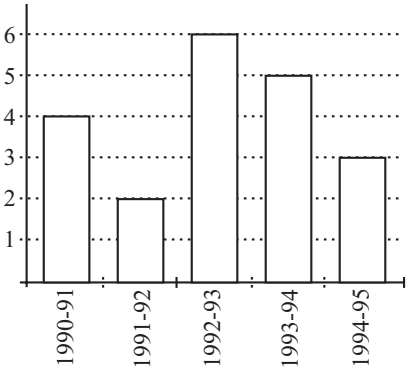
$$= [46 \times 91 \sim 49 \times 92] \times \frac{1000}{100}$$

$$= (4186 \sim 4508) \times 10 = +3220$$ **Ans.**

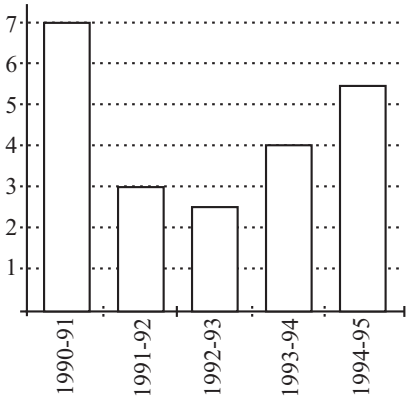
Example 3.

Directions (Q. 11–15) : *Study the following graph and answer each of the questions from 11 to 15 on the basis of it.*

Percentage Increase in India's Agriculture Production over the years



Percentage Increase in India's Industrial Production over the years



11. In which of the following years the total percentage increase in Agriculture and Industrial production is maximum ?

(A) 1990-91 (B) 1991-92 (C) 1992-93 (D) 1993-94

(E) None of these

12. If the difference in the Industrial production between 1991-92 and 1992-93 is of Rs. 50,000 crore what was the Industrial production for 1991-92 ?
(A) Rs. 100000 crore (B) Rs. 250000 crore (C) Rs. 200000 crore (D) Data insufficient
(E) None of these

13. In which of the given years the rate of percentage increase in agriculture production is thrice than the previous year ?
(A) 1992-93 (B) 1991-92
(C) 1991-92 and 1992-93 (D) 1994-95
(E) None of these

14. In which of the given years the difference between the rates of percentage increase of Agriculture and Industrial production is minimum ?
(A) 1992-93 (B) 1993-94 (C) 1990-91 (D) 1994-95
(E) None of these

15. The combined percentage increase of Agriculture production during the year 1990-91 and 1994-95 is exactly equal to percentage increase of Industrial production during the year?
(A) 1991-92 (B) 1994-95 (C) 1990-91 (D) 1993-94
(E) None of these

Solution :

11. (A) Total per cent increase for 1990-91 in Agriculture and Industrial production
$= 4 + 7 = 11\%$
Total per cent increase for 1991-92 in Agriculture and Industrial production
$= 2 + 3 = 5\%$
Total per cent increase for 1992-93 in Agriculture and Industrial production
$= 6 + 2{\cdot}5 = 8{\cdot}5\%$
Total per cent increase for 1993-94 in Agriculture and Industrial production
$= 5 + 4 = 9\%$
Total per cent increase for 1994-95 in Agriculture and Industrial production
$= 3 + 5{\cdot}5 = 8{\cdot}5\%$
$\therefore$ The highest per cent increase in 1990-91. **Ans.**

12. (E) $\because$ $(3\% - 2{\cdot}5\%) = 0{\cdot}5\% =$ Rs. 50,000 crore
$\therefore$ $3\% = \dfrac{50000 \times 3}{0{\cdot}5} =$ Rs. 3,00,000 crore **Ans.**

13. (A) It is clear from the graph the rate of percentage increase in agriculture production in thrice than previous year in 1992-93. **Ans.**

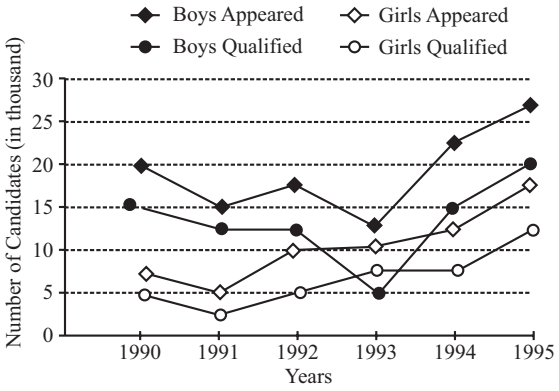
14. (B) Difference in 1992-93 $= 6 - 2{\cdot}5 = 3{\cdot}5$
Difference in 1993-94 $= 5 - 4 = 1$
Difference in 1990-91 $= 7 - 4 = 3$
and difference in 1994-95 $= 5{\cdot}5 - 3 = 2{\cdot}5$
$\therefore$ The minimum difference is in 1993-94 **Ans.**

15. (C) The combined percentage increase of Agriculture production during the year 1990-91 and 1994-95 = 4% + 3% = 7%.
and the percentage increase of Industrial production during the year 1990-91 = 7%. **Ans.**

Example 4.

Directions (Q. 16–20) : *Study the following graph carefully and answer the questions given below—*

Number of Candidates (Boys and Girls) Appeared and Qualified in an examination over the years.



16. What was the approximate percentage of boys qualified to appeared in 1992 ?
(A) 35 (B) 70 (C) 80 (D) 65
(E) None of these

17. The total number of girls qualified in 1991 and 1992 together was exactly equal to the total number of girls appeared in which of the following years—
(A) 1994 (B) 1995 (C) 1991 (D) 1990
(E) None of these

18. What was the percentage increase in the number of boys qualified from 1993 to 1994 ?
(A) 50% (B) 5% (C) 100% (D) 200%
(E) None of these

19. What was difference between the total number of boys and girls appeared in 1993 and the total number of boys and girls appeared in 1991 ?
(A) 5000 (B) 2500 (C) 7500 (D) 10000
(E) None of these

20. In which of the following year was the percentage of girls qualified to appeared the highest among the given years ?
(A) 1991 (B) 1993 (C) 1994 (D) 1992
(E) None of these

Solution :

16. (B) The approximate percentage of boys qualified to appeared in 1992.

$$= \frac{12{\cdot}5}{17{\cdot}5} \times 100\% = 71{\cdot}43\% \simeq 70\%$$ **Ans.**

17. (D) The total number of girls qualified in 1991 and 92.

$$= 2500 + 5000 = 7500$$

= Total number of girls appeared is 1990 **Ans.**

18. (D) The percentage increase in the number of boys qualified from 1993 to 1994

$$= (15 - 5) \times 1000 = 10000$$

$$\therefore \quad \text{Percentage increase} = \frac{10000}{5000} \times 100\% = 200\%$$ **Ans.**

19. (B) Difference between the total number of boys and girls appeared is 1993 and the total number of boys and girls appeared in 1991 $= [(12{\cdot}5 + 10) - (15 + 5)] \times 1000$

$= (22{\cdot}5 - 20) \times 1000 = 2{\cdot}5 \times 1000$

$= 2500$ **Ans.**

20. (B) The percentage of girls qualified to appeared in 1990 $= \frac{5{\cdot}0}{7{\cdot}5} \times 100 = 66{\cdot}66\%$

The percentage of girls qualified to appeared in 1991 $= \frac{2{\cdot}5}{5} \times 100 = 50\%$

The percentage of girls qualified to appeared in 1992 $= \frac{5}{10} \times 100 = 50\%$

The percentage of girls qualified to appeared in 1993 $= \frac{7{\cdot}5}{10} \times 100 = 75\%$

The percentage of girls qualified to appeared in 1994 $= \frac{7{\cdot}5}{12{\cdot}5} \times 100 = 60\%$

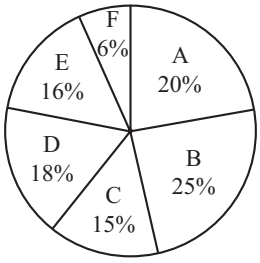
The percentage of girls qualified to appeared in 1995 $= \frac{12{\cdot}5}{17{\cdot}5} \times 100 = 71{\cdot}43\%$

Hence in the year 1993 the percentage of girls qualified to appeared was maximum. **Ans.**

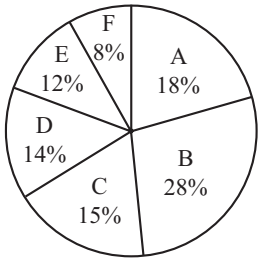
Example 5.

Directions (Q. 21–25) : *Study the graph given below carefully and answer the questions based on it—*

Percentage of workers of various types in two years in an organisation



Total number of workers 1600



Total number of workers 1800.

21. The number of which type of workers decreased from 1995 to 1996 ?

(A) A, D and E (B) D and E (C) Only D (D) Only E

(E) None of these

22. If in 1996, 176 workers of A type are extra appointed, then approximately what will be new percentage of A type workers ?

(A) 20 (B) 30 (C) 25 (D) 35

(E) None of these

23. How many per cent is the number of C type of workers in 1996 of the number of workers of B type of workers in 1995 ?

(A) 90% (B) 18% (C) 45% (D) 36%

(E) None of these

24. What is the difference between the number of D type workers in 1995 and the number of A type workers in 1996 ?

(A) 0 (B) 18 (C) 54 (D) 36

(E) None of these

25. What is the difference between the number of C type workers between 1995 and 1996 ?

(A) 240 (B) 360 (C) 120 (D) 160

(E) None of these

Solution :

21. (B) No. of A type of workers in 1995 $= 1600 \times \frac{20}{100} = 320$

No. of A type of workers in 1996 $= 1800 \times \frac{18}{100} = 324$

No. of B type of workers in 1995 $= 1600 \times \frac{25}{100} = 400$

No. of B type of workers in 1996 $= 1800 \times \frac{28}{100} = 504$

No. of C type of workers in 1995 $= 1600 \times \frac{15}{100} = 240$

No. of C type of workers in 1996 $= 1800 \times \frac{20}{100} = 360$

No. of D type of workers in 1995 $= 1600 \times \frac{18}{100} = 288$

No. of D type of workers in 1996 $= 1800 \times \frac{14}{100} = 252$

No. of E type of workers in 1995 $= 1600 \times \frac{16}{100} = 256$

No. of E type of workers in 1996 $= 1800 \times \frac{12}{100} = 216$

No. of F type of workers in 1995 $= 1600 \times \frac{6}{100} = 96$

No. of F type of workers in 1996 $= 1800 \times \frac{8}{100} = 144$

Hence, from 1995 to 1996 the number of D and E type of workers have decreased. **Ans.**

22. (C) The No. of A type workers in 1996 $= 324$

Total workers including new workers $= 324 + 176$

$= 500$

Total number of workers in 1996 $= 1800 + 176$

$= 1976$

$\therefore$ Required new percentage of A type of workers $= \frac{500}{1976} \times 100\%$

$= 25{\cdot}3\%$

$= 25\%$ **Ans.**

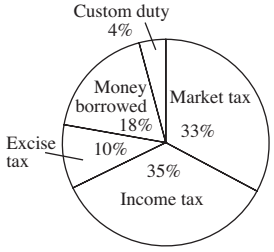
23. (A) $\therefore$ Required percentage $= \frac{360}{400} \times 100\% = 90\%$ **Ans.**

24. (D) $\therefore$ Required difference $= 324 - 288 = 36$ **Ans.**

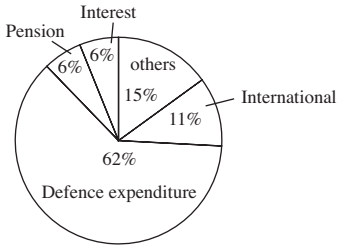
25. (C) $\therefore$ Required difference $= 360 - 240 = 120$ **Ans.**

EXERCISE 17

Directions (Q. 1–5) : Two pie chart are given below. One of them represents the income of a state while the other, its expenditure. Study these charts carefully and find out the correct answer of each question.



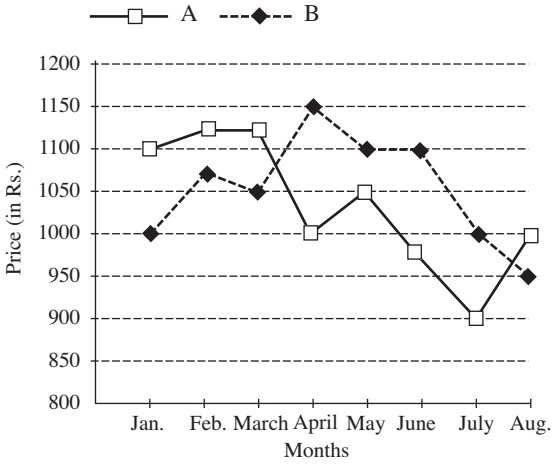
Income



Expenditure

1. In chart of income, what is the sectorial angle of market tax ?
   (A) 150° (B) 135°
   (C) 119° (D) 105°
   (E) None of these
2. What is the ratio between the total expenditure of defence & pension and the total expenditure on the rest ?
   (A) 3 : 2 (B) 2 : 1
   (C) 3 : 1 (D) 5 : 4
   (E) None of these
3. If in a certain year the income from custom duty to the State is Rs. 25,000 then what is income of the state for that year ?
   (A) Rs. 3,00,000 (B) Rs. 3,75,000
   (C) Rs. 4,50,000 (D) Rs. 6,25,000
   (E) None of these
4. If the income and expenditure of the State are equal, then what is the rate of interest paid by the State ?
   (A) 33·3% per annum
   (B) 25% per annum
   (C) 6% per annum
   (D) 10% per annum
   (E) None of these
5. The expenditure on International is how many per cent of the other total expenditure ?
   (A) 11·00% (B) 22·37%
   (C) 19·81% (D) 12·36%
   (E) None of these

Directions (Q. 6–10) : Study the following graph carefully and answer the questions given below it—



6. In which of the following pairs of months was the prices of commodity A same ?
   (A) January-March (B) May-June
   (C) July-August (D) April-August
   (E) None of these
7. What was the price difference in average price between commodity A and B in the month of April ?
   (A) Rs. 250 (B) Rs. 150
   (C) Rs. 100 (D) Rs. 90
   (E) None of these
8. What was the difference in average price between commodity A and B from April to August ?
   (A) Rs. 86 (B) Rs. 76
   (C) Rs. 95 (D) Rs. 85
   (E) None of these

9. What was the percentage increase in price of commodity B from January to April ?
   (A) 15% (B) 10%
   (C) 13% (D) 9%
   (E) None of these
10. What was the approximate percentage decrease in the price of commodity A from March to April ?
   (A) 1% (B) 9%
   (C) 14% (D) 12%
   (E) None of these

Directions (Q. 11–15) : Read the following table and answer the questions given below it.

Yearly Commission Earned by Five Salesman

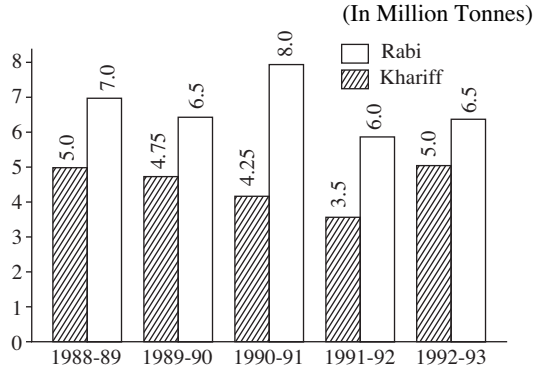
Year / Salesman	1988	1989	1990	1991	1992	1993
A	27,350	28,500	25,200	29,800	24,600	27,000
B	26,850	27,900	27,400	28,000	28,500	29,000
C	26,200	27,800	28,200	29,100	29,400	30,000
D	27,850	30,040	29,800	30,060	29,800	32,000
E	28,640	29,000	28,750	30,000	29,750	29,700
Total	1,36,890	1,43,240	1,39,240	1,46,960	1,42,050	1,47,700

11. In which year commission earned by the salesman C show the highest increase are that of the preceding year ?
   (A) 1989 (B) 1990
   (C) 1991 (D) 1992
   (E) None of these
12. In the year 1991 the commission of B was approximately what per cent of the total commission earned by five salesman in that year ?
   (A) 20 (B) 98
   (C) 80 (D) 90
   (E) None of these
13. Which salesman's commission in 1991 show the highest increase over that in 1988 ?
   (A) A (B) B
   (C) D (D) C
   (E) None of these
14. In which of the following year was the difference between the highest and lowest commission earned by any salesman maximum ?
   (A) 1990
   (B) 1991
   (C) 1992
   (D) 1993
   (E) None of these
15. In the year 1992, commission earned by salesman D was approximately what per cent of commission earned by A ?
   (A) 18 (B) 21
   (C) 52 (D) 17
   (E) None of these

Directions (Q. 16–20) : Study the following graph carefully and answer the questions given below—

Production of Pulses in Rabi and Khariff Season

(In Million Tonnes)



16. What was the average of Khariff production of the given years ?
   (A) 4 million tonnes
   (B) 5 million tonnes
   (C) 4·5 million tonnes
   (D) 5·5 million tonnes
   (E) None of these

17. What was the percentage decrease in Rabi production from 1990-91 to 1991-92 ?
(A) $33\frac{1}{3}$ (B) $66\frac{2}{3}$
(C) 75 (D) 40
(E) None of these

18. The difference between the Rabi and Khariff production was minimum in which of the following years ?
(A) 1988-89 (B) 1990-91
(C) 1992-93 (D) 1991-92
(E) None of these

19. What is the difference between the Rabi production in 1990-91 and the average Rabi production of the given years ?
(A) 2·5 million tonnes
(B) 20 lakh tonnes
(C) 1 million tonnes
(D) 15 lakh tonnes
(E) None of these

20. The Khariff production was approximately what percentage of Rabi production in 1989-1990 ?
(A) 80% (B) 120%
(C) 60% (D) 75%
(E) None of these

Directions (Q. 21–24) : Study the following tables and answer the questions below it.

Production of Fertilizers by six major production units of India in million tonnes

Month	I	II	III	IV	V	VI
April	310	180	169	137	140	120
May	318	179	177	162	140	122
June	320	160	188	173	135	130
July	326	167	187	180	146	130
August	327	150	185	178	145	128

21. In the month of June, how many of the given units have a share of more than 25% of the total production of fertilizers ?
(A) Two (B) Three
(C) Four (D) Data inadequates
(E) None of these

22. What was the approximate percentage increase in fertilizers production in unit V in august, over that in May ?
(A) 4·5% (B) 3·5%
(C) 2·0% (D) 36%
(E) None of these

23. In which month does unit No. II have a contribution of approximately 15% in the total fertilizers production ?
(A) April (B) May
(C) June (D) July
(E) None of these

24. Which units shows constant rise in fertilizer production over the months ?
(A) I (B) II
(C) III (D) IV
(E) None of these

Directions (Q. 25–29) : Study the following table carefully and answer the questions given below :

Percentage Share in Final Energy consumption By Different Sectors

Sector	1950-51	1960-61	1970-71	1980-81	1990-91
Industry	39·8	40·7	51·6	57·0	50·4
Transport	46·2	44·9	29·4	23·5	24·5
Household	9·9	10·6	14·3	12·3	13·3
Agriculture	1·7	1·8	3·8	6·1	9·0
Others	2·4	2·0	0·9	1·1	2·3

25. What was the percentage increase in final energy consumption in the Household sector from 1960-61 to 1970-71 ?
(A) 3·7% (B) 35%
(C) 37% (D) 4·2%
(E) None of these

26. In which of the following years was the percentage energy consumption in household sector almost equal to the average percentage energy consumption in the household sector in the given years ?
(A) 1970-71 (B) 1999-91
(C) 1980-81 (D) 1950-51
(E) None of these

27. In the case of which of the following sectors was there continuous increase or decrease in consumption over the given years ?
(A) Transport (B) Agriculture
(C) Industry (D) Household
(E) None of these

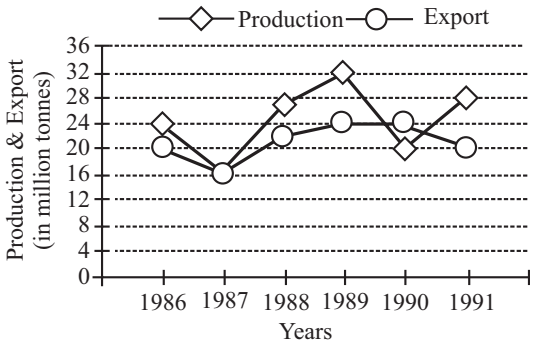
28. What was the difference in the energy consumption in Agricultural sector between 1960-61 and 1970-71 ?
(A) 20,000 Megawatt
(B) 2,00,000 Megawatt
(C) 40,000 Megawatt
(D) Data inadequate
(E) None of these

29. The total consumption of Household, Agriculture and others' sectors together was minimum in which of the following period ?
(A) 1990-91 (B) 1960-61
(C) 1970-71 (D) 1980-81
(E) None of these

Directions (Q. 30–34) : Study the following graph carefully and answer the questions given below it.

Production in Export to Stainless Steel of by a Company Over the Years

(In million tonnes)



30. What was the decrease in the requirement of export of steel in the year 1990 ?
(A) 5 million tons (B) 6 million tons
(C) 12 million tons (D) 4 million tons
(E) None of these

31. In which year the requirement of export in 1989 was equivalent to the generation ?
(A) 1987 (B) 1986
(C) 1988 (D) 1990
(E) None of these

32. What was the approximate increase percentage in the production of steel from 1988 to 1989 ?
(A) 16 (B) 24
(C) 6 (D) 32
(E) None of these

33. What was the decrease percentage of export from 1986 to 1987 ?
(A) 35 (B) 65
(C) 45 (D) 55
(E) None of these

34. Among the given years for how many years the production was less than the average production for the whole period ?
(A) 1 (B) 2 (87 and 90)
(C) 3 (D) 4
(E) None of these

Directions (Q. 35–39) : Study the given table carefully and answer the questions based on it—

Production of five different types of machine tool (in lakhs) of a company over the year

	Types of machine tools					
Year	**A**	**B**	**C**	**D**	**E**	**Total**
1989	14	18	27	34	26	119
1990	18	24	25	32	28	127
1991	21	22	24	36	27	130
1992	24	32	34	25	29	144
1993	26	39	32	21	27	145
1994	32	46	31	24	25	158

35. What is the difference of production in C type machine tools from the year 1989 to 1994 ?
(A) 4000 (B) 400000
(C) 4000000 (D) 40000
(E) None of these

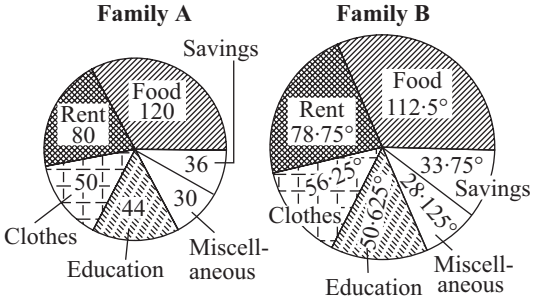
36. There is continuous increase in the production of which type of machine tools over the year ?
(A) A (B) C
(C) E (D) D
(E) None of these

37. The total production of A type of machine tools in 1991 and 1992 is approximately how many per cent of the production of C type of machine tools in 1993 ?
(A) 40 (B) 150
(C) 160 (D) 120
(E) None of these

38. What is nearly percentage of increase of C type of machine tools from 1991 to 1992 ?
(A) 20% (B) 60%
(C) 40% (D) 50%
(E) None of these

39. In 1992 how many percentage was the production of E type of machine tools, of all the total production of types of machine tools of same year ?
(A) 40% (B) 20%
(C) 15% (D) 25%
(E) None of these

Directions (Q. 40–44) : Refer the figure given below to answer the following questions.



The above diagrams indicate the expenditure of two families in Rupees.

40. How much expenduture on food of the family A is more than the expenditure on rent ?
(A) Rs. 100 (B) Rs. 120
(C) Rs. 140 (D) Rs. 90
(E) None of these

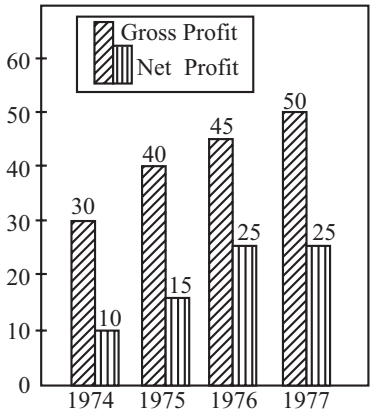
41. From family A to B, the increase in expenditure on cloth was about what per cent of the total increase of expenditure ?
(A) $15\frac{2}{7}\%$ (B) $17\frac{6}{7}\%$
(C) $14\frac{2}{3}\%$ (D) $18\frac{1}{6}\%$
(E) None of these

42. On which commodity the expenditure of family B is same as the expenditure on clothes of the family A ?
(A) Saving (B) Clothes
(C) Miscellaneous (D) Education
(E) None of these

43. What is the saving of the family B ?
(A) Rs. 120 (B) Rs. 125
(C) Rs. 250 (D) Rs. 150
(E) None of these

44. How much per cent of the expenditure on food of the family B is to the entirely expenditure of the family A and B ?
(A) 25% (B) 20%
(C) 30% (D) 40%
(E) None of these

Directions (Q. 45–49) : The following chart represents Gross profit and Net profit in Rs. thousands for the years 1974-1977.



On the basis of this chart answer the following questions :

45. In which year there is the greatest increase in gross profit in comparision of net profit ?
(A) 1975 (B) 1977
(C) 1976 (D) 1974
(E) None of these

46. In which year the gross profit was double of the net profit ?
(A) 1974 (B) 1975
(C) 1977 (D) 1976
(E) None of these

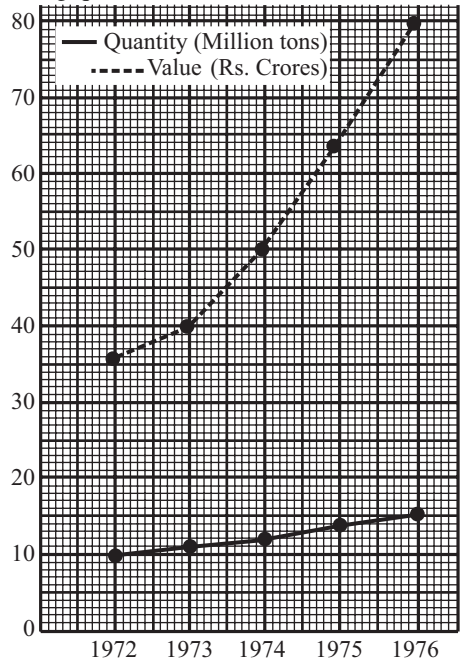
47. What per cent was the net profit of 1975 as compared to the gross profit ?
(A) 33·3% (B) 37·5%
(C) 25% (D) 20%
(E) None of these

48. For the entire four years shown on the graph, the gross profit is to net profit as :
(A) 13 : 4 (B) 11 : 5
(C) 11 : 6 (D) 9 : 4
(E) None of these

49. The smallest growth of either gross profit or net profit between two years on the survey was :
(A) Rs. 5 thousand (B) Zero
(C) Rs. 10 thousand (D) Rs. 15 thousand
(E) None of these

Directions (Q. 50–54) : The following graph represents the exports of Iron ore for the five

years. On the basis of the graph answer the following questions :



50. Rate of iron ore per million ton in 1976 is Rs.
(A) $3\frac{1}{7}$ crore (B) $5\frac{1}{3}$ crore
(C) $3\frac{2}{7}$ crore (D) $4\frac{2}{5}$ crore
(E) None of these

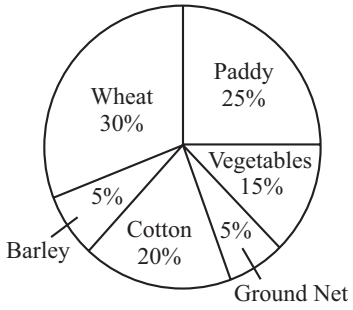
51. What is the percentage of increase of iron ore in quantity from 1974 to 1975 ?
(A) 8% (B) 1·5%
(C) 12% (D) 14%
(E) None of these

52. Average receipt per year in crores of rupees from export is :
(A) 48·7 (B) 72·2
(C) 60·8 (D) 54·4
(E) None of these

53. What is the ratio of the quantity of iron ore export in 1975 to the entire quantity of iron ore export in all the five years ?
(A) 1/5 (B) 3/4
(C) 1/4 (D) 2/9
(E) None of these

54. What is the least difference of receipt in the two successive years in crores of rupees ?
(A) 7·2 (B) 4·5
(C) 3·4 (D) 7·0
(E) None of these

Directions (Q. 55–59) : The land cultivated under different crops in a district is given in the following chart. Study the chart and on the basis of this chart answer the questions given below :



55. If the total area cultivated be 2,00,000 sq. metre, what is the area cultivated for vegetables ?
(A) 15,000 sq. m (B) 30,000 sq. m
(C) 20,000 sq. m (D) 35,000 sq. m
(E) None of these

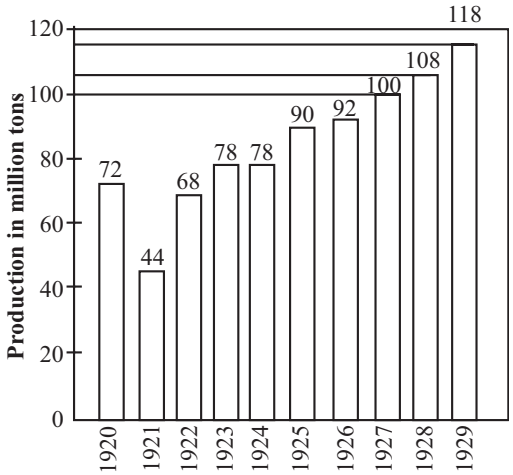
56. In the graph given above, what is the central angle of the sector that represents the area cultivated for ground-nut ?
(A) 54° (B) 18°
(C) 60° (D) 36°
(E) None of these

57. How much more area in sq. metre is cultivated of the largest cultivated crop than to the second largest if the total area cultivated be 2,00,000 sq. metre.
(A) 10,000 sq. m (B) 20,000 sq. m
(C) 5,000 sq. m (D) 25,000 sq. m
(E) None of these

58. If the area cultivated for paddy be 5,000 sq. metre what is the area cultivated for cotton ?
(A) 2,000 sq. metre (B) 1,500 sq. metre
(C) 3,400 sq. metre (D) 4,000 sq. metre
(E) None of these

59. What is the ratio of the area cultivated for barely and wheat together to the area cultivated for paddy, ground nut and vegetables together ?
(A) 5/9 (B) 7/9
(C) 3/10 (D) 4/9
(E) None of these

Directions (Q. 60–64) : The following diagram represents the production of steel from 1920 to 1929. On the basis of this diagram, answer the following questions :



60. What is the ratio of steel produced in 1921 as compared with 1929 ?
(A) 21/53 (B) 22/59
(C) 31/56 (D) 32/57
(E) None of these

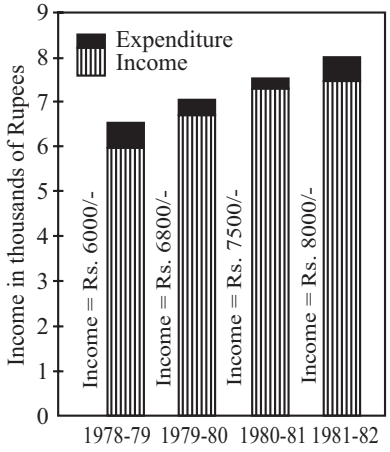
61. How much per cent of production was in 1920 of the entire production from 1920 to 1929 ?
(A) 14·6% (B) 12·3%
(C) 8·5% (D) 4·6%
(E) None of these

62. What is the average annual production ?
(A) 84·8 (B) 56·3
(C) 66·5 (D) 72·1
(E) None of these

63. Between which consecutive odd years was the steel production jump highest ?
(A) 1923 and 1925 (B) 1925 and 1927
(C) 1927 and 1929 (D) 1921 and 1923
(E) None of these

64. What is the greatest difference of production in million tons of two successive years ?
(A) 32 (B) 28
(C) 16 (D) 24
(E) None of these

Directions (Q. 65–69) : The following bar diagram represents the income and expenditure of a middle class family for four consecutive years in thousands of rupees. Analyse the chart carefully and answer the following questions :



65. The ratio of the income of the year 1978-79 and 1981-82 is nearest to
(A) 4 : 3 (B) 12 : 1
(C) 1 : 12 (D) 3 : 4
(E) None of these

66. In (1981-82) what is the percentage of expenditure over of income ?
(A) 87·32% (B) 12·76%
(C) 93·75% (D) 88·12%
(E) None of these

67. What is the average annual income ?
(A) Rs. 6125 (B) Rs. 7075
(C) Rs. 7375 (D) Rs. 6375
(E) None of these

68. Percentage increase of expenditure in 1979-80 as compared with the income in 1978-79 is :
(A) $6\frac{2}{11}$ (B) $5\frac{7}{13}$
(C) $7\frac{9}{13}$ (D) $8\frac{1}{3}$
(E) None of these

69. What is the balance of the family budget during the period from 1979 to 1982 ?
(A) Rs. 300 (B) Nil
(C) (– Rs. 100) (D) Rs. 400
(E) None of these

ANSWERS WITH HINTS

CHAPTER 1

1. (B) 2. (A) 3. (D) 4. (D) 5. (A)

6. (D) The tank will be filled 10% in the first hr. In the next hour 8% of it *i.e.* $10 \times 8/100 = 8\%$ of the tank is emptied. The remaining water after the second hour is 9·2%. Again in the third hour 10% tank is filled, it becomes 19·2%. Now again 8% of it *i.e.* $19{\cdot}2 \times 8/100 = 1{\cdot}536\%$ is emptied in the fourth hour so the remaining water is $19{\cdot}2 - 1{\cdot}536 = 17{\cdot}664\%$. **Ans.**

7. (A)

8. (B) Since the water is evaporated the quantity of sugar remains same.

$$\therefore \quad 6 \times \frac{4}{10} = 5 \times \frac{x}{100}$$

$$\therefore \quad x = \frac{24}{5} = 4\frac{4}{5} \qquad \textbf{Ans.}$$

9. (E) Since the quantity of cloth sold is increased by 20%

Since the quantity of cloth sold is increased by 20%

$\therefore$ The quantity will be 120% of the original cloth but the price is reduced by 25%.

$\therefore$ New price $= \frac{120 \times 75}{100} = 90\%$ of the original price

Hence the gross receipts will be decrease by 10%. **Ans.**

10. (B) 11. (B)

12. (C) Rs. 43·50 = Interest on Rs. 725 for 12 months + Interest on Rs. 362·50 for 4 months with double the rate of interest.

But interest on Rs. 362·50 with double the rate of interest = Interest on Rs. 725 with the single rate of interest.

$\therefore$ Rs. 43·50 = Inrerest on Rs. 725 for 12 months + Interest on the same amount for 4 months.

Interest on Rs. 725 for 16 months = 43·50

Interest on Rs. 100 for 12 months

$$= 43{\cdot}50 \times \frac{100}{725} \times \frac{12}{16}$$

$$= 4{\cdot}5\% \qquad \textbf{Ans}$$

13. (B) Total debt $= 25{,}500 \times \frac{100}{85}$

$$= \text{Rs. } 30{,}000$$

Money received by selling the goods

$$= 25{,}500\left(\frac{2}{5} \times \frac{83}{100} + \frac{3}{5} \times \frac{78}{100}\right)$$

$$= \frac{25{,}500}{500}(166 + 234)$$

$$= \text{Rs. } 20{,}400$$

$\therefore$ Money received by the creditors for a rupee $= \text{Rs. } \frac{20{,}400}{30{,}000}$

$$= \text{Rs. } 0{\cdot}68 = 68 \text{ paisa} \qquad \textbf{Ans.}$$

14. (D) 10% of 2,000 = 200

S.P. of 200 tables at 50% $= \text{Rs. } 200 \times \frac{17{\cdot}25}{2}$

$$= \text{Rs. } 1725$$

S.P. of remaining 1,800 tables

$$= \text{Rs. } 1{,}800 \times 17{\cdot}25$$

$$= \text{Rs. } 31{,}050$$

Rs. 31,050 + Rs. 1,725 = Rs. 32,775

Now Rs. 32,775 includes 15% profit

$\therefore$ C.P. $= \frac{100}{115} \times 32{,}775 = \text{Rs. } 28{,}500$

Now the actual S.P.

$$= 2000 \times \frac{30}{100} \times 17{\cdot}25 + 2{,}000 \times \frac{70}{100} \times \frac{17{\cdot}25}{2}$$

$$= 2{,}000\left(\frac{30}{100} + \frac{35}{100}\right) \times 17{\cdot}25$$

$$= 20 \times 65 \times 17{\cdot}25$$

$$= \text{Rs. } 22{,}425$$

$\therefore$ Loss = C.P. – S.P. $= 28{,}500 - 22{,}425$

$$= \text{Rs. } 6{,}075 \qquad \textbf{Ans.}$$

15. (C) If Mohan gets 100, then Ramesh will get 110.

Now if Ramesh gets 110 then Mohan gets

$$= 100$$

Now if Ramesh gets 100 then Mohan gets

$$= \frac{100 \times 100}{110}\%$$

$$= 90\frac{10}{11}\%$$

Hence, Mohan gets $(100 - 90\frac{10}{11})\%$

$$= 9\frac{1}{11}\% \text{ less} \qquad \textbf{Ans.}$$

16. (B)

17. (C) Reqd. population

$$= 8{,}000\left(1+\frac{10}{100}\right)^3$$

$$= 8{,}000\times\left(\frac{11}{10}\right)^3$$

$$= 8{,}000\times\frac{1331}{1000} = 10{,}648 \quad \textbf{Ans.}$$

18. (D) Let the total no. of scholars be x.

$\therefore$ No. of infants $= 20\%$ of x

$$= \frac{20}{100}\times x = \frac{1}{5}x$$

Let the no. of scholars of 8 $= y$

$\therefore$ No. of scholars above 8 $= \frac{2}{3}y$

$$= 48$$

$\Rightarrow$ $$y = \frac{3}{2}\times 48 = 72$$

$\because$ $$x - \frac{1}{5}x = 72 + 48$$

$\Rightarrow$ $$\frac{4}{5}x = 120$$

$\therefore$ $$x = \frac{5}{4}\times 120$$

$$= 150 \quad \textbf{Ans.}$$

19. (A) Reqd. Increase %

$$= \left[20 + 15 + \frac{20\times 15}{100}\right]\%$$

$$= 38\% \quad \textbf{Ans.}$$

20. (B) Let the Income be Rs. x. Then,

$$\text{Tax} = 3\frac{1}{2}\% \text{ of } x = \frac{7}{200}x$$

$$\text{Saving} = 12\frac{1}{2}\% \text{ of } \left[x - \frac{7}{200}x\right]$$

$$= \frac{25}{2\times 100}\left[\frac{(200-7)x}{200}\right]$$

$$= \frac{1}{8}\times\frac{193}{200}x = \frac{193}{1{,}600}x$$

$\because$ $$x - \left[\frac{7}{200} + \frac{193}{1{,}600}\right]x = 4{,}053$$

$\Rightarrow$ $$x - \left(\frac{56+193}{1{,}600}\right)x = 4{,}053$$

$\therefore$ $$x = \frac{4{,}053\times 1{,}600}{1{,}351}$$

$$= \text{Rs. } 4{,}800 \quad \textbf{Ans.}$$

CHAPTER 2

1. (A) New Price $= 50{,}000 + 13{,}000$

$$= \text{Rs. } 63{,}000$$

Deduction $= \frac{1}{7}$ of Rs. 63,000

$$= \text{Rs. } 9{,}000$$

S.P. $= 63{,}000 - 9{,}000$

$$= \text{Rs. } 54{,}000$$

Reqd. percentage $= \frac{54{,}000}{50{,}000}\times 100\%$

$$= 108\% \quad \textbf{Ans.}$$

2. (B)

3. (D) Let the S.P. be Rs. 100

If loss is 15% on S.P. then C.P. = Rs. 115

If on Rs. 115, loss is Rs. 15

$\therefore$ On Rs. 100, loss is Rs. $\frac{15\times 100}{115}$

$$= 13{\cdot}04\% \quad \textbf{Ans.}$$

4. (D) Let the list price be Rs. 100.

Then S.P. $=$ Rs. 96

Since profit is 10%

If Rs. 110 is S.P., then C.P. = Rs. 100

If Rs. 96 is S.P., then C.P $= \frac{100\times 96}{110}$

$\frac{960}{11}$ is C.P. then list price $=$ Rs. 100

100 is C.P. then list price $= \frac{100\times 11\times 100}{960}$

$$= \frac{1{,}375}{12}$$

$\therefore$ Reqd. addition $= 114\frac{7}{12} - 100$

$$= 14\frac{7}{12}\% \quad \textbf{Ans.}$$

5. (C) Let S.P. be Rs. 100

$\therefore$ Profit $= 25\%$ on S.P.

$\therefore$ C.P. $= 100 - 25$

$$= \text{Rs. } 75$$

$\therefore$ % of profit on C.P. $= \frac{25}{75}\times 100\%$

$$= \frac{100}{3}\%$$

$$= 33\tfrac{1}{3}\% \quad \textbf{Ans.}$$

6. (A) Let C.P. be Rs. x

then loss $= x\%$

Loss on Rs. $x = x\times\frac{x}{100}$

$$= \text{Rs. } \frac{x^2}{100}$$

S.P. = Rs. $x - \frac{x^2}{100}$. But S.P. is given Rs. 16.

$\because \quad x - \frac{x^2}{100} = 16$

$\Rightarrow \quad x^2 - 100x + 1{,}600 = 0$

$\Rightarrow \quad (x - 80)(x - 20) = 0$

$\therefore \quad x = 80$ and 20 **Ans.**

7. (B) Let the sale price be Rs. 100

Then profit = Rs. 12

$\therefore$ C.P. = Rs. 88

This C.P. includes 32% of the C.P. as expenses.

$\therefore$ For 132 C.P. including expenses only

C.P. = 100

88 C.P. including expenses only

$$\text{C.P.} = \frac{100 \times 88}{132}$$

$$= \frac{200}{3}$$

Rs. 200/3 is C.P. then S.P.

= Rs. 100

$\because$ 10·50 is C.P. then S.P.

$$= \frac{100 \times 3 \times 10{\cdot}50}{200}$$

$$= \frac{315}{20}$$

= Rs. 15·75 **Ans.**

8. (A) Suppose the list price = Rs. 100

then S.P. = Rs. 97·50

Rs. 117 is S.P. then C.P.

= Rs. 100

Rs. 97·50 is S.P. then C.P. $= \frac{100 \times 97{\cdot}50}{117}$

= Rs. 250/3

If no discount has been allowed then

S.P. = list price = Rs. 100

Hence profit in this case = 100 – 250/3

= Rs. 50/3

If Rs. 250/3 is C.P. then profit = Rs. 50/3

$\therefore$ Rs. 100 is C.P. then profit

$$= \frac{50}{3} \times \frac{3}{250} \times 100\%$$

= Rs. 20% **Ans.**

9. (D) He purchase goods worth Rs. 115 in Rs. 100 and sells the goods of Rs. 100 in Rs. 115.

Suppose he purchases goods of Rs. 100. If Rs. 100 goods is sold in Rs. 115.

$\therefore$ Rs. 115 goods is sold in = Rs. $\frac{115 \times 115}{100}$

= Rs. $\frac{23 \times 23}{4}$

= Rs. $132\frac{1}{4}$

Hence profit = $132\frac{1}{4} - 100$

= $32\frac{1}{4}\%$ **Ans.**

10. (A)

11. (B) Since the loss is 12%

S.P. is Rs. 88 then C.P. = Rs. 100

S.P. is Rs. 1 then C.P. = Rs. $\frac{100}{88}$

Hence C.P. of 14 oranges is Rs. $\frac{100}{88}$

To earn 12% profit,

Orange of Rs. 100 must be sold for Rs. 112

Orange of 100/88 must be

$$= \frac{112}{100} \times \frac{100}{88} = \frac{112}{88}$$

$$= \text{Rs. } \frac{14}{11}$$

Hence 14 oranges must be sold for = Rs. $\frac{14}{11}$

$\therefore$ 1 orange must be sold = $\frac{14}{11 \times 14}$

= Rs. $\frac{1}{11}$

$\therefore$ 11 oranges must be sold = Re. 1 **Ans.**

12. (E) 13. (D)

14. (B) C.P. of one horse = $\frac{100}{(100 + 15)} \times 1{,}955$

$$= \frac{1{,}95{,}500}{115}$$

= Rs. 1,700

C.P. of other horse = $\frac{100}{(100 - 15)} \times 1{,}955$

$$= \frac{1{,}95{,}500}{85}$$

= Rs. 2,300

$\therefore$ C.P. of both horses = (1,700 + 2,300)

= Rs. 4,000

$\Rightarrow$ S.P. of both horses = 2 × 1,955

= Rs. 3,910

$\therefore$ Total loss = C.P. – S. P.
= 4,000 – 3,910
= Rs. 90 **Ans.**

15. (B)

16. (A) Let the cost price = Rs. 100

$\because$ Estimated profit = $22\frac{1}{2}\% = \frac{45}{2}\%$

$\Rightarrow$ Selling price = $\left(100 + \frac{45}{2}\right)$

= Rs. $\frac{245}{2}$

If S.P. is Rs. $\frac{245}{2}$, then

Profit = Rs. $\frac{45}{2}$

If S.P. is Rs. 392, then

Reqd. profit = $\frac{45}{2} \times \frac{3}{245} \times 392$

= Rs. 72 **Ans.**

17. (D) $\because$ S.P. of the house = Rs. 12,600

$\therefore$ Profit = 5%

$\therefore$ C.P. of the house = $\frac{100}{105} \times 12{,}600$

= $\frac{20}{21} \times 12{,}600$

= Rs. 12,000

$\therefore$ Reqd. % gain

= $\frac{13{,}000 - 12{,}000}{12{,}000} \times 100\%$

= $\frac{100}{12}\% = 8\frac{1}{3}\%$ **Ans.**

18. (B) Let the C.P. of the cow = Rs. x

$\therefore$ S.P. of cow (at a loss of 15%)

= $\frac{(100 - 15)}{100} \times x$

= $\frac{17}{20}x$

As per question,

$\because$ $\frac{17}{20}x + 90 = x \times \frac{(100 + \frac{15}{2})}{100}$

$\Rightarrow$ $\frac{17}{20}x + 90 = x \times \frac{215}{100} = \frac{43x}{40}$

$\Rightarrow$ $\left(\frac{43}{40}x - \frac{17}{20}x\right)$ = Rs. 90

$\Rightarrow$ $\left(\frac{43 - 34}{40}\right)x$ = Rs. 90

$\therefore$ $x = \frac{40}{9} \times 90$

= Rs. 400 **Ans.**

19. (A) Let the C.P. of the typewriter = Rs. x. Then,

$\because$ $\frac{(100 + 8)}{100} \times x = \frac{(100 - 10)}{100} \times 480$

$\therefore$ $x = \frac{90}{108} \times 480$

= Rs. 400

If no discount were allowed

$\therefore$ Reqd. Gain = M. P. – C.P.
= 480 – 400
= Rs. 80 **Ans.**

20. (A) C.P. of 100 shawls = Rs. 2,450

S.P. of 100 shawls = $76 \times 35 + 24 \times \frac{35}{2}$

= Rs. 2,660 + 420
= Rs. 3,080

$\therefore$ Reqd. Gain = 3,080 – 2,450
= Rs. 630

$\therefore$ % Gain = $\frac{630}{2{,}450} \times 100\%$

= $\frac{6{,}300}{245}\%$

= $\frac{180}{7}\%$

= $25\frac{5}{7}\%$ **Ans.**

CHAPTER 3

1. (A) The two quantities compared in a ratio are called its items. The first term is called antecedent, the second the consequent. **Ans.**

2. (B)

3. (B) $\frac{a}{d} = \frac{a}{b} \times \frac{b}{c} \times \frac{c}{d}$

= $\frac{2}{3} \times \frac{4}{5} \times \frac{6}{7}$

= $\frac{16}{35}$ **Ans.**

4. (B) In the first glass, milk : water = $\frac{1}{3} : \frac{2}{3}$

In the second glass, milk : water = $\frac{1}{4} : \frac{3}{4}$

Since the L.C.M. of the denominators 3 and 4 is 12. So the first glass of capacity 12 will contain milk : water = 4 : 8 and the second of the same capacity will contain milk : water = 3 : 9, so the tumbler will contain 24 of both glasses having milk = 7 and water = 17. **Ans.**

5. (A) Since the mixture contains 30 litre of mixure of milk and water in the ratio of = 7: 3. So milk = 21 litre, water = 9 litre. Now the milk remains the same *i.e.* 21 litre and water should be increased to make ratio 3 : 7. So if antecedent is 21 the consequent must be 49 hence 40 litre of water must be added to make 49 litre of it. **Ans.**

6. (C) No. of 25 paisa, 10 paisa and 5 paisa are in the ratio 1 : 2 : 3 so their values in paisa are in the ratio 1 × 25 : 2 × 10 : 3 × 5 = 25 : 20 : 15 = 5 : 4 : 3. The value of all the coins is Rs. 30. So the value of 5 paisa coins.

$$= \frac{3}{(5+4+3)} \times 30 = \text{Rs. } 7{\cdot}50$$

Hence the number of 5 paisa coins

$$= 7{\cdot}50 \times 20 = 150$$ **Ans.**

7. (B) Let the present age of Shyam be x years.

$\therefore$ His sister's present age = $x/2$ years.

When the age of Shyam is doubled then Shyam's age = $2x$ years.

and his sister's age will be $\frac{x}{2} + x = \frac{3x}{2}$ years

$$\therefore \quad \text{Reqd. Ratio} = \frac{2x}{\frac{3x}{2}}$$

$$= \frac{4x}{3x} = \frac{4}{3}$$ **Ans.**

8. (E) If he travels whole distance in second class he will spend Rs. 3. But he spends Rs. 3·40 hence he spends 40 paisa more. For travelling one kilometre he spends 4 paisa more, therefore he will travel 10 km in first class. **Ans.**

9. (D) 10. (D)

11. (C)

	days	work	labours
	9 ↑	5 km ↓	100 ↓
	6 ↑	7 km ↓	x ↓
	I	II	III	IV

$$\left.\begin{matrix} 6:9 \\ 5:7 \end{matrix}\right\} :: \ 100 : x$$

Hence, $x = \frac{9 \times 7 \times 100}{6 \times 5}$

$= 210$ labours.

Reqd. number of more labours

$= 210 - 100$

$= 110$ **Ans.**

12. (C) 13. (B)

14. (C) $\because$ Ratio of their capitals

$$= \frac{1}{5} : \frac{1}{6} : \frac{1}{8}$$

$$= 24 : 20 : 15$$

$\Rightarrow$ Sum of ratios $= 24 + 20 + 15$

$= 59$

$\therefore$ Division of their profits

$$= \frac{24}{59} \times 1180, \ \frac{20}{59} \times 1180, \ \frac{15}{59} \times 1180$$

= Rs. 480, Rs. 400, Rs. 300 **Ans.**

15. (A)

16. (C) As per question,

$$\text{Tax paid} = 20\% \text{ of } 450$$

$$= \frac{20}{100} \times 450$$

$$= \text{Rs. } 90$$

$\therefore$ Remaining amount

$$= \text{Rs. } (450 - 90)$$

$$= \text{Rs. } 360$$

$\because$ Ratio of division of profit among

A, B and C $= 1 : 1\frac{1}{2} : 2 = 2 : 3 : 4$

$\Rightarrow$ Sum of Ratios $= 2 + 3 + 4 = 9$

$\therefore$ Shares of profit of A; B; C

$$= \frac{2}{9} \times 360; \frac{3}{9} \times 360 \text{ and } \frac{4}{9} \times 360$$

= Rs. 80; Rs. 120 and Rs. 160 **Ans.**

17. (A)

Amount	Period	Men
45 gms ↑	16 weeks ↑	2,200 ↓
33 gms ↑	24 weeks ↑	$(2{,}200 - x)$ ↓

$$\therefore \quad \left.\begin{matrix} 45:33 \\ 16:24 \end{matrix}\right\} :: \ (2{,}200 - x) : 2{,}200$$

$$\therefore \quad (2{,}200 - x) = \frac{45 \times 16 \times 2{,}200}{33 \times 24} = 2{,}000$$

$$\therefore \quad x = 2{,}200 - 2{,}000$$

$$= 200 \text{ men}$$ **Ans.**

18. (A) 19. (B)

20. (C) Let the volume of each container = V cu. m
∵ Total amount of water
$$= \frac{V}{2} + \frac{V}{3} + 0 = \frac{5V}{6}$$
∴ Reqd. part of third container will be full
$$= \frac{1}{3} \times \frac{5V}{6}$$
$$= \frac{5}{18} V \quad \textbf{Ans.}$$

CHAPTER 4

1. (A)
2. (C) If C subscribes zero then B subscribes Rs. 500 A subscribes 500 + 700 = Rs. 1,200. Hence divide Rs. 4,700 – 1,200 – 500 = Rs. 3,000 equally among A, B and C. So C' share is Rs. 1,000. B's share = Rs. 1,000 + 500 = Rs. 1,500 and A's share = Rs. 1,500 + 700 = Rs. 2,200. Now divide the profit according to their capitals.
$$\therefore \text{ Share of A } = \frac{22}{47} \times 846$$
$$= 22 \times 18 = \text{Rs. } 396$$
$$\text{Share of B } = \frac{15}{47} \times 846$$
$$= 15 \times 18 = \text{Rs. } 270$$
$$\text{Share of C } = \frac{10}{47} \times 846$$
$$= 10 \times 18 = \text{Rs. } 180 \quad \textbf{Ans.}$$
3. (A) Capitals invested by A, B, C for the periods of 12 months, 7 month and 5 months and their shares in the profit are in the ratio 4 : 3 : 2. Since A invests Rs. 1,400 for 12 months and let B invests Rs. x for 7 months.
$\therefore 1,400 \times 12 : x \times 7 :: 4 : 3$
$$\Rightarrow \quad x = \frac{1,400 \times 12 \times 3}{7 \times 4} = \text{Rs. } 1,800$$
$\therefore 1,400 \times 12 : y \times 5 :: 4 : 2$
$$\Rightarrow \quad y = \frac{1,400 \times 12 \times 2}{5 \times 4}$$
$$= \text{Rs. } 1,688 \quad \textbf{Ans.}$$
4. (C) Capital of A : B = 5 : 6
Profit of A : B = 5 : 9
Time of A = 8 months.
Let time of B be x months.
Hence $\frac{5 \times 8}{6 \times x} = \frac{5}{9} \Rightarrow x = \frac{8 \times 9}{12} = 12$ months **Ans.**
5. (C) Let the total profit be Rs. x
Salary paid to B = Rs. 1,440.
Net profit = Rs. $(x - 1,440)$
A gets $\frac{x - 1,440}{2}$ and B gets $\frac{x - 1,440}{2}$
B pays to A an interest $= \frac{10}{100} \times 22,500$
$= \text{Rs. } 2,250$
$$\because \frac{\text{B' income}}{\text{A' income}} = \frac{\frac{x - 1,440}{2} + 1,440 - 2,250}{\frac{x - 1,440}{2} + 2,250}$$
$$= \frac{1}{2}$$
$$\Rightarrow \quad \frac{x - 3,060}{x + 3,060} = \frac{1}{2}$$
$$\Rightarrow \quad 2x - 6,120 = x + 3,060$$
$$\therefore \quad x = 9,180 \quad \textbf{Ans.}$$
6. (D) Ratio of the capitals
$= 12,500 : 8,500$
$= 25 : 17$
The interest is to be divided in the ratio 25 : 17.
Difference = 25 – 17 = 8.
But the actual difference = Rs. 300
If Rs. 8 is the difference,
Total interest = 25 + 17 = Rs. 42
Rs. 300 is the difference,
$$\text{Total interest } = \frac{42 \times 300}{8}$$
$= \text{Rs. } 1,575$
But this interest is 40% of the total income
$$\text{Hence, whole profit } = \frac{1,575 \times 100}{40}$$
$= \text{Rs. } 3,937{\cdot}50 \quad \textbf{Ans.}$
7. (B) Let Ram had put his capital for x months.
$$\because \quad \frac{15,000 \times 4}{12,000 \times x} = \frac{5,000}{8,000 - 5,000}$$
$$\Rightarrow \quad \frac{5 \times 4}{4 \times x} = \frac{5}{3}$$
$$\therefore \quad x = 3 \text{ months.} \quad \textbf{Ans.}$$
8. (A)
9. (A) ∵ Ratio of their rents
$$\text{A : B : C } = 5 \times \frac{9}{2} : 8 \times 5 : 9 \times \frac{13}{2}$$
$$= 45 : 80 : 117$$

Sum of ratios = 45 + 80 + 117 = 242

$\therefore$ Share of A = $\frac{45}{242} \times 60{\cdot}50$

= $45 \times 0{\cdot}25$

= $11{\cdot}25$

Share of B = $\frac{80}{242} \times 60{\cdot}50$

= $80 \times 0{\cdot}25$

= $20{\cdot}00$

Share of C = $\frac{117}{242} \times 60{\cdot}50$

= $117 \times 0{\cdot}25$

= $29{\cdot}25$ **Ans.**

10. (B) Profit of C = Rs. $\frac{75}{500} \times 700$

= Rs. 15×7

= Rs. 105 **Ans.**

CHAPTER 5

1. (C)
2. (D) Wt. of A + B + C = $45 \times 3 = 135$ kg (i)

Wt. of A + B = $40 \times 2 = 80$ kg (ii)

Wt. of B + C = $43 \times 2 = 86$ kg (iii)

Adding (ii) and (iii),

Wt. of A + 2B + C = 166 kg

A + B + C = 135 kg …(i)

Subtracting (i) B = 31 kg **Ans.**

3. (B) Let the fourth number be x.

then the average of first three = $2x$

So the sum of three numbers = $3 \times 2x = 6x$

Since the average of 4 numbers = 12.

Sum of four numbers = $4 \times 12 = 48$.

$\because$ $48 - 6x = x \Rightarrow 7x = 48, \therefore x = \frac{48}{7}$ **Ans.**

4. (D) Reqd. average = $\frac{4 \times 76 + 3 \times 81}{(4 + 3)}$

= $\frac{304 + 243}{7}$

= $\frac{547}{7}$ **Ans.**

5. (A) Time taken to travel 24 km with the speed of 16 km/hour. = $\frac{24}{16} = \frac{3}{2}$ hour.

Similarly time taken to travel 36 km with the speed of 15 km/hour. = $\frac{36}{15} = \frac{12}{5}$ hour.

Total distance travelled = 36 + 24 = 60 km

and total time taken to travel distance

= $\left(\frac{3}{2} + \frac{12}{5}\right)$ hour

= $\frac{39}{10}$ hour

Hence average speed = $60 \times \frac{10}{39}$

= $\frac{200}{13}$

= $15{\cdot}38$ **Ans.**

6. (A) Total workers = 600 + 400 = 1,000

Total wages per day = $2{\cdot}55 \times 1{,}000$

= Rs. 2,550.

Since a man gets 50 P. more, 600 men will get Rs. $600 \times {\cdot}50$ = Rs. 300 more.

$\therefore$ 2,550 – 300 = 2,250 is the daily wages of 1,000 women.

Hence, daily wage of man is

= $2{\cdot}25 + {\cdot}50$

= Rs. $2{\cdot}75$

and daily wage of women

= Rs. $2{\cdot}25$ **Ans.**

7. (B) $\because$ L.C.M. of 40 and 35 = 280.

Let the journey be 280 km

If the speed is 40 km/hour,

time taken = $\frac{280}{40} = 7$ hrs.

If the speed is 35 km/hour,

time taken = $\frac{280}{35} = 8$ hrs.

Difference of times

= 8 – 7 = 1 hour

= 60 minutes

If 60 minutes is the difference, length of journey = 280 km

If 15 minutes is the difference, journey

= $\frac{280}{60} \times 15$

= 70 km **Ans.**

8. (A) Sum of wt. of
A, B and C = 84 × 3 = 252 kg
Sum of wt. of
A, B, C and D = 80 × 4 = 320 kg
wt. of D = 320 – 252 = 68 kg
wt. of E = 68 + 3 = 71 kg
Sum of wt. of
B, C, D, E = 79 × 4 = 316 kg
wt. of (B + C) = 316 – 68 – 71
= 177 kg
wt. of A = 252 – 177
= 75 kg **Ans.**

9. (B) Let the length of journey be L.C.M. of 3, 5 = 15 km
Time taken in going P to Q = $\frac{15}{5}$
= 3 hr
Time taken in coming Q to P = $\frac{15}{3}$
= 5 hr
Total time in going and coming back
= 5 + 3 = 8 hr
Hence, the average speed
= $\frac{30}{8}$
= $\frac{15}{4}$ km/hr. **Ans.**

10. (B) In 12 minutes leak admits
= $\frac{15}{4}$ quintals
One hour leak admits
= $\frac{15}{4} \times \frac{60}{12} = \frac{75}{4}$ quintals
In one hour pumps throw out
= 12 quintals
Water left in the ship in one hour
= $\frac{75}{4} - 12$
= $\frac{27}{4}$ quintals

$\because$ $\frac{27}{4}$ quintals of water is left in the ship in
= 1 hour.

$\Rightarrow$ 60 quintals of water is left in = $\frac{1 \times 60 \times 4}{27}$
= $\frac{80}{9}$ hour

Now in 80/9 hour the ship runs = 40 km
1 hour the ship runs = $\frac{40 \times 9}{80}$
= 4·5 km **Ans.**

CHAPTER 6

1. (B) 2. (C) 3. (B)

4. (C) Interest on (Rs. 2,000 + Rs. 1,600) with the rate of r and interest on Rs. 1,600 with the rate of 2% for 3 years = Rs. 960.

Hence, $960 = \frac{3{,}600 \times r \times 3}{100} + \frac{1{,}600 \times 2 \times 3}{100}$

Ans.

5. (D) Interest on Rs. 1,550 with the rate of 5% for 3 years = Rs. 232·50 the remaining interest = 300 – 232·50 = Rs. 67·50.
$\because$ Rs. 67·50 is earned by the difference of rate of interest = 8% – 5% = 3%.

$\therefore$ $67{\cdot}50 = \frac{P \times 3 \times 3}{100}$ or P = 750

Hence Rs. 750 is being invested in 8% and the remaining 1,550 – 750 = Rs. 800 on 5%. So the ratio = 800/750 = 16 : 15. **Ans.**

6. (B) Let the principals invested for 2 years, 3 years and 4 years be P_1, P_2 and P_3.

$$\text{So } P_1 + \frac{P_1 \times 5 \times 2}{100} = P_2 + \frac{P_2 \times 5 \times 3}{100}$$
$$= P_3 + \frac{P_3 \times 5 \times 4}{100}$$
$$\therefore \quad P_1\left(1 + \frac{2}{20}\right) = P_2\left(1 + \frac{3}{20}\right) = P_3\left(1 + \frac{4}{20}\right)$$
$$\therefore \quad P_1 \times \frac{22}{20} = P_2 \times \frac{23}{20} = P_3 \times \frac{24}{20}$$
$$P_1 \times 22 = P_2 \times 23 = P_3 \times 24$$

Let it be equal to K.

Therefore, $P_1 = \frac{K}{22}$, $P_2 = \frac{K}{23}$, $P_3 = \frac{K}{24}$,

$$P_1 : P_2 : P_3 = \frac{K}{22} : \frac{K}{23} : \frac{K}{24}$$
$$= \frac{1}{110} : \frac{1}{115} : \frac{1}{120}$$ **Ans.**

7. (B) Suppose the marked price for the cash payment is Rs. 100.
$\because$ Marked price for the credit of 1 month
= $100 + \frac{100 \times 4 \times 1}{100 \times 12}$
= $100\left(1 + \frac{1}{300}\right)$
= Rs. $\frac{301}{3}$

Reqd. ratio $= 100 : \frac{301}{3} = 300 : 301$ **Ans.**

8. (A) $9{,}600 = P + \frac{P \times 5 \times 4}{100}$

$= P\left(1 + \frac{1}{5}\right)$

$= \frac{6P}{5}$

$\therefore \quad P = \frac{9{,}600 \times 5}{6} = \text{Rs. } 8{,}000$

$\therefore$ Cash value of house

$= 8{,}000 + 8{,}000 = \text{Rs. } 16{,}000$ **Ans.**

9. (D) Period = 3rd March to 15 May

= (28 + 30 + 15) days

= 73 days

$= \frac{73}{365}\text{ year} = \frac{1}{5}\text{ year}$

$\therefore \quad \text{S. I.} = \frac{600 \times 6 \times 1}{100 \times 5} = \frac{36}{5}$

= Rs. 7·20 **Ans.**

10. (C) Let the second part of the sum be Rs. x. Then,

$\because \quad \frac{(2{,}600 - x) \times 3 \times 5}{100} = \frac{x \times 6 \times 4}{100}$

$\Rightarrow \quad 13{,}000 - 5x = 8x$

$\therefore \quad x = \frac{13{,}000}{13}$

= Rs. 1,000 **Ans.**

CHAPTER 7

1. (B) Amount $= 500\left(1 + \frac{6}{100}\right)^2$

$= 500\left(\frac{53}{50}\right)^2$

$= 500 \times \frac{53}{50} \times \frac{53}{50}$

$= \frac{2{,}809}{5}$

= Rs. 561·80 **Ans.**

2. (C) Amount = Principal $\left(1 + \frac{r}{100}\right)^n$

In first case $2 = 1\left(1 + \frac{r}{100}\right)^4 \quad \ldots(1)$

and in second case

$8 = 1\left(1 + \frac{r}{100}\right)^n \quad \ldots(2)$

$\Rightarrow \quad (2)^3 = \left(1 + \frac{r}{100}\right)^n$

$\Rightarrow \left[\left(1 + \frac{r}{100}\right)^4\right]^3 = \left(1 + \frac{r}{100}\right)^n$

$\Rightarrow \quad \left(1 + \frac{r}{100}\right)^{12} = \left(1 + \frac{r}{100}\right)^n$

$\therefore \quad n = 12$ **Ans.**

3. (D) C. I. $= 10{,}000\left[\left(1 + \frac{1}{100}\right)^3 - 1\right]$

$= 10{,}000\left[\frac{101 \times 101 \times 101}{100 \times 100 \times 100} - 1\right]$

$= 10{,}000\left[\frac{10{,}30{,}301 - 10{,}00{,}000}{10{,}00{,}000}\right]$

$= \frac{30{,}301}{100} = \text{Rs. } 303{\cdot}01$ **Ans.**

4. (D) Interest on Rs. 100 for the first year

= Rs. 4

Interest on Rs. 100 for the second year

$= 100\left\{\left(1 + \frac{4}{100}\right)^2 - 1\right\} - 4$

= Rs. 4·16

Now if Rs. 4·16 – Rs. 4 = Rs. 0·16 is the difference then,

principal = Rs. 100

Now if Rs. 88 is the difference then,

$\text{principal} = \frac{100 \times 88}{0{\cdot}16}$

= Rs. 55,000 **Ans.**

5. (C) Required population

$= \text{Initial population}\left(1 - \frac{r}{1000}\right)^n$

$= 50{,}000\left(1 - \frac{20}{1000}\right)^2$

$= 50{,}000\left(\frac{98}{100}\right)^2$

$= 9{,}604 \times 5 = 48{,}020$ **Ans.**

6. (D) $\because \quad 10{,}648 = x\left(1+\frac{10}{100}\right)^3$

$= x \times \frac{1{,}331}{1{,}000}$

$\therefore \quad x = 8{,}000$ **Ans.**

7. (A) Let the share of elder son be Rs. x

$\because \quad x\left(1+\frac{5}{100}\right)^2 = (16{,}400 - x)\left(1+\frac{5}{100}\right)^3$

$\therefore \quad x = 8{,}000$ **Ans.**

8. (C) $\quad 410 = P\left[\left(1+\frac{r}{100}\right)^2 - 1\right]$

and $\quad 400 = \frac{P \times r \times 2}{100}$

$\therefore \quad r = 5\%$ **Ans.**

CHAPTER 8

1. (B) 12th Aug. to 17 Sept. = 36 days.

Now $90 - 36 = 54$ days.

Now interest on Rs. 400 for 54 days at the rate of $6\frac{1}{2}\%$ = Rs. 3·90.

Hence amount received by the depositors

$400 - 3{\cdot}90$ = Rs. 396·10 **Ans.**

2. (C) Cash value of Rs. 4500 stock at 86·75

$= 4500 \times \frac{86{\cdot}75}{100}$

= 3903·75 **Ans.**

3. (B) No. of shares purchased in Rs. 14,400 at 20% premium. $= \frac{14{,}400}{120} = 120.$

Gain on 120 shares = 120 × 5

= Rs. 600. **Ans.**

4. (D) Reqd. Income $= 1260 \times \frac{100}{84} \times \frac{3}{100}$

= Rs. 45 **Ans.**

5. (C) Suppose the income from each investment is Re. 1.

Then Re. 1 is the income from the first stock.

$= \frac{126}{6} = \text{Rs. } 21$

and Re. 1 is the income from the second stock.

$= \frac{120}{5} = \text{Rs. } 24$

Hence the investment is to be divided in the ratio 21 : 24 or 7 : 8

Reqd. investments are as follows—

(I) $= \frac{7}{(7+8)} \times \text{Rs. } 27{,}000$

= 12,600

and (II) $= \frac{8}{(7+8)} \times \text{Rs. } 27{,}000$

= Rs. 14,400 **Ans.**

6. (A) For Rs. $\left(98\frac{1}{4}+\frac{1}{4}\right)$ = Rs. $\frac{197}{2}$

cash, we can buy a stock of Rs. 100. So for Rs. 12,805 cash we can buy a stock of

$= \frac{100 \times 2 \times 12{,}805}{197}$

= Rs. 13,000.

Now for a stock of Rs. 100, we can get cash

$= 102\frac{5}{8} - \frac{1}{4}$

$= \text{Rs. } 102\frac{3}{8} = \text{Rs. } \frac{819}{8}$

so for Rs. 13,000 we can get a cash

$= \frac{819}{8} \times \frac{1}{100} \times 13{,}000$

$= \text{Rs. } \frac{1{,}06{,}470}{8}$

With a cash of Rs. $\left(105\frac{3}{8}+\frac{1}{4}\right) = \text{Rs. } \frac{845}{8}$

We can buy a stock of Rs. 100

So with a cash of Rs. $\frac{1{,}06{,}470}{8}$ we can buy stock of

$= \text{Rs. } \frac{1{,}06{,}470}{8} \times \frac{100 \times 8}{845} = \text{Rs. } 12{,}600$

Income from 1st stock

$\frac{13{,}000 \times 4}{100} = \text{Rs. } 520$

Income from 2nd stock

$= \frac{9 \times 12{,}600}{2 \times 100} = \text{Rs. } 567$

Hence, change in Income

= Rs. (567 ~ 520)

= Rs. 47 increase **Ans.**

7. (C) Let the sum invested be Rs. x.

$\therefore$ Income in first case

$= \frac{9}{2} \times \frac{x}{96} = \frac{3x}{64}$

and income in second case

$$= \frac{4 \times x}{88} = \frac{x}{22}$$

$$\therefore \quad \frac{3x}{64} - \frac{x}{22} = 100$$

$$\Rightarrow \quad \frac{33x - 32x}{704} = 100$$

or, x = Rs. 70,400 **Ans.**

8. (B)Face value of 20 shares

$$= 20 \times 50$$

$$= \text{Rs. } 1{,}000$$

$\therefore$ Income on Rs. 1,000 at 5%

$$= \frac{5 \times 1{,}000}{100}$$

$$= \text{Rs. } 50 \quad \textbf{Ans.}$$

CHAPTER 9

1. (E) $\because$ 14 persons complete in 16 days

$$= 1 \text{ work}$$

$\Rightarrow$ 8 persons complete in 12 days

$$= \frac{1 \times 8}{14} \times \frac{12}{16}$$

$$= \frac{3}{7}$$

$$\Rightarrow \text{Remaining work} = 1 - \frac{3}{7} = \frac{4}{7}$$

and total number of persons = 8 + 8

= 16

$\because$ 14 persons do 1 work in = 16 days

$\therefore$ 16 persons do $\frac{4}{7}$ work in $= \frac{16 \times 14}{16} \times \frac{4}{7}$

= 8 days **Ans.**

2. (A) $\because$ In 10 days a work is completed by = 15 men

$\therefore$ in 1 day a work is completed by

$$= 15 \times 10$$

$$= 150 \text{ men}$$

$\because$ In 15 days the work is completed by

$$= 20 \text{ boys}$$

$\therefore$ 1 day the work is completed by

$$= 20 \times 15$$

$$= 300 \text{ boys}$$

$\because$ Work of 150 men = work of 300 boys

$$\Rightarrow \quad \text{Work of 1 man} = \frac{300}{150}$$

$$= \text{work of 2 boys}$$

$\therefore$ 10 man $= 2 \times 10$

$$= 20 \text{ boys}$$

$\therefore$ 10 men + 10 boys $= 20 + 10$

$$= 30 \text{ boys}$$

$\because$ 20 boys completed the work in =15 days

$\therefore$ 30 boys completed the work in

$$= \frac{15 \times 20}{30}$$

= 10 days **Ans.**

3. (A) In 5 days 14 workers make =1400 toys

$\therefore$ In 1 day 14 workers make $= \frac{1400}{5}$ toys

$$= 280 \text{ toys}$$

$\Rightarrow$ Number of remaining toys $= 1400 - 280$

$$= 1120$$

and number of total workers $= (14 + 14)$

$$= 28$$

$\because$ 14 workers make 1400 toys in

= 5 days

$\therefore$ 28 workers make 1120 toys in

$$= \frac{5 \times 14 \times 1120}{28 \times 1400}$$

= 2 days **Ans.**

4. (D) $\because$ In 12 days work done by 14 men = 1

$\therefore$ In 4 days work done by 14 men

$$= \frac{1 \times 4}{12} = \frac{1}{3}$$

$$\therefore \quad \text{Remaining work} = 1 - \frac{1}{3} = \frac{2}{3}$$

and number of total men = 14 + 2 = 16

If 1 work is done by 14 men in = 12 days

$\therefore$ $\frac{2}{3}$ work is done by 16 men in

$$= \frac{12 \times 14}{16} \times \frac{2}{3}$$

= 7 days **Ans.**

5. (A) Time taken to complete by both together

$$= \frac{xy}{x + y}$$

[Here $x = 8$ and $y = 4$]

$$= \frac{8 \times 4}{8 + 4} = \frac{32}{12}$$

$$= 2\frac{2}{3} \text{ hour} \quad \textbf{Ans.}$$

6. (D) Work of (Ganesh, Ram and Sohan) for 1 day $= \frac{1}{16}$

and work of (Ganesh and Ram) for 1 day

$$= \frac{1}{24}$$

$\therefore$ Work of Sohan for 1 day $= \frac{1}{16} - \frac{1}{24} = \frac{1}{48}$

$\therefore$ Sohan alone will complete the work in

$$= 1 \div \frac{1}{48}$$

$$= 48 \text{ days}$$ **Ans.**

7. (C) Time taken by B alone to complete the work $= \frac{xy}{x-y}$

[Here $x = 12$ and $y = 8$]

$$= \frac{12 \times 8}{12 - 8} = \frac{96}{4}$$

$$= 24 \text{ days}$$ **Ans.**

8. (A) Work done by (A + B) in 1 day $= \frac{1}{24}$

Work done by B alone in 1 day

$$= \frac{1}{3 \times 12} = \frac{1}{36}$$

$\therefore$ Work of A for 1 day

$$= \frac{1}{24} - \frac{1}{36} = \frac{1}{72}$$

and remaining work $= 1 - \frac{1}{3} = \frac{2}{3}$

$\because$ $\frac{1}{72}$ work is done by A in = 1 day

$\therefore$ $\frac{2}{3}$ work is done by A in

$$= 1 \times \frac{72}{1} \times \frac{2}{3}$$

$$= 48 \text{ days}$$ **Ans.**

9. (A) Work of (Ram + Dilip + Shekhar) for 1 day $= \frac{1}{20}$

and work of (Ram + Dilip) for 1 day

$$= \frac{1}{30}$$

$\therefore$ Work of Shekhar for 1 day

$$= \frac{1}{20} - \frac{1}{30} = \frac{1}{60}$$

Hence Shekhar alone will complete the work in 60 days. **Ans.**

10. (C) Time taken by (A + B) to complete the work $= \frac{xy}{x+y}$

[Here $x = 6$ and $y = 3$]

$$= \frac{6 \times 3}{6 + 3}$$

$$= 2 \text{ days}$$ **Ans.**

CHAPTER 10

1. (C) Let the speed of the first train be x km/hr.

$\because$ Time $= \frac{\text{Total distance}}{\text{Speed}}$

$\therefore$ $\frac{12}{60} = \frac{\text{(Length of first train + length of second train)}}{(80 + x)}$

Hence in order to find the value of x, both the statements together are necessary. **Ans.**

2. (B) According to both statements

Let the speed of the boat in still water be x km/hr.

Speed of river $= 1$ km

Time taken to go and return = 3 hour

$\because$ $3 = \frac{4}{x+1} + \frac{4}{x-1}$

$\Rightarrow$ $3 = \frac{4(x - 1 + x + 1)}{x^2 - 1}$

$\Rightarrow$ $\frac{3}{4} = \frac{2x}{x^2 - 1}$

$\Rightarrow$ $3x^2 - 8x - 3 = 0$

$\Rightarrow$ $(3x + 1)(x - 3) = 0$

On solving $\therefore$ $x = 3$

$\therefore$ Both statements together are needed **Ans.**

3. (E) Speed of train

$$= \frac{\text{Length of the train + length of platform}}{\text{Time taken to cross the platform}}$$

Hence both together are necessary. **Ans.**

4. (E) $\because$ The train and the man are moving in opposite directions

$\therefore$ Time taken to cross the man

$$= \frac{\text{Length of the train in metre}}{\text{[(Speed of the train + Speed of the man) in m/sec]}}$$

$\because \quad 4 = \dfrac{\text{Length of the train}}{(84+6)\times\frac{5}{18}}$

$\Rightarrow \quad 4 = \dfrac{\text{Length of the train}}{25}$

$\therefore$ Length of the train $= 25 \times 4 = 100$ m **Ans.**

5. (E) Let the speed of the second train be x km/hr.
and sum of lengths of both the trains
$= 100 + 120$
$= 220$ m
$= \dfrac{220}{1000} = \dfrac{11}{50}$ km
Since both the trains are moving in opposite directions
$\therefore$ Relative speed $= (50 + x)$ km/hr
and time $= 6$ sec
$= \dfrac{6}{60\times60} = \dfrac{1}{600}$ hr

$\because \quad \dfrac{1}{600} = \dfrac{\frac{11}{50}}{50+x}$

$\Rightarrow \quad (50+x) = \dfrac{11}{50}\times 600 = 132$

$\therefore \quad x = 132 - 50$
$= 82$ km/hr **Ans.**

6. (E) According to the formula
Time taken to cross another train moving in opposite direction
$= \dfrac{\text{Sum of length of both the trains}}{\text{Sum of speed of both the trains}}$
$\therefore$ Both statements together are needed **Ans.**

7. (D) Since the speed of the stream is not given, hence the question cannot be solved. **Ans.**

8. (A) Speed of the train $= 90$ km/hr
$= 90 \times \dfrac{5}{18}$
$= 25$ m/sec

$\because$ Speed of the train $= \dfrac{\text{Length of the train}}{\text{Time taken to cross}}$

$\Rightarrow \quad 25 = \dfrac{\text{Length of the train}}{10}$

$\therefore$ Length of the train $= 25 \times 10$
$= 250$ m **Ans.**

9. (C) All the three statements are necessary.
$\because$ Time taken to cross
$= \dfrac{\text{Sum of lengths of both the trains}}{\text{Sum of speeds of both the trains}}$
Ans.

10. (B) Let the speed of the train be x km/hr.
$\because$ Length of the train $= 150$ m
$= \dfrac{150}{1000} = \dfrac{3}{20}$ km
and time taken to cross $= 10$ seconds
$= \dfrac{10}{60\times60} = \dfrac{1}{360}$ hr

$\because \quad$ Time $= \dfrac{\text{Length of the train}}{\text{Speed of the train} - \text{speed of the man}}$

$\Rightarrow \quad \dfrac{1}{360} = \dfrac{\frac{3}{20}}{x-2}$

$\Rightarrow \quad x - 2 = \dfrac{3}{20}\times 360$

$\Rightarrow \quad x - 2 = 54$

$\therefore \quad x = 54 + 2$
$= 56$ km/hr **Ans.**

CHAPTER 11

1. (B) $\because$ Weight of 13 m long rod $= 23{\cdot}4$ kg

$\Rightarrow$ Weight of 1 m long rod $= \dfrac{23{\cdot}4}{13}$

$\therefore$ Weight of 6 m long rod $= \dfrac{23{\cdot}4\times 6}{13}$
$= 10{\cdot}8$ kg
Ans.

2. (C) Three dozen $= 3 \times 12 = 36$
$\because$ The cost of 36 mangoes $=$ Rs. 245

$\Rightarrow$ The cost of 1 mango $=$ Rs. $\dfrac{245}{36}$

$\therefore$ The cost of 363 mangoes $= \dfrac{245}{36}\times 353$
$=$ Rs. $2402{\cdot}36$
$=$ Rs. 2400 (app.)
Ans.

3. (B) $\because$ 1 kg = 1000 grams

$\therefore$ $\frac{1}{4}$ kg = $1000 \times \frac{1}{4}$

= 250 gram

$\because$ The cost of 250 gram = 60 paise

$\Rightarrow$ The cost of 1 gram = $\frac{60}{250}$

$\therefore$ The cost of 200 gram = $\frac{60}{250} \times 200$

= 48 paise **Ans.**

4. (C) Let the cost of the table be Rs. x

and the cost of the chair = Rs y

From 1st condition $2x = 5y$

$\Rightarrow$ $x = \frac{5y}{2}$

From IInd condition

$\because$ $x - y = 1200$

$\Rightarrow$ $\frac{5y}{2} - y = 1200$

$\Rightarrow$ $\frac{3y}{2} = 1200$

$\therefore$ y = Rs. 800 **Ans.**

5. (E) Reqd. No. of pieces = $\frac{192}{3{\cdot}2}$

= 60 **Ans.**

6. (A) 49 dozen = 49×12 = 588

$\because$ The cost of 357 mangoes = Rs. 1517·25

$\Rightarrow$ The cost of 1 mango = $\frac{1517{\cdot}25}{357}$

= Rs. 4·25

$\therefore$ The cost of 588 mangoes

= $4{\cdot}25 \times 588$

= Rs. 2499

= Rs. 2500 (appro.). **Ans.**

7. (C) $\because$ Total cost of 7000 bricks

= 5740 + 805

= Rs. 6545

$\Rightarrow$ Total cost of 1 brick = $\frac{6545}{7000}$

$\therefore$ Total cost of 1000 bricks = $\frac{6545}{7000} \times 1000$

= Rs. 935 **Ans.**

8. (B) Five dozen = 5×12 = 60

No. of toys can be kept in 1 box = 60

$\therefore$ No. of toys can be kept in 98 boxes

= 60×98

= 5880

$\because$ 5880 toys can be lifted by = 1 tempo

$\therefore$ 29400 toys can be lifted by

= $\frac{1}{5880} \times 29400$

= 5 **Ans.**

9. (D) 1 dozen = 12

$\frac{1}{4}$ dozen = $\frac{3}{4} \times 12 = 3$

$\because$ Cost of 3 bananas = Rs. 2·38

$\Rightarrow$ Cost of 1 banana = $\frac{2{\cdot}38}{3}$

$\therefore$ Cost of (42×12) bananas

= $\frac{2{\cdot}38 \times 42 \times 12}{3}$

= 399·84

$\simeq$ Rs. 400 (approx.) **Ans.**

10. (A) $\because$ Cost of 6 dozen chairs

= $6 \times 12 \times 214$

= Rs. 15408

and cost of 4 dozen tables

= $4 \times 12 \times 937$

= Rs. 44976

$\therefore$ Total cost = 15408 + 44976

= Rs. 15408 + 44976

= Rs. 60384

$\simeq$ Rs. 60000 (appro.) **Ans.**

CHAPTER 12

1. (B) Let the present age of Sudhir be $4x$ years.

$\therefore$ The present age of Madan $5x$ years.

$\because$ = $\frac{4x + 5}{5x + 5}$

= $\frac{5}{6}$

$\Rightarrow$ $25x + 25 = 24x + 30$

$\Rightarrow$ $25x - 24x = 30 - 25$

$\therefore$ $x = 5$

$\therefore$ Present age of Sudhir

= 4×5

= 20 years **Ans.**

2. (A) Let the present age of Lata be x years
and the present age of Aruna = y years
From Ist condition
$\because \quad (x - 5) = 2(y - 5)$
$\Rightarrow \quad x - 5 = 2y - 10$
$\Rightarrow \quad x - 2y = -5 \quad \ldots(i)$
From IInd condition
$\because \quad (x + 10) = \frac{4}{3}(y + 10)$
$\Rightarrow \quad 3x + 30 = 4y + 40$
$\Rightarrow \quad 3x - 4y = 10 \quad \ldots(ii)$
Multiplying equation (i) by 2 and subtracting from (ii)
$2x - 4y = -10$
$3x - 4y = 10$
$- \quad + \quad \_ \quad \_$
$-x = -20$
$x = 20$
$\therefore$ Age of Lata = 20 years **Ans.**

3. (A) Let the present age of Kunal be $3x$ years
and the present age of Ganesh
$= 5x$ years
$\therefore$ According to question,
$5x - 3x = 12$
$2x = 12$
$x = 6$
$\therefore$ Present age of Kunal $= 3 \times x$
$= 3 \times 6$
$= 18$ years **Ans.**

4. (C) Let the present age of father be x years
then the present age of son = $(x - 25)$ years
$\because$ According to question
$x - 4 = 45$
$x = 45 + 4$
$x = 49$
$\therefore$ Age of son $= 49 - 25$
$= 24$ years.
$\therefore$ Age of son after five years
$= 24 + 5 = 29$ years
$\therefore$ Age of father after five years
$= 49 + 5 = 54$ years
$\therefore$ Total age $= 29 + 54$
$= 83$ years **Ans.**

5. (E) Let the age of Jayesh 10 years ago be $2x$ years
and the age of Prakash 10 years ago be $3x$ years
and the age of Sameer 10 years ago be $4x$ years
$\therefore$ Present age of Jayesh = $(2x + 10)$ years
$\therefore$ Present age of Prakash = $(3x + 10)$ years
$\therefore$ Present age of Sameer = $(4x + 10)$ years
$\because$ According to question
$\Rightarrow (2x + 10) + (3x + 10) + (4x + 10) = 93$
$\Rightarrow \quad 9x + 30 = 93$
$\Rightarrow \quad 9x = 63$
$\therefore \quad x = 7$
$\therefore$ Present age of Sameer $= 4x + 10$
$= 4 \times 7 + 10$
$= 28 + 10$
$= 38$ years **Ans.**

6. (B) Let the present age of Pradhan be x years
and his father's age = y years
From Ist condition
$\because \quad (x + 6) = (y + 6)\frac{3}{7}$
$\Rightarrow \quad 7x + 42 = 3y + 18$
$\Rightarrow \quad 7x - 3y = -24 \quad \ldots(i)$
From IInd condition
$\because \quad \frac{(x - 10)}{(y - 10)} = \frac{1}{5}$
$\Rightarrow \quad 5x - 50 = y - 10$
$\Rightarrow \quad 5x - y = 40 \quad \ldots(ii)$
Multiplying equation (ii) by 3 and subtracting from (i)
$7x - 3y = -24$
$15x - 3y = 120$
$- \quad + \quad \_ \quad \_$
$-8x = -144$
$x = \frac{144}{8} = 18$
Putting the value of x in equation (i)
$\because \quad 7 \times 18 - 3y = -24$
$\Rightarrow \quad 126 - 3y = -24$
$\Rightarrow \quad 3y = 126 + 24$
$\Rightarrow \quad 3y = 150$
$\therefore \quad y = \frac{150}{3}$
$\therefore \quad y = 50$ years **Ans.**

7. (E) Let the present age of A and B be x and y years respectively

From Ist condition

$\because \quad \frac{x-1}{y-1} = \frac{3}{4}$

$\Rightarrow \quad 4x - 4 = 3y - 3$

$\Rightarrow \quad 4x - 3y = 1 \quad \ldots(i)$

From IInd condition

$\because \quad \frac{x+1}{y+1} = \frac{5}{6}$

$\Rightarrow \quad 6x + 6 = 5y + 5$

$\Rightarrow \quad 6x - 5y = -1 \quad \ldots(ii)$

Multiplying equation (i) by 3 and equation (ii) by 2 and subtract

$$\begin{array}{rl} 12x - 9y &= 3 \\ 12x - 10y &= -2 \\ \hline - \quad + \quad\quad + & \\ \hline y &= 5 \end{array}$$

$\therefore$ Present age of B = 5 years **Ans.**

8. (C) Let the age of Vimal and Aruna be $3x$ and $5x$ years respectively

$\therefore$ According to question

$3x + 5x = 80$

$x = 10$

$\therefore$ Age of Vimal after 10 years

$= 3x + 10$

$= 3 \times 10 + 10$

$= 40$ years

$\therefore$ Age of Aruna after 10 years

$= 5x + 10$

$= 5 \times 10 + 10$

$= 60$ years

Therefore, required ratio

$= 40 : 60 = 2 : 3$ **Ans.**

9. (E) Let the present age of Sushil be x years and the present age of Snehal = y years

From Ist condition

$\because \quad (x - 6) = 3(y - 6)$

$\Rightarrow \quad x - 6 = 3y - 18$

$\Rightarrow \quad x - 3y = -12 \quad \ldots(i)$

From IInd condition

$\because \quad (x + 6) = (y + 6) \times \frac{5}{3}$

$\Rightarrow \quad 3x + 18 = 5y + 30$

$\Rightarrow \quad 3x - 5y = 12 \quad \ldots(ii)$

Multiplying equation (i) by 3 and subtracting from equation (ii)

$$\begin{array}{rl} 3x - 9y &= -36 \\ 3x - 5y &= 12 \\ \hline - \quad + \quad\quad - & \\ \hline -4y &= -48 \\ y &= 12 \end{array}$$

Age of Snehal = 12 years **Ans.**

10. (B) Let the present age of Ramesh be $3x$ years

and the present age of Jayesh = $2x$ years

According to question

$\because \quad (3x - 4) = (2x - 4) + 6$

$\Rightarrow \quad 3x - 4 = 2x - 4 + 6$

$\Rightarrow \quad 3x - 4 = 2x + 2$

$\Rightarrow \quad 3x - 2x = 2 + 4$

$\therefore \quad x = 6$

$\therefore$ Present age of Jayesh

$= 2x$

$= 2 \times 6 = 12$ years **Ans.**

CHAPTER 13

1. (A) $\because \quad x \times \frac{3}{4} + 5 = x \times \frac{4}{5}$

$\Rightarrow \quad \frac{3x}{4} + 5 = \frac{4x}{5}$

$\Rightarrow \quad \frac{4x}{5} - \frac{3x}{4} = 5$

$\Rightarrow \quad \frac{x}{20} = 5$

$\therefore \quad x = 100$ litre **Ans.**

2. (D) Total marks = 160

Let the marks in Geography be x

$\therefore$ Marks in History = $(160 - x)$

$\because \quad (160 - x) \times \frac{1}{3} = x$

$\Rightarrow \quad 160 - x = 3x$

$\Rightarrow \quad 160 = 3x + x$

$\Rightarrow \quad 160 = 4x$

$\therefore \quad x = 40$ **Ans.**

3. (C) $\because$ Cost of the shirt = Rs. 180

and cost of the kurta $= 180 \times \frac{2}{3}$

$=$ Rs. 120

$\Rightarrow$ Cost of the saree $= 120 \times 2\frac{1}{2}$

$= 120 \times \frac{5}{2}$

$= \text{Rs. } 300$

$\therefore$ Total expenditure $= 180 + 120 + 300$

$\therefore \quad = \text{Rs. } 600$ **Ans.**

4. (E) Number of men donors $= 150 \times \frac{1}{3} = 50$

and number of women donors

$= 150 - 50 = 100$

$\because$ 1 man donor donates

$= \text{Rs. } 2{,}000$

$\therefore$ 50 men donors-donates

$= 50 \times 2{,}000 = \text{Rs. } 1{,}00{,}000$

$\because$ 1 woman donor donates

$= 2000 \times \frac{1}{5} = \text{Rs. } 400$

$\therefore$ 100 women donor donates

$= 400 \times 100 = \text{Rs. } 40{,}000$

Hence, total amount collected

$= 1{,}00{,}000 + 40{,}000$

$= \text{Rs. } 1{,}40{,}000$ **Ans.**

5. (D) Let the length of the second piece be x cm

The length of the first piece $= \frac{2}{5}x$ cm

$\because \quad x + \frac{2}{5}x = 63$

$\Rightarrow \quad \frac{7x}{5} = 63$

$\Rightarrow \quad x = 45$ cm

$\therefore$ Length of the samll piece $= 63 - 45$

$= 18$ cm

Ans.

6. (B) Let the length of the hall be x m

$\therefore$ Breadth of the hall $= \frac{3x}{4}$ m

$\because$ Area of the hall = length × breadth

$\Rightarrow \quad 300 = x \times \frac{3x}{4}$

$\Rightarrow \quad 3x^2 = 1{,}200$

$\Rightarrow \quad x^2 = 400$

$\therefore \quad x = 20$

$\therefore$ Difference between the length and breadth of the hall $= x - \frac{3x}{4} = \frac{x}{4}$

$= \frac{20}{4} = 5$ m **Ans.**

7. (D) Data is inadequate. (Prabodh gave what portion of his money) **Ans.**

8. (C) Out of each 5 girls one girl and out of each 8 boys, one boy participated in camp. In other word, out of 13 students, 2 students participated in camp. Hence $\frac{2}{13}$ of the total students took part. **Ans.**

9. (E) $\therefore$ Monthly salary $= \text{Rs. } 5{,}600$

Let the saving be Rs. x

$\therefore$ Expenditure $= \text{Rs. } (5{,}600 - x)$

then, $(5{,}600 - x) \times \frac{1}{5} = x \times \frac{1}{2}$

$\Rightarrow \quad 1{,}120 - \frac{x}{5} = \frac{x}{2}$

$\Rightarrow \quad \frac{x}{2} + \frac{x}{5} = 1{,}120$

$\Rightarrow \quad \frac{7x}{10} = 1{,}120$

$\therefore \quad x = 1{,}600$

Hence, saving $= \text{Rs. } 1{,}600$ **Ans.**

10. (A) Let Ragni had Rs. x

$\therefore$ Amount received by Jaya $= \text{Rs. } \frac{x}{2}$

then amount received by Savita

$= \frac{x}{2} \times \frac{1}{4} = \text{Rs. } \frac{x}{8}$

then, $\because \quad \frac{x}{8} = 450$

$\Rightarrow \quad x = 8 \times 450$

$x = \text{Rs. } 3{,}600$

$\therefore$ Amount that Jaya received from Ragni

$= \frac{x}{2} = \frac{3 \cdot 600}{2}$

$= \text{Rs. } 1{,}800$ **Ans.**

CHAPTER 14

1. (D) Let the three consecutive odd numbers be x, $(x + 2)$ and $(x + 4)$

$\because \quad \{x + (x + 2) + (x + 4)\} - x = 20$

$\Rightarrow \quad x + 2 + x + 4 = 20$

$\Rightarrow \quad 2x + 6 = 20$

$\Rightarrow \quad 2x = 20 - 6 = 14$

$\therefore \quad x = 7$

$\therefore$ Middle number $= (x + 2)$

$= 7 + 2 = 9$ **Ans.**

2. (C) ∵ First number : Second number : Third number = 4 : 9 : 16

$\Rightarrow$ Sum of ratios = (4 + 9 + 16)

$\Rightarrow$ Sum of the numbers = 174

$\therefore$ Second number $= \dfrac{9 \times 174}{(4 + 9 + 16)}$

$= 54$ **Ans.**

3. (C) Let the two number be x and y

$\because$ 30% of $x + y = y + \dfrac{1}{5}y$

$\Rightarrow \dfrac{30x}{100} = \dfrac{y}{5}$

$\therefore \dfrac{x}{y} = \dfrac{100}{5 \times 30}$

$= \dfrac{2}{3}$ **Ans.**

4. (B) Let the two-digit number be $(10x + y)$

$\because (10x + y) - (10y + x) = 45$

$\Rightarrow 9x - 9y = 45$

$\therefore$ Reqd. difference $= x - y$

$= 5$ **Ans.**

5. (E) Let the number be x

$\because x - 28 = x \times \dfrac{1}{3}$

$\Rightarrow x - \dfrac{x}{3} = 28$

$\Rightarrow \dfrac{2x}{3} = 28$

$\therefore x = 28 \times \dfrac{3}{2} = 42$

$\therefore$ 50% of the number $= 42 \times \dfrac{50}{100}$

$= 21$ **Ans.**

6. (D) Let the number be x

$\because \dfrac{x}{3} - \dfrac{x}{4} = 10$

$\Rightarrow \dfrac{x}{12} = 10$

$\therefore x = 10 \times 12$

$= 120$

$\therefore$ 60% of the number $= \dfrac{60}{100} \times 120$

$= 72$ **Ans.**

7. (C) Let the two-digits number be $(10x + y)$

$\because (10x + y) - (10y + x) = 63$

$\Rightarrow 9x - 9y = 63$

$\Rightarrow 9(x - y) = 63$

$\therefore$ Reqd. difference $= (x - y)$

$\therefore = \dfrac{63}{9} = 7$ **Ans.**

8. (B) Let the two-digit number be $(10x + y)$

$\because x - y = 3$ and $xy = 18$

$\because (x + y)^2 = (x - y)^2 + 4xy$

$= (3)^2 + 4 \times 18$

$= 9 + 72$

$= 81$

$\therefore$ Reqd. sum $(x + y) = \sqrt{81} = 9$ **Ans.**

9. (C) Let the two-digit number be $(10x + y)$

$\because x + y = 9$ and $x - y = 3$

$\Rightarrow (x + y)^2 = (x - y)^2 + 4xy$

$\Rightarrow (9)^2 = (3)^2 + 4xy$

$\Rightarrow 4xy = 81 - 9$

$= 72$

$\therefore xy = \dfrac{72}{4} = 18$ **Ans.**

10. (A) Let the number be x.

$\because x \times \dfrac{1}{4} \times \dfrac{3}{5} \times \dfrac{2}{3} = 34$

$\Rightarrow x = 340$

$\therefore$ 20% of $x = 340 \times \dfrac{20}{100} = 68$ **Ans.**

CHAPTER 15

1. (C) $\because \dfrac{50}{20} = \dfrac{8 - x}{x - 7}$ where x is C.P. of the mix. per kg.

$\Rightarrow 5x - 35 = 16 - 2x$

$\Rightarrow 7x = 16 + 35$

$= 51$

$\therefore x =$ Rs. $\dfrac{51}{7}$

But S.P. = Rs. 10 per kg.

$\therefore$ Profit on 1 kg $= 10 - \dfrac{51}{7}$

$=$ Rs. $\dfrac{19}{7}$

$\therefore$ Profit on 70 kg $= \dfrac{19}{7} \times 70$

$=$ Rs. 190 **Ans.**

2. (E) $\because \quad \frac{30}{20} = \frac{x-8}{8{\cdot}50-x}$ Where x is the C.P. of the mix. per kg.

$\Rightarrow \quad 25{\cdot}50 - 3x = 2x - 16$

$\Rightarrow \quad 5x = 25{\cdot}50 + 16$

$\therefore \quad x = \frac{41{\cdot}50}{5} = \text{Rs. } 8{\cdot}30$

$\therefore$ S.P. of mix. per kg at 20% profit

$= \frac{8{\cdot}30 \times 120}{100}$

$= 9{\cdot}96$

$= \text{Rs. } 10{\cdot}00 \text{ (App.)}$ **Ans.**

3. (C) $\because \quad \frac{20}{30} = \frac{7-x}{x-6{\cdot}50}$ Where x is the C.P. of the mix. per kg.

$\Rightarrow \quad 2x - 13 = 21 - 3x$

$\Rightarrow \quad 5x = 34$

$\therefore \quad x = \text{Rs. } 6{\cdot}80$

$\therefore$ C.P. of 50 kg mix. $= 50 \times 6{\cdot}80$

$= \text{Rs. } 340$

$\therefore$ S.P. of 50 kg mix. $= 340 + 60$

$= \text{Rs. } 400$

$\therefore$ S.P. of 1 kg mix. $= \frac{400}{50} = \text{Rs. } 8$ **Ans.**

4. (C) Let the water to be added be x litre

$\because \quad \frac{x}{175} = \frac{8-7}{7-0}$

$\Rightarrow \quad 7x = 175$

$\Rightarrow \quad x = \frac{175}{7}$

$\therefore \quad = 25 \text{ litre}$ **Ans.**

5. (A) Let the Wheat at Rs. 4·00 is mixed x kg.

$\because \quad \frac{x}{42} = \frac{6{\cdot}00 - 4{\cdot}80}{4{\cdot}80 - 4{\cdot}00}$

$= \frac{1{\cdot}20}{0{\cdot}80}$

$\Rightarrow \quad 0{\cdot}8x = 1{\cdot}2 \times 42$

$\therefore \quad x = \frac{1{\cdot}2 \times 42}{0{\cdot}8}$

$= 63 \text{ kg}$ **Ans.**

6. (C) The quantity of gold in first alloy $= \frac{7}{9} \times$ wt. of I alloy

and quantity of gold in second alloy $= \frac{7}{18} \times$ wt. of II alloy

Let 1 kg of each alloy are mixed and the quantity of gold in the third alloy be x kg.

$\because \quad \frac{1}{1} = \frac{\frac{7}{9} - \frac{x}{2}}{\frac{x}{2} - \frac{7}{18}}$

$\Rightarrow \quad \frac{7}{9} - \frac{x}{2} = \frac{x}{2} - \frac{7}{18}$

$\therefore \quad x = \frac{7}{9} + \frac{7}{18} = \frac{7}{6}$

$\therefore \quad$ Quantity of gold $= \frac{7}{6}$

and quantity of copper $= 2 - \frac{7}{6}$

$= \frac{5}{6} \text{ kg.}$

$\therefore \quad$ Ratio in gold and copper $= \frac{7}{6} : \frac{5}{6}$

$= 7 : 5$ **Ans.**

7. (A) Let the price of milk per litre be Re. 1

$\therefore$ S.P. of adulterated milk per litre = Re. 1

$\therefore$ C.P. of adultrated milk per litre

$= \frac{1 \times 100}{(100 + 20)}$

$= \text{Rs. } \frac{5}{6}$

$\because \quad \frac{\text{Quantity of water}}{\text{Quantity of milk}} = \frac{1 - \frac{5}{6}}{\frac{5}{6} - 0} = \frac{\frac{1}{6}}{\frac{5}{6}}$

$= 1 : 5$

$\therefore$ Quantity of water with 1 litre of milk

$= 200 \text{ ml}$ **Ans.**

8. (C) Quantity of water to be added

$= \frac{(\text{Value of reqd.\%} - \text{Value of present\%})}{100\% - \text{Value of reqd.\%}} \times \text{volume of solution}$

$= \frac{20 - 10}{100 - 20} \times 40$

$= \frac{10 \times 40}{80} = 5 \text{ litre}$ **Ans.**

9. (B) C.P. of mixture per kg $= \frac{100 \times 96}{(100 + 20)}$

$= \text{Rs. } 80$

$\because$ $\dfrac{\text{Quantity of pure ghee}}{\text{Quantity of vegetable oil}}$

$= \dfrac{50-80}{80-100}$

$\therefore$ Reqd. ratio $= \dfrac{30}{20}$

$= 3:2$ **Ans.**

10. (B) C.P. of the mixture per kg

$= \dfrac{22\times 100}{(100+10)} = \text{Rs. } 20$

$\because \quad \dfrac{2}{3} = \dfrac{x-20}{20-14}$

$\Rightarrow \quad \dfrac{2}{3} = \dfrac{x-20}{6}$

$\Rightarrow \quad 3x-60 = 12$

$\Rightarrow \quad 3x = 12+60 = 72$

$\therefore \quad x = \dfrac{72}{3} = \text{Rs. } 24$ **Ans.**

CHAPTER 16

1. (A) Let the length of the plot be x m and breadth be y m

$\therefore$ Area of the plot $= x \times y = xy$ m^2

Area after the percentage increase in length and breadth

$= x\times\dfrac{150}{100}\times y\times\dfrac{120}{100} = \dfrac{9xy}{5}$

The new area is $\dfrac{9}{5}$ of the old area

Hence it is $1\dfrac{4}{5}$ times of the old area **Ans.**

2. (D) Side of the square $= 6$ cm

Breadth of the rectangle $= 6-2 = 4$ cm

$\because$ Area of the square = Area of the rectangle

$\Rightarrow \quad (\text{Side})^2 = \text{length}\times\text{breadth}$

$\Rightarrow \quad (6)^2 = \text{length}\times 4$

$\therefore \quad \text{length} = \dfrac{36}{4} = 9 \text{ cm}$ **Ans.**

3. (A) Let the breadth of rectangular plot be x m

Length of the rectangular plot

$= x + x\times\dfrac{30}{100}$

$= \dfrac{130x}{100} = \dfrac{13x}{10}$ m

$\because$ Area of the rectangular plot

$= \text{length}\times\text{breadth}$

$\Rightarrow \quad 20{\cdot}8 = \dfrac{13x}{10}\times x$

$\Rightarrow \quad x^2 = 16$

$\therefore \quad x = 4$

$\therefore$ Length of the plot $= \dfrac{13x}{10} = \dfrac{13\times 4}{10} = \dfrac{52}{10}$

$= 5{\cdot}2$ m **Ans.**

4. (E) Let the area of the original rectangle be 100 m^2

Area of the new rectangle $= 100\times\dfrac{130}{100}$

$= 130$ m^2

Hence, the ratio between the area of the new and original rectangle $= 130:100$

$= 13:10$ **Ans.**

5. (B) $\because$ Area of a square = Area of a circle

$\Rightarrow \quad (\text{side})^2 = \pi\times(\text{radius})^2$

$\Rightarrow \quad (\text{side})^2 = \dfrac{22}{7}\times 14\times 14$

$\Rightarrow \quad (\text{side})^2 = 616$

$\therefore \quad \text{Side} = 24{\cdot}8$ cm

$\simeq$ 25 cm (app.)

Ans.

6. (D) Let the length of the rectangular field be x m

and breadth of the rectangular field

$= x\times\dfrac{75}{100} = \dfrac{3x}{4}$

$\because \quad (\text{diagonal})^2 = (\text{length})^2 + (\text{breadth})^2$

$\Rightarrow \quad (100)^2 = x^2 + \left(\dfrac{3x}{4}\right)^2$

$\Rightarrow \quad 10{,}000 = x^2 + \dfrac{9x^2}{16}$

$\Rightarrow \quad 10{,}000 = \dfrac{25x^2}{16}$

$\Rightarrow \quad 25x^2 = 16\times 10{,}000$

$\Rightarrow \quad x^2 = \dfrac{16\times 10{,}000}{25}$

$\therefore \quad x = \sqrt{\dfrac{16\times 10{,}000}{25}}$

$= \dfrac{4\times 100}{5} = 80$

$\therefore$ Area of the field = length × breadth

$= x \times \frac{3}{4}x = \frac{3}{4}x^2$

$= \frac{3}{4} \times 80 \times 80$

$= 4{,}800\ m^2$ **Ans.**

7. (D) Area of the whole rectangular plot

$= 50 \times 20 = 1000\ m^2$

Length of the plot excluding the path

$= 50 - 2 \times 7 = 50 - 14 = 36$ m

Breadth of the plot excluding the path

$= 20 - 2 \times 7 = 20 - 14 = 6$ m

Area of the plot excluding the path

$= 36 \times 6 = 216\ m^2$

Area of the path = 1,000 – 216

$= 784\ m^2$ **Ans.**

8. (A) Let the breadth of the field be x m

$\therefore$ Length of the field $= x \times \frac{150}{100} = \frac{3x}{2}$ m

and perimeter of the field

= 2(length + breadth)

$\Rightarrow \quad 200 = 2\left(x + \frac{3x}{2}\right)$

$\Rightarrow \quad \frac{200}{2} = \frac{5x}{2}$

$\therefore \quad x = 40$

Length of the field $= \frac{3x}{2}$

$= \frac{3 \times 40}{2}$

= 60 m **Ans.**

9. (C) $\because$ Perimeter of the field

= 2(length + breadth)

= 2(35 + 16)

= 2 × 51 = 102 m

$\because$ Cost of fencing

1 m = Rs. 7

$\therefore$ Cost of fencing

102 m = 7 × 102

= Rs. 714 **Ans.**

10. (D) Let the breadth of the rectangular be x m

Length of the rectangle $= x \times \frac{160}{100} = \frac{8x}{5}$ m

$\because$ Area = length × breadth

$\Rightarrow \quad 5732 = \frac{8x}{5} \times x$

$\Rightarrow \quad 8x^2 = 28{,}660$

$\Rightarrow \quad x^2 = \frac{28{,}660}{8}$

$\Rightarrow \quad x^2 = 3{,}582{\cdot}5$

$\therefore \quad x = 59{\cdot}85$ m

$\therefore$ Breadth of the rectangle

$\simeq$ 60 m (app.) **Ans.**

CHAPTER 17

1. (C) Sectorial angle made by market tax

$= \frac{33 \times 360^\circ}{100} = 118{\cdot}8^\circ$

$\simeq 119^\circ$ (App.) **Ans.**

2. (B) Total expenditure on rest except on defence and pension

= 11% + 15% + 6%

= 32%

and total expenditure on defence and pension

= (100 – 32)

= 68%

$\therefore$ Ratio $= \frac{68}{32} = 2 : 1$ (App.) **Ans.**

3. (D) Since the income from custom duty = 4%

$\therefore$ 4% of the income = Rs. 25 thousand

$\therefore$ Total income $= \frac{25 \times 100}{4}$ thousand

= Rs. 6,25,000 **Ans.**

4. (A) Money borrowed = 18%

and expenditure on interest = 6%

$\therefore$ Rate of interest $= \frac{6 \times 100}{18}\%$

$= 33{\cdot}3\%$ **Ans.**

5. (D) Expenditure on International = 11%

$\therefore$ Other total expenditure = (100 – 11)%

= 89%

$\therefore$ Reqd. percentage $= \frac{11 \times 100}{89}\%$

$= 12{\cdot}36\%$ **Ans.**

6. (D) It is clear from the graph that the price of commodity A in the month of April and August is Rs. 1000 and Rs. 1000 respectively hence it is equal. **Ans.**

7. (B) Difference in the price of commodity A and B in the month of April.

$= 1150 - 1000$

$= \text{Rs. } 150$ **Ans.**

8. (E) Average price of commodity A and B in the month fo April $= \frac{1150 + 1000}{2}$

$= \text{Rs. } 1075$

and average price of commodity A and B in the month of August $= \frac{1000 + 950}{2}$

$= \text{Rs. } 975$

$\therefore$ Reqd. difference $= 1075 - 975$

$= \text{Rs. } 100$ **Ans.**

9. (A) Increase in the price of commodity B from Jan. to April $= 1150 - 1000$

$= \text{Rs. } 150$

$\therefore$ Percentage increase in the price of commodity B from Jan. to April

$= \frac{150 \times 100}{1000}\%$

$= 15\%$ **Ans.**

10. (D) Decrease in the price of commodity A from March to April

$= 1125 - 1000 = 125$

$\therefore$ Percentage decrease in the price of commodity A from March to April

$= \frac{125 \times 100}{1125} = 11{\cdot}11\%$

$\simeq 12\%$ (App.) **Ans.**

11. (A) Increase percentage in commission of sales- man C in 1989

$= \frac{(27800 - 26200)}{26200} \times 100\%$

$= 6{\cdot}10\%$

Percentage increase in the commission of salesman C in 1990

$= \frac{(28200 - 27800) \times 100}{27800}\%$

$= 1{\cdot}44\%$

Percentage increase in the commission of salesman C in 1991

$= \frac{(29100 - 28200) \times 100}{28200}\%$

$= 3{\cdot}19\%$

Percentage increase in the commission of salesman C in 1992

$= \frac{(29400 - 29100) \times 100}{29100}\%$

$= 1{\cdot}03\%$

Percentage increase in the commission of salesman C in 1993

$= \frac{(30000 - 29400) \times 100}{29400}\%$

$= 2{\cdot}04\%$

$\therefore$ Maximum percentage increase was in the year 1989. **Ans.**

12. (A) Required percentage

$= \frac{28000 \times 100}{146960} = 19{\cdot}05$

$= 20\%$ (Approx.) **Ans.**

13. (D) Increase in the commission of A in 1991 as compared to 1988

$= 29800 - 27350 = 2450$

Increase in the commission of B in 1991 as compared to 1988

$= 28000 - 26850 = 1150$

Increase in the commission of C in 1991 as compared to 1988

$= 29100 - 26200 = \boxed{2900}$

Increase in the commission of D in 1991 as compared to 1988

$= 30060 - 27850 = 2210$

Increase in the commission of E in 1991 as compared to 1988

$= 30000 - 28640 = 1360$

$\therefore$ Maximum increase was in the commission of salesman C. **Ans.**

14. (C) In 1989 the difference between the maximum and minimum commission

$= 30040 - 27800 = \text{Rs. } 2240$

In 1990 the difference between the maximum and minimum commission

$= 29800 - 25200 = \text{Rs. } 4600$

In 1991 the difference between the maximum and minimum commission

$= 30060 - 28000 = \text{Rs. } 2060$

In 1992 the difference between the maximum and minimum commission

$= 29800 - 24600 = \boxed{\text{Rs. } 5200}$

In 1993 the difference between the maximum and minimum commission

$= 32000 - 27000 = \text{Rs. } 5000$

$\therefore$ Maximum difference was in the year 1992. **Ans.**

15. (E) Commission earned by salesman D in the year 1992 = Rs. 29800

and Commission earned by salesman A in the year 1992 = Rs. 24600

$\therefore$ Required percentage

$$= \frac{29800 \times 100}{24600}\%$$

$$= 121{\cdot}14\ \%$$

$$\simeq 120\% \text{ (Approx.)}$$ **Ans.**

16. (C) The average Khariff production of the given years

$$= \frac{(5 + 4{\cdot}75 + 4{\cdot}25 + 3{\cdot}5 + 5)}{5} \text{ million tons}$$

$$= \frac{22{\cdot}5}{5}$$

$= 4{\cdot}5$ million tons **Ans.**

17. (E) Rabi production in the year 1990-91

$= 8$ million tons

Rabi production in the year 1991-92

$= 6$ million tons

Decrease $= 8 - 6$

$= 2$ million tons

$\therefore$ Required percentage decrease

$$= \frac{2}{8} \times 100\%$$

$= 25\%$ **Ans.**

18. (C) Difference in the production of Rabi and Khariff in 1988-89

$= 7 - 5$

$= 2$ million tons

Difference in the production of Rabi and Khariff in 1989-90

$= 6{\cdot}5 - 4{\cdot}75$

$= 1{\cdot}75$ million tons

Difference in the production of Rabi and Khariff in 1990-91

$= 8 - 4{\cdot}25 = 3{\cdot}75$ million tons

Difference in the production of Rabi and Khariff in 1991-92

$= 6 - 3{\cdot}5 = 2{\cdot}5$ million tons

Difference in the production of Rabi and Khariff in 1992-93

$= 6{\cdot}5 - 5 =$ $\boxed{1{\cdot}5 \text{ million tons}}$

Hence, the minimum difference was in 1992-93. **Ans.**

19. (E) Average production of Rabi

$$= \frac{7 + 6{\cdot}5 + 8 + 6 + 6{\cdot}5}{5} = \frac{34}{5}$$

$= 6{\cdot}8$ million tons

In 1990-91 the production of Rabi

$= 8$ million tons

$\therefore$ Required difference

$= 8 - 6{\cdot}8$

$= 1{\cdot}2$ million tons **Ans.**

20. (D) Production of Khariff in 1989-90

$= 4{\cdot}75$ million tons

Production of Rabi in 1989-90

$= 6{\cdot}5$ million tons

Hence, Required percentage

$$= \frac{4{\cdot}75 \times 100}{6{\cdot}5} = 73\%$$

$\simeq 75\%$ (Approx.) **Ans.**

21. (E) Total production of fertilizers in the month of June

$= 320 + 160 + 188 + 173 + 135 + 130$

$= 1106$ millions tones

$\therefore$ 25% of the total production of fertilizers in the months of June

$$= 1106 \times \frac{25}{100} = 276{\cdot}5 \text{ millions tons}$$

Hence, in the month of June $\boxed{\text{unit I}}$ has the share of more than 25% of the total production of fertilizers. **Ans.**

22. (B) Production of fertilizers in unit V in the month of May = 140 million tons

Production of fertilizers in unit V in the month of August = 145 million tons

$\therefore$ Increase $= 145 - 140$

$= 5$ million tons

Hence, percentage increase

$$= \frac{5 \times 100}{140}\% = 3{\cdot}57\%$$

$\simeq 3{\cdot}5\%$ (App.) **Ans.**

23. (E) 15% of the total production in the month of April

$= (310 + 180 + 169 + 137 + 140 + 120) \times \frac{15}{100}$

$= \frac{1056 \times 15}{100} = 158{\cdot}4$ million tons

15% of the total production in the month of May

$= (318 + 179 + 177 + 162 + 140 + 122) \times \frac{15}{100}$

$= \frac{1098 \times 15}{100} = 164{\cdot}7$ million tons

15% of the total production in the month of June

$= (320 + 160 + 188 + 173 + 135 + 130) \times \frac{15}{100}$

$= \frac{1106 \times 15}{100} = 165{\cdot}9$ million tons

15% of the total production in the month of July

$= (326 + 167 + 187 + 180 + 146 + 130) \times \frac{15}{100}$

$= \frac{1136 \times 15}{100} = 170{\cdot}4$ million tons

15% of the total production in the month of August

$= (327 + 150 + 185 + 178 + 145 + 128) \times \frac{15}{100}$

$= \frac{1113 \times 15}{100} = 166{\cdot}95$ million tons

Hence, in none of the months unit No. II has a contribution of approximately 15% in the total fertilizer production **Ans.**

24. (A)

25. (B) Required percentage increase

$= \frac{(14{\cdot}3 - 10{\cdot}6)}{10{\cdot}6} \times 100\ \%$

$= 34{\cdot}9\%$

$\simeq$ 35% (App.) **Ans.**

26. (C) Average consumption of household energy

$= \frac{9{\cdot}9 + 10{\cdot}6 + 14{\cdot}3 + 12{\cdot}3 + 13{\cdot}3}{5}$

$= \frac{60{\cdot}4}{5} = 12{\cdot}08\%$

Hence, in the year 1980-81 was the percentage energy consumption in household sector is (12·3%) almost equal to the average percentage energy consumption in the household sector in the given years. **Ans.**

27. (B) In agriculture sector there was continuous increase in consumption over the given years. **Ans.**

28. (D) Data are inadequate. **Ans.**

29. (E) Total consumption of energy in household, agriculture and other sectors in 1990-91

$= 13{\cdot}3 + 9 + 2{\cdot}3 = 24{\cdot}6$

Total consumption of energy in household, agriculture and other sectors in 1980-81

$= 12{\cdot}3 + 6{\cdot}1 + 1{\cdot}1 = 19{\cdot}5$

Total consumption of energy in household, agriculture and other sectors in 1970-71

$= 14{\cdot}3 + 3{\cdot}8 + 0{\cdot}9 = 19$

Total consumption of energy in household, agriculture and other sectors in 1960-61

$= 10{\cdot}6 + 1{\cdot}8 + 2{\cdot}0 = 14{\cdot}4$

Total consumption of energy in household, agriculture and other sectors in 1950-51

$= 9{\cdot}9 + 1{\cdot}7 + 2{\cdot}4 = 14$

$\therefore$ Minimum consumption was in $\boxed{1950\text{-}51}$.

Ans.

30. (D) Production in 1990 = 20 million tons

Product to be exported in 1990

$= 24$ million tons

Reqd. decrease $= (24 - 20)$

$= 4$ million tons **Ans.**

31. (B) $\because$ Required export in 1989

$= 24$ million tons

$\Rightarrow$ Production in 1986

$= 24$ million tons

$\therefore$ Required year = 1986 **Ans**

32. (B) Required percentage increase

$= \frac{(32 - 26)}{26} \times 100\%$

$= 23{\cdot}076\%$

$\simeq$ 24% (App.) **Ans.**

33. (E) Required decrease $= \frac{(20 - 16)}{20} \times 100\%$

$= 20\%$ **Ans.**

34. (B) Average production

$$= \frac{(24 + 16 + 26 + 32 + 20 + 28)}{6}$$

$$= \frac{146}{6} = 24{\cdot}33 \text{ million tons}$$

Hence, in two years 1987 and 1990 the production was less than the average production. **Ans.**

35. (B) Production of C machine tools in 1989

$$= 27 \text{ lakh}$$

Production of C machine tools in 1994

$$= 31 \text{ lakh}$$

Hence, Required difference

$$= 31 - 27 = 4 \text{ lakh}$$

$$= 400000$$ **Ans.**

36. (A) On studying the table it is clear that the production of 'A' type of machine tools is continuously increasing. **Ans.**

37. (E) Total production of A type of machine tools in 1991 and 1992

$$= 21 + 24 = 45 \text{ lakh}$$

Production of C type of machine tools in 1993 = 32 lakh

Hence, Required percentage

$$= \frac{45 \times 100}{32}\% = 140{\cdot}6\%$$

$$\simeq 140\% \text{ (App.)}$$ **Ans.**

38. (C) Required percentage increase

$$= \frac{(34 - 24)}{24} \times 100 = 41{\cdot}67\%$$

$$\simeq 40\% \text{ (App.)}$$ **Ans.**

39. (B) Required percentage

$$= \frac{29 \times 100}{144} = 20{\cdot}14\%$$

$$\simeq 20\% \text{ (App.)}$$ **Ans.**

40. (A) Difference in degrees on food and rent

$$= 120° - 80° = 40°$$

Since 360° represent Rs. 900

$$\therefore \quad 40° = \frac{900 \times 40°}{360°} = \text{Rs. } 100$$ **Ans.**

41. (B) $\because$ Expenditure of family A on cloth

$$= \frac{50° \times 900}{360°} = \text{Rs. } 125$$

$\Rightarrow$ Expenditure of B family on cloth

$$= \frac{56{\cdot}25° \times 1600}{360°} = \text{Rs. } 250$$

$\Rightarrow$ Increase in expenditure

$$= 250 - 125 = \text{Rs. } 125$$

$\therefore$ % of increase of the total increase

$$= \frac{125 \times 100}{700}\%$$

$$= 17\frac{6}{7}\%$$ **Ans.**

42. (C) Expenditure on clothes of family

$$A = \frac{50° \times 900}{360°} = \text{Rs. } 125$$

and expenditure on miscellaneous of family

$$B = \frac{28{\cdot}125° \times 1600}{360} = \text{Rs. } 125$$

Hence the expenditure on clothes of family A is the same as the **expenditure on miscellaneous of Family B.** **Ans**

43. (D) Saving of the family

$$B = \frac{33{\cdot}75° \times 1600}{360°} = \text{Rs. } 150$$ **Ans.**

44. (B) Total expenditure of both families

$$= 900 + 1600$$

$$= \text{Rs. } 2500$$

and expenditure on food of the family

$$B = \frac{112{\cdot}5 \times 1600}{360}$$

$$= \text{Rs. } 500$$

$$\text{Reqd. percentage} = \frac{500 \times 100}{2500}\%$$

$$= 20\%$$ **Ans.**

45. (D) In 1974, the ratio of gross profit to Net profit $= \frac{30}{10} = 3$

In 1975, reqd. ratio $= \frac{40}{15} = 2{\cdot}6$

In 1976, reqd. ratio $= \frac{45}{25} = 1{\cdot}8$

In 1977, reqd. ratio $= \frac{50}{25} = 2{\cdot}0$

$\therefore$ The greatest increase in gross profit to the net profit was in 1974. **Ans.**

46. (C) In 1977 the ratio $= \frac{50}{25} = 2$ **Ans.**

47. (B) % of net profit to gross profit in the year 1975

$$= \frac{15 \times 100}{40}\%$$

$$= 37{\cdot}5\%$$ **Ans.**

48. (B) Entire gross profit for 4 years
$= 30 + 40 + 45 + 50$
$= \text{Rs. } 165$
and entire net profit for 4 years
$= 10 + 15 + 25 + 25$
$= \text{Rs. } 75$
Reqd. ratio $= 165 : 75$
$= 11 : 5$ **Ans.**

49. (B) Between 1976 and 1977 net profit is same. Hence there is no increase and there it is the least. The growth is zero **Ans.**

50. (B) Quantity of iron ore export in 1976 $= 15$ million tons
and the value of iron ore export in 1976
$= \text{Rs. } 80$ crore
$\therefore$ Rate of iron per million ton
$= \frac{80}{15} = \frac{16}{3}$
$= \text{Rs. } 5\frac{1}{3}$ crore **Ans.**

51. (C) Actual increase in quantity from 1974 to 1975 $= 14{\cdot}0 - 12{\cdot}5$
$= 1{\cdot}5$ million tons
$\therefore$ Percentage increase $= \frac{1{\cdot}5}{12{\cdot}5} \times 100\%$
$= 12\%$ **Ans.**

52. (D) Total receipt for the five years
$= 36{\cdot}0 + 40{\cdot}5 + 50{\cdot}0 + 65{\cdot}6 + 80{\cdot}0$
$= \text{Rs. } 272{\cdot}1$ crore
$\therefore$ Average receipt per year
$= \frac{272{\cdot}1}{5} = 54{\cdot}42$
$= \text{Rs. } 54{\cdot}4$ crore **Ans.**

53. (D) Total of quantity of iron export in 5 years.
$= 10{\cdot}5 + 11{\cdot}0 + 12{\cdot}5 + 14{\cdot}0 + 15{\cdot}0$
$= 63{\cdot}0$ million tons
and the quantity of iron export in 1975
$= 14{\cdot}0$ million tons
$\therefore$ Reqd. ratio $= \frac{14}{63} = \frac{2}{9} = 2 : 9$ **Ans.**

54. (B) Difference in receipt between two successive years 1973 and 1972 is least
$= 40{\cdot}5 - 36{\cdot}0$
$= \text{Rs. } 4{\cdot}5$ crore
This is the least difference **Ans.**

55. (B) Area cultivated for vegetables
$= \frac{15}{100} \times 200000$
$= 30000$ sq. meter **Ans.**

56. (B) Since 100% represents $= 360°$
$\therefore$ 5% represents $= \frac{360° \times 5}{100} = 18°$ **Ans.**

57. (A) Largest area cultivated is for wheat *i.e.* 30% and second largest area cultivated is for paddy *i.e.* 25%
$\because$ Difference $= 30\% - 25\% = 5\%$
Excess $= \frac{5}{100} \times 200000$
$= 10000$ sq. meter **Ans.**

58. (D) Since 25% area $= 5000$ sq. meter
$\therefore$ 20% area $= \frac{5000 \times 20}{25}$
$= 4000$ sq. meter **Ans.**

59. (B) Area cultivated for barley and wheat
$= 5\% + 30\% = 35\%$
and area cultivated for Paddy, groundnut and vegetables $= 25\% + 5\% + 15\%$
$= 45\%$
$\therefore$ Reqd. Ratio $= \frac{35}{45} = \frac{7}{9} = 7 : 9$ **Ans.**

60. (B) Production of steel in 1921
$= 44$ million tons
and production of steel in 1929
$= 118$ million tons
$\therefore$ Reqd. Ratio $= \frac{44}{118} = \frac{22}{59}$ **Ans.**

61. (C) Production of steel in 1920 = 72 million tons and total production from 1920 to 1929
$= 72 + 44 + 68 + 78 + 78 + 90 + 92 + 100 + 108 + 118$
$= 848$ million tons
$\therefore$ Reqd. percentage $= \frac{72 \times 100}{848}\ \%$
$= 8{\cdot}49\%$
$\simeq 8{\cdot}5\%$ (App.) **Ans.**

62. (A) Total production
$= 848$ million tons
$\therefore$ Average annual production
$= \frac{848}{10}$
$= 84{\cdot}8$ million tons **Ans.**

63. (D) Jump from 1921 to 1923
= 78·00 – 44·00
= 34·0 million tons
Jump from 1923 to 1925
= 90·00 – 78·00
= 12·0 million tons
Jump from 1925 to 1927
= 100 – 90
= 10·0 million tons
Jump from 1927 to 1929
= 118 – 100
= 18·0 million tons
Thus the greatest jump is between 1921 and 1923 **Ans.**

64. (B) The greatest difference of two successive years is for 1920 and 1921 and this difference = 72 – 44
= 28 million tons **Ans.**

65. (D) Income in 1978-79 = Rs. 6000
and Income in 1981-82 = Rs. 8000
$\therefore$ Reqd. Ratio $= \frac{6000}{8000}$
= 3 : 4 **Ans.**

66. (C) Expenditure of the year (1981-82)
= Rs. 7500
and Income of the year (1981-82) = Rs. 8000
$\therefore$ % of expenditure to the income
$= \frac{7500 \times 100}{8000}\%$
= 93·75% **Ans.**

67. (B) Total income for the four years
= 6000 + 6800 + 7500 + 8000
= Rs. 28300
$\therefore$ Average annual income
$= \frac{28300}{4}$
= Rs. 7075 **Ans.**

68. (C) Expenditure in 1978-79
= Rs. 6500
and expenditure in 1979-80
= Rs 7000
$\therefore$ Increase in expenditure
= 7000 – 6500
= Rs. 500
$\therefore$ Percentage of increase of expenditure
$= \frac{500 \times 100}{6500}\%$
$= \frac{100}{13}\% = 7\frac{9}{13}\%$ **Ans.**

69. (C) Total income for the entire period of 4 years = 6000 + 6800 + 7500 + 8000
= Rs. 28300
and Total expenditure the entire period of 4 years = 6500 + 7000 + 7400 + 7500
= Rs. 28400
$\therefore$ Balance = 28300 – 28400
= Rs. (– 100) **Ans.**

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Objective
General English