RATIO & PROPORTION

A fraction with its denominator as 100 is called per cent, the symbol '%' is used for per cent and it indicates multiplication with $\frac{1}{100}$.

For example,

$$\frac{18}{100} = 18 \text{ hundredths}$$
$$= 18 \text{ per hundred}$$
$$= 18 \times \frac{1}{100}$$
$$= 18 \text{ per cent}$$
$$= 18\%$$

$\frac{18}{100}$ can also be expressed as 18 : 100.

30% is equivalent to the ratio 30 : 100.

Or

30% is equivalent to the fraction $\frac{30}{100}$ or $\frac{3}{10}$.

Working Rules

To Find the Percentage of a Number

To find the value of a given per cent of a given quantity, we multiply the given quantity by the fraction or decimal fraction of the given per cent, i.e., **value of a given percent = Given quantity × given percent converted into fraction**.

❖ EXAMPLES ❖

Ex.1 : If 8.5% of a number is 51, then find the number.

Sol.: Let the required number be x.

$\therefore$ 8.5% of x = 51

or $\frac{85}{10}\%$ of x = 51

or $\frac{85}{10} \times \frac{1}{100} \times x = 51$

or $x = \frac{51 \times 100 \times 10}{85} \quad 1 = 3 \times 100 \times 2 = 600$

Thus, 8.5% of 600 is 51.

Ex.2 : The difference between increasing a number by 8% and decreasing it by 7% is 75. What is the number ?

Sol.: Let the required number be x.

$\therefore$ 8% of $x = \frac{8x}{100}$

Therefore, Increased number $= x + \frac{8x}{100} = \frac{108x}{100}$

Similarly, the number decreased by

$$7\% = x - \frac{7x}{100} = \frac{93x}{100}$$

Now, $= \frac{108x}{100} - \frac{93x}{100} = \frac{15x}{100}$

But, actual difference = 75

So, $\frac{15x}{100} = 75$

Thus, $x = \frac{75 \times 100}{15}$

$= 5 \times 100 = 500$

Hence, the required number is 500.

Ex.3 : Rani's weight is 25% that of Meena's weight and 40% that of Tara's weight. What percentage of Tara's weight is Meena's weight ?

Sol.: Let Meena's weight be x kg and Tara's weight be y kg.

Then, Rani's weight = 25% of Meena's weight

$= \frac{25}{100} \times x$ ... (i)

Also, Rani's weight = 40% of Tara's weight

$= \frac{40}{100} \times y$ ... (ii)

From (i) and (ii), we get

$\frac{25}{100} \times x = \frac{40}{100} \times y$

$\Rightarrow 25x = 40\ y$ [Multiplying both sides by 100]

$\Rightarrow 5x = 8y$ [Dividing both sides by 5]

$\Rightarrow x = \frac{8}{5}y$ ... (iii)

We have to find Meena's weight as the percentage of Tara's weight, i.e.,

$\frac{x}{y} \times 100 = \frac{\frac{8}{5}y}{y} \times 100$ [Using (iii)]

$= \frac{8}{5} \times 100 = 160$

Hence, Meena's weight is 160% of Tara's weight.

Ex.4 : Rakesh's income is 25% more than that of Rohan's income. What per cent is Rohan's income less than Rakesh's income ?

Sol.: Let Rohan's income be Rs 100. Then,

Rakesh's income = Rs 125.

If Rakesh's income is

Rs 125, Rohan's income = Rs 100

If Rakesh's income is

Rs 1, Rohan's income = Re $\frac{100}{125}$

If Rakesh's income is Rs 100,

Rohan's income = Rs $\left(\frac{100}{125} \times 100\right)$

= Rs 80.

Now, difference between Rohan's

and Rakesh's income = Rs (100 – 80)

= Rs 20

Hence, Rohan's income is 20% less than that of Rakesh.

Ex.5 : The price of sugar goes up by 20%. By how much per cent must a house wife reduce her consumption so that the expenditure does not increase ?

Sol.: Let the consumption of sugar originally be 100 kg and its price be Rs 100. Then,
New price of 100 kg sugar = Rs 120
[∵ Price increases by 20%]
Now, Rs 120 can fetch 100 kg sugar.

$\therefore$ Rs 100 can fetch $= \left(\frac{100}{120} \times 100\right)$ kg sugar

$= \frac{250}{3}$ kg sugar

$\therefore$ Reduction in consumption $= \left(100 - \frac{250}{3}\right)\%$

$= \frac{50}{3}\% = 16\%\frac{2}{3}\%.$

Ex.6 : A number is increased by 10% and then it is decreased by 10%. Find the net increase or decrease per cent.

Sol: Let the number be 100.
Increase int he number = 10% of 100

$= \frac{10}{100} \times 100 = 10$

$\therefore$ Increased number = 100 + 10 = 110.
This number is then decreased by 10%.
Therefore, decrease in the number = 10% of 110

$= \left(\frac{10}{100} \times 110\right) = 11.$

$\therefore$ New number = 110 – 11 = 99
Thus, net decrease = 100 – 99 = 1

Hence, net percentage decrease $= \left(\frac{1}{100} \times 100\right)\%$

$= 1\%.$

Ex.7 : The salary of an officer has been increased by 50%. By what per cent the new salary must be reduced to restore the original salary ?

Sol.: Let original salary be Rs 100.
Then, Increase in the salary = 50% of Rs 100
= Rs 50.
Salary after increment = Rs 150.
Now, in order to restore the original salary, a reduction of Rs 50 should be made on Rs 150.
Thus, Reduction on Rs 150 = Rs 50

$\Rightarrow$ Reduction on Re 1 = Rs $\frac{50}{150}$

$\Rightarrow$ Reduction on Rs 100 = Rs $\left(\frac{50}{150} \times 100\right)$

$= 33\frac{1}{3}$

$\therefore$ Reduction on new salary $= 33\frac{1}{3}\%.$

Profit and Loss :
In our daily routine, we have to buy some articles from various shops. The shopkeepers purchase these articles either from wholesalers or directly from the manufacturers by paying a certain price. Generally, the shopkeeper sells his articles at a different price. These prices and difference in these prices are given special names such as cost price, selling price, profit, loss etc.

Cost Price :
The price for which an article is purchased is called the cost price and abbreviated as C.P.

Selling Price :
The price for which an article is sold is called the selling price and abbreviated as S.P.

Profit :
If selling price is more than cost price, then the difference between selling price and the cost price is called the profit.
∴ Profit = Selling Price – Cost Price

Loss :
If selling price is less than cost price, then the difference between the selling price and cost price is called loss.
∴ Loss = Cost Price – Selling Price

Overheads :
Usually, a merchant has to spend some money on freight or transport, labour or maintenance of the purchased articles. These extra expenditures are called overheads. The overheads are an essential part of cost price.
∴ Cost Price = (Payment made while purchasing the articles) + overhead charges

Some useful Formulae to Find the above defined Terms :

A. Profit or Gain (S.P. > C.P.)

1. Profit = S.P. – C.P.
2. S.P. = Profit + C.P.
3. C.P. = S.P. – Profit
4. $\text{Profit \%} = \frac{\text{Profit}}{\text{C.P.}} \times 100$
5. $\text{Profit} = \frac{\text{C.P.} \times \text{Profit \%}}{100}$
6. $\text{S.P.} = \text{C.P.}\left(\frac{100 + \text{Profit \%}}{100}\right)$
7. $\text{C.P.} = \frac{100 \times \text{S.P.}}{(100 + \text{Profit \%})}$

B. Loss (S.P. > C.P.)

1. Loss = C.P. – S.P.
2. S.P. = C.P. – Loss
3. C.P. = Loss + S.P.
4. $\text{Loss \%} = \frac{\text{Loss}}{\text{C.P.}} \times 100$

5. $\text{Loss} = \frac{\text{C.P.} \times \text{Loss\%}}{100}$

6. $\text{S.P.} = \text{C.P.}\left(\frac{100 - \text{Loss\%}}{100}\right)$

7. $\text{C.P.} = \frac{100 \times \text{S.P.}}{(100 - \text{Loss\%})}$

❖ EXAMPLES ❖

Ex.1 : Anshul purchased 100 oranges at the rate of Rs 2 per orange. He sold 60% of the oranges at the rate of Rs 2.50 per orange and the remaining oranges at the rate of Rs 2 per orange. Find his profit percent.

Sol. : S.P. of 100 oranges = Rs 2 × 100 = Rs 200

60% of 100 oranges $= \frac{60}{100} \times 100$ oranges

= 60 oranges

Now S.P. of 60 oranges = Rs 2.50 × 60 = Rs 150

and S.P. of the remaining (100 – 60), i.e.,

40 oranges = Rs 2 × 40 = Rs 80

∴ S.P. of all the 100 oranges

= Rs 150 + Rs 80 = Rs 230

Therefore, profit = S.P. – C.P.

= Rs (230 – 200) = Rs 30

Hence, Profit percent $= \frac{30}{200} \times 100 = 15\%$

Thus, Anshul's profit is 15%.

Ex.2 : By selling 144 eggs, Anuj lost the S.P. of 6 eggs. Find his loss percent.

Sol. : Let S.P. of 1 egg = Re 1

∴ S.P. of 144 eggs = Rs 144 × 1 = Rs 144

and, Loss = S.P. of 6 eggs

= Re 1 × 6 = Rs 6

∴ C.P. of 144 eggs = S.P. + Loss

= Rs 144 + Rs 6 = Rs 150

Therefore, loss % $= \frac{\text{Loss}}{\text{C.P.}} \times 100 = \frac{6}{150} \times 100 = 4$

Thus, Anuj's loss is 4%.

Ex.3 : Mahender bought two cows at Rs 20,000 each. He sold one cow at 15% gain. But he had to sell the second cow at a loss. If he had suffered a loss of Rs 1,800 on the whole dealing, find the selling price of the second cow.

Sol. : Total C.P. of the two cows = 2 × Rs 20000

= Rs 40000

Loss = Rs 1800

∴ Total S.P. = Rs 40000 – Rs 1800

= Rs 38200 ... (i)

Now, S.P. of the first cow at 15% profit

$= \text{C.P.}\left(\frac{100 + \text{Profit\%}}{100}\right)$

$= \text{Rs } 20000 \times \frac{(100 + 15)}{100}$

$= \text{Rs } 20000 \times \frac{115}{100}$

= Rs 200 × 115

= Rs 23000 ... (ii)

$\therefore$ S.P. of the second cow = Rs 38200 – Rs 23000
[From (i) and (ii)]
= Rs 15200
Thus, the selling price of the second cow is Rs 15,200.

Ex.4 : A man buys 60 pens at Rs 10 per pen and sells 40 pens at Rs 12 per pen and remaining 20 pens at Rs 9 per pen. Find his gain or loss percent.

Sol. : Cost of 60 pens = Rs 10 × 60 = Rs 600
S.P. of 40 pens = Rs 12 × 40 = Rs 480
S.P. of 20 pens = Rs 9 × 20 = Rs 180
$\Rightarrow$ Total S.P. = Rs 480 + Rs 180 = Rs 660
Since, S.P. > C.P.
$\therefore$ Profit = Rs 660 – Rs 600 = Rs 60

$\therefore$ Profit percent $= \frac{\text{Profit}}{\text{C.P.}} \times 100$

$= \frac{60}{600} \times 100 = 10\%.$

Ex.5 : By selling an air-cooler for Rs 6,800, Mr. Avinash lost 15%. For what price should he sell it to get a profit of 10% ?

Sol. : This sum will be solved in two parts. In 1st part, we find the C.P. and in 2nd part, we find the required S.P.

Part I :
S.P. of the air cooler = Rs 6800
Loss = 15% i.e., for every Rs 100 he is losing Rs 15.
$\therefore$ If C.P. is Rs 100,
then S.P. Rs 100 – Rs 15 = Rs 85
$\therefore$ If S.P. is Rs 85, then C.P. = Rs 100

If S.P. is Re 1, then C.P. $= \text{Rs}\frac{100}{85}$

If S.P. is Rs 6800, then C.P. $= \text{Rs}\frac{100}{\cancel{85}_{5}} \times \overset{80}{\cancel{6800}_{400}}$
= Rs 100 × 80
= Rs 8000.

Part II :
C.P. = Rs 8000
Profit = 10%
$\therefore$ Profit = 10% of Rs 8000

$= \frac{10}{\cancel{100}_{10}} \text{Rs } \overset{800}{\cancel{8000}} = \text{Rs } 800$

$\therefore$ S.P. = C.P. + Profit
= Rs 8000 + Rs 800 = Rs 8800.
Hence, the air-cooler should be sold for Rs 8,800 in order to make a profit of 10%.

Ex.6 : A man sold two scooters for Rs 18000 each. On one, he gained 20% and on the other, he lost 20%. Find his total loss or gain.

Sol. : S.P. of the first scooter = Rs 18000
Gain = 20%

Therefore, C.P. $= \frac{100 \times \text{S.P.}}{(100 + \text{Profit}\,\%)}$

$= \text{Rs}\frac{100 \times 18000}{(100+20)}$

$$= Rs\frac{100 \times \overset{\overset{150}{1800}}{18000}}{_{12}120}$$

= Rs 100 × 150

= Rs 15000 ... (i)

S.P. of the second scooter = Rs 18000

Loss = 20%

Therefore, C.P. $= \frac{100 \times S.P.}{(100 - Loss\%)}$

$$= Rs\frac{100 \times 18000}{(100-20)}$$

$$= \frac{100 \times \overset{\overset{225}{1800}}{18000}}{_{8}80}$$

= Rs 100 × 225

= Rs 22500 ... (ii)

Now, total C.P. = Rs 15000 + Rs 22500

[From (i) and (ii)]

= Rs 37500

and, total S.P. = 2 × Rs 18000 = Rs 36000

Hence, loss= C.P. – S.P.

= Rs 37500 – Rs 36000

= Rs 1,500.

Ex.7 : The cost price of 10 tables is equal to the selling price of 8 tables. Find the loss or profit percent.

Sol. : Let the C.P. of each table = Rs 100

∴ C.P. of 10 tables = Rs 1000

∴ S.P. of 8 tables = Rs 1000

So, S.P. of 1 table = Rs $\frac{1000^{125}}{8}$ = Rs 125

∴ Profit on 1 table = Rs 125 – Rs 100 = Rs 25

or Profit percent $= \frac{25}{100} \times 100 = 25\%$.

We read advertisements in our day-to-day life in newspapers. magazines, banners, posters given by various companies and shopkeepers declaring discounts such as :

"Off Season Discount",

"Grand Puja Discount",

"Goods at Throw away prices",

"Now get 1100 g Desi Ghee for the cost of just 1 kg.",

"Get a Steel Glass free with every 500 g pack of tea", etc.

When discount is given, a certain price is attached to the article which the shopkeeper professes to be the cost of the article for the customer. This price is called the marked price (or list price). Then, the shopkeeper offers discount on this marked price. Customer pays the difference between the marked price and the discount.

Some useful formulae regarding Discount, Marked Price, Selling Price, etc.

1. Net Selling Price = Marked Price – Discount
2. Discount = Marked Price – Net Selling Price
3. Marked Price = Net Selling Price + Discount

4. $\text{Discount \%} = \left(\frac{\text{Discount}}{\text{Marked Price}}\right) \times 100\%$

5. $\text{S.P.} = \text{M.P.} - \frac{\text{Discount \%} \times \text{M.P.}}{100}$

6. $\text{S.P.} = \text{M.P.}\left(1 - \frac{\text{Discount \%}}{100}\right)$

7. $\text{S.P.} = \text{M.P.}\left(\frac{100 - \text{Discount \%}}{100}\right)$

8. $\text{M.P.} = \frac{100 \times \text{S.P.}}{(100 - \text{Discount \%})}$

Let us now consider some examples to illustrate the above facts.

❖ EXAMPLES ❖

Ex.1 : Marked price of a pen is Rs 20. It is sold at a discount of 15%. Find the discount allowed on the pen and its selling price.

Sol. : Marked Price of the pen = Rs 20

Rate of discount = 15%

∴ Discount allowed = 15% of Rs 20

$= \frac{15}{100} \times$ Rs 20 = Rs 3

Therefore, selling price of the pen = Rs 20 – Rs 3 = Rs 17.

Ex.2 : A chain with marked price Rs 1,200 was sold to a customer for Rs 1,000. Find the rate of discount allowed on the chain.

Sol. : Marked Price = Rs 1200

Selling Price = Rs 1000

Discount = Rs 1200 – Rs 1000 = Rs 200

$\text{Rate of discount} = \frac{\text{Discount}}{\text{M.P.}} \times 100\%$

$= \frac{200}{1200} \times 100\% = 16.66\%$

Ex.3 : A shopkeeper offers 15% season discount to the customers and still makes a profit of 19%. What is the cost price for the shopkeeper on a saree marked at Rs 2,240 ?

Sol. : M.P. = Rs 2240

Rate of discount = 15%

Discount allowed = $\text{Rs}\frac{15}{100} \times 2240 = \text{Rs } 336$

Thus, S.P. of the saree = Rs (2240 – 336) = Rs 1904

Now, profit % of the shopkeeper = 19%

Therefore, C.P. $= \frac{100 \times \text{S.P.}}{(100 + \text{Profit \%})}$

$= \text{Rs}\frac{100 \times 1904}{(100 + 19)}$

$= \text{Rs}\frac{100 \times 1904}{119}$

= Rs 100 × 16 = Rs 1600

Thus, the cost price of the saree is Rs 1,600.

Ex.4 : A Jacket was sold for Rs 680 after allowing a discount of 15% on the marked price. Find the marked price of the Jacket.

Sol. : Let M.P. be Rs x.

$\therefore$ Discount = 15% on Rs x

$$= \text{Rs } \frac{15}{100} \times x = \text{Rs } \frac{3x}{20}$$

$$\therefore \quad \text{S.P.} = \text{Rs } \left(x - \frac{3x}{20}\right) = \text{Rs} \left(\frac{20x - 3x}{20}\right)$$

$$= \text{Rs } \frac{17x}{20}$$

According to the given condition,

$$\frac{17x}{20} = 680$$

or $$x = \frac{680 \times 20}{17} = \text{Rs } 800$$

Thus, marked price of the Jacket is Rs 800.

Ex.5 : Abbas and Tony run a ready-made garments shop. They mark the garments at such a price that even after allowing a discount of 12.5%, gain a profit of 25%. Find the marked price of a ladies suit which costs them Rs 2,100.

Sol. : First method : C.P. of a suit = Rs 2100

Profit = 25% of Rs 2100

$$= \text{Rs } \frac{25}{100} \times 2100 = \text{Rs } 525$$

$\therefore$ S.P. of the suit = Rs (2100 + 525)

= Rs 2625

Let the marked price be Rs 100.

Then, Discount = 12.5% of Rs 100

$$= \frac{12.5}{100} \times 100 = \text{Rs } 12.50$$

$\therefore$ S.P. = Rs (100 – 12.50) = Rs 87.50

Now, if S.P. is Rs 87.50, M.P. = Rs 100

$\therefore$ If S.P. is Rs 2625, M.P. = $\text{Rs } \frac{100}{87.50} \times 2625$

$$= \frac{100 \times 2625 \times 100}{8750}$$

= Rs 3000

Thus, the marked price of the ladies suit is Rs 3,000.

Alternate Method :

Let the marked price be Rs x.

We have $$\text{M.P.} = \frac{100 \times \text{S.P.}}{(100 - \text{Discount}\%)}$$

or $$x = \frac{100 \times 2625}{(100 - 12.5)} = \frac{262500}{87.5} = \text{Rs } 3000$$

Thus, the marked price of the suit is Rs 3,000

Sales tax is an indirect tax. In purchasing of some specified items from the market, we have to pay a certain extra amount (at a rate specified by the Government), in addition to the cost of the item. This additional amount is called sales tax.

Working Rules

Sales tax is calculated on the selling price in the same way as we calculate percentage.

❖ EXAMPLES ❖

Ex.1 : Amar buys a pair of shoes costing Rs 470. If the rate of sales tax is 7%, calculate the total amount payable by him for shoes.

Sol. : Rate of sales tax = 7%

$$\text{Sales tax} = \text{Rs } \frac{7}{100} \times 470$$

$$= \frac{3290}{100} = \text{Rs } 32.90$$

Hence, total amount to be paid = Rs 470 + Rs 32.90

= Rs 502.90

Ex.2 : Rakesh purchased a cycle for Rs 660 including sales tax. If the rate of sales tax is 10%, find the selling price of cycle.

Sol. : Let the selling price be Rs x.

Sales tax = 10% of x

$$= \frac{10}{100} \times x = \frac{x}{10}$$

∴ Amount to be paid for the cycle

$$= x + \frac{x}{10} = \frac{11x}{10}$$

Now, $\frac{11x}{10} = 660$ (given)

Therefore, $x = \frac{660 \times 10}{11} = 600$

Hence, the selling price of the cycle is Rs 600.

Ex.3 : Nazim purchases a motorcycle, having marked price of Rs 46,000 at a discount 5%. If sales tax is charged at 10%, find the amount Nazim has to pay to purchase the motorcycle.

Sol. : Marked price of motor cycle = Rs 46000

Discount = 5%

∴ Discounted price of motorcycle

$$= \text{Rs}\left(46000 - 46000 \times \frac{5}{100}\right)$$

= Rs (46000 – 2300) = Rs 43700

Sales tax on Rs 43700 = Rs $43700 \times \frac{10}{100}$ = Rs 4370

Amount, Nazim has to pay for motorcycle

= Rs (43700 + 4370) = Rs 48,070.

When we borrow money from a financial agency (bank, financial agency or individual), it is called the lender.

The borrowed money is called the principal.

We have to pay some additional money together with the borrowed money for a certain time period, for the benefit of using his or her money. The additional money that we pay is called the interest.

If the principal remains the same for the whole loan period (or time), then the interest is called the simple interest.

The interest together with the principal is called the amount.

If the principal does not remain the same for the whole loan period due to addition of (compounding of) interest to the principal after a certain interval of time to form the new principal, then the interest so obtained is called the compound interest.

Simple Interest :

(i) Simple Interest

$$= \frac{\text{Principal} \times \text{Rate of interest} \times \text{Time}}{100}$$

(ii) Amount = Principal + Simple Interest.

Compound Interest :

To understand compound interest, we consider the following example -

"A man lends Rs 5,000 to a finance company at 10% per annum. What interest does he get after one year ? What will be the amount then ? At the end of the year, if he decides to deposit the whole sum (amount after one year) for another year, what interest does he get at the end of the second year ?"

Interest after one year = Rs $\frac{5000 \times 1 \times 10}{100}$ = Rs 500

$\therefore$ Amount after one year = Rs 5000 + Rs 500

= Rs 5500.

When the deposit is Rs 5,500 in the company for one more year, the amount of Rs 5,500 due at the end of first year becomes the principal for the second year.

$\therefore$ Interest at the end of the second year

= Rs $\frac{5000 \times 1 \times 10}{100}$ = Rs 550

Thus, the interest for two years is

Rs 500 + Rs 550 = Rs 1050.

What do we notice ?

We notice that the interest for the second year is more than that for the first year.

Why, it is so ?

It is clear that in the second year, interest has been calculated on Rs 5500, which is equal to Rs 5,000 (Principal at the beginning) + Rs 500 (Interest for the first year). So, for the second year, interest on the interest has also been calculated. Interest calculated in this manner is known as compound interest.

Computation of Compound Interest by Using Formulae

Formula 1 :

Let P be the principal and the rate of interest be R% per annum. If the interest is compounded annually, then the amount A and the compound interest C.I. at the end of n years are given by

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

$$C.I. = A - P = P\left\{\left(1+\frac{R}{100}\right)^n - 1\right\}$$

Formula 2 :

Let P be the principal and the rate of interest be R% per annum. If the interest is compounded annually, then the amount A and the compound interest C.I. at the end of n years are given by

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

and, C.I. = A – P

$$= P\left\{\left(1+\frac{R}{100k}\right)^{nk} - 1\right\} \text{ respectively.}$$

Here, interest is payable k times in a year.

Particular Cases :

Case 1 : When the interest is compound half-yearly or semi-annually.

In this case, $k = 2$

$$\therefore \quad A = P\left(1+\frac{R}{2\times100}\right)^{2n}$$

$$\text{and} \quad C.I. = P\left[\left(1+\frac{R}{2\times100}\right)^{2n}-1\right]$$

Case 2 : When interest is compounded quarterly.

In this case, $k = 4$

$$\therefore \quad A = P\left(1+\frac{R}{4\times100}\right)^{4n}$$

$$\text{and} \quad C.I. = P\left[\left(1+\frac{R}{4\times100}\right)^{4}-1\right]$$

❖ EXAMPLES ❖

Ex.1 : A man deposits Rs 1,000 in a savings bank account. How much will it amount in three years if the rate of interest is 5% per annum and the interest is payable annually ?
(Solve without using formulae)

Sol. : Interest on Rs 1000 for the first year

$$= \text{Rs } \frac{1000\times1\times5}{100}$$

$$= \text{Rs } 10 \times 1 \times 5$$

$$= \text{Rs. } 50$$

Amount after one year = Rs 1000 + Rs 50

$$= \text{Rs } 1050$$

$\therefore$ Interest for the second year $= \frac{1050\times1\times5}{100}$

$$= \text{Rs}\frac{105}{2} = \text{Rs } 52.50$$

Amount after two years = Rs 1050 + Rs 52.50

$$= \text{Rs } 1102.50$$

$\therefore$ Principal for the third year

$$= \text{Rs } \frac{1102.50\times1\times5}{100}$$

$$= \text{Rs } \frac{5512.5}{100}$$

$$= \text{Rs } 55.13$$

Amount after three years = Rs 1102.50 + Rs 55.13

$$= \text{Rs } 1157.63$$

Thus, Rs 1,000 will become Rs 1,157.63 in three years.

Ex.2 : Find the amount and the compound interest on Rs 5,000 lent at compound interest at 5% per annum for one year if the interest is payable half-yearly.
(Solve without using formulae)

Sol. : Here, we calculate the compound interest for the period of one year in such a way that interest is calculated after six months. So, there will be two time intervals, each of six months, for the calculation of interest.

First Interval of Six Months

Interest on Rs 5000 for 6 months $= \frac{5000 \times 5 \times 1}{2 \times 100}$

$= \text{Rs } 125$

$\therefore$ Amount at the end of the first interval of six months

$= \text{Rs } 5000 + \text{Rs } 125$

$= \text{Rs } 5125.$

Second Interval of Six Months

Amount at the end of the first interval of six months will be taken as the principal for the second interval of six months.

interest on Rs 5125 for 6 months

$= \text{Rs} \frac{5125 \times 5 \times 1}{2 \times 100} = \text{Rs } \frac{1025}{8}$

$= \text{Rs } 128.13$

$\therefore$ Total interest on Rs 5000 for one year

$= \text{Rs } 125 + \text{Rs } 128.13$

$= \text{Rs } 253.13.$

Amount at the end of one year

$= \text{Rs } 5000 + \text{Rs } 253.13$

$= \text{Rs } 5253.13.$

Ex.3 : Find the compound interest on Rs 90,000 for 3 years at the rate of 10% per annum compounded annually.

Sol. : $P = \text{Rs } 90000$

$n = 3$ [$\because$ Interest is compounded annually]

$r = 10\%$ p.a.

Since $A = P\left(1+\frac{r}{100}\right)^n$

$\therefore \quad A = \text{Rs } 90000\left(1+\frac{10}{100}\right)^3$

$= \text{Rs } 90000\left(1+\frac{1}{10}\right)^3$

$= \text{Rs } 90000\left(\frac{11}{10}\right)^3$

$= \text{Rs } 90000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$

$= \text{Rs } 90 \times 11 \times 11 \times 11 = \text{Rs } 119790$

Now, C.I. $= A - P = \text{Rs } 119790 - \text{Rs } 90000$

$= \text{Rs } 29,790.$

Ex.4 : Calculate the amount due in 3 years on Rs 5,000, if the rates of compound interest for successive years are 7%, 8% and 10% respectively.

Sol. : Interest for 1st year $= \text{Rs} \frac{5000 \times 7 \times 1}{100} = \text{Rs } 350$

and, amount at the end of 1st year

$= \text{Rs } 5000 + \text{Rs } 350$

$= \text{Rs } 5350$

$=$ Principal for 2nd year

Interest for 2nd year $= \text{Rs } \frac{5350 \times 8 \times 1}{100}$

$= \text{Rs } \frac{42800}{100} = \text{Rs } 428$

and, amount at the end of 2nd year
= Rs 5350 + Rs 428
= Rs 5778
= Principal for 3rd year

Interest for 3rd year = Rs $\frac{5778\times10\times1}{100}$

= Rs $\frac{57780}{100}$ = Rs 577.80

and, amount due at the end of 3rd year
= Rs 5778 + Rs 577.80
= Rs 6,355.80.

Ex.5 : Compute the compound interest on Rs 20,000 for 2 years at 20% per annum when compounded half yearly.

Sol. : Here,

Principal (P) = Rs 20000

Rate (r) = 20% per annum

= $\frac{20}{2}$% or 10% per half year

Time(n)= 2 years

= 4 half years

Since, $A = P\left(1+\frac{r}{100}\right)^n$

$\therefore$ Amount = Rs $20000 \times \left(1+\frac{10}{100}\right)^4$

= Rs $20000 \times \left(1+\frac{1}{10}\right)^4$

= Rs $20000 \times \left(\frac{11}{10}\right)^4$

= Rs $20000 \times \frac{11}{10}\times\frac{11}{10}\times\frac{11}{10}\times\frac{11}{10}$

= Rs $2 \times 11 \times 11 \times 11 \times 11$

= Rs 29282

$\therefore$ C.I. = A – P

$\therefore$ Compound Interest = Rs (29282 – 20000)

= Rs 9282.

Ex.6 : Find the compound interest on Rs 15,625 for 9 months at 16% per annum, compounded quarterly.

Sol. : Here, Principal (P) = Rs 15625

Rate (r) = 16% p.a.

= 4% per quarter

Time (n) = 9 months

= 3 quarters

Now, Amount, (A) = $P\left(1+\frac{r}{100}\right)^n$

= Rs $15625\left(1+\frac{4}{100}\right)^3$

= Rs $15625\left(1+\frac{1}{25}\right)^3$

$$= \text{Rs } 15625\left(\frac{26}{25}\right)^3$$

$$= \text{Rs } 15625 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$$

$$= \text{Rs } 26 \times 26 \times 26$$

$$= \text{Rs } 17576$$

Since, Compound Interest = Amount – Principal

$\therefore$ C.I. = Rs 17576 – Rs 15625

= Rs 1,951.

Inverse Problems -

[To find Principal, Time or Rate of Interest]

Ex.7 : A certain sum was borrowed at 15% per annum. If at the end of 2 years, Rs 1,290 was compounded as C.I., then find the sum borrowed.

Sol. : **First Method :**

Let the sum be Rs 100.

Then, Amount = Rs $100\left(1+\frac{15}{100}\right)^2$

$$\left[\because \text{Amount} = P\left(1+\frac{r}{100}\right)^n\right]$$

$$= \text{Rs } 100\left(1+\frac{3}{20}\right)^2$$

$$= \text{Rs } 100\left(\frac{23}{20}\right)^2$$

$$= \text{Rs}\left(100 \times \frac{23}{20} \times \frac{23}{20}\right) = \text{Rs}\frac{529}{4}$$

$\therefore$ Compound Interest $= \frac{529}{4} - 100 = \text{Rs}\frac{129}{4}$

If C.I. is Rs $\frac{129}{4}$, then the sum borrowed = Rs 100

If C.I. is Rs 1,

then the sum borrowed = Rs $100 \times \frac{4}{129}$

If C.I. is Rs 1290, then the sum borrowed

$$= \text{Rs } 100 \times \frac{4}{129} \times 1290$$

$$= \text{Rs } 100 \times 4 \times 10 = \text{Rs } 4{,}000$$

Hence, the sum borrowed is Rs 4,000.

Alternate Method :

$$\text{Amount} = P\left(1+\frac{r}{100}\right)^n = P\left(1+\frac{15}{100}\right)^2$$

$$= P\left(1+\frac{3}{20}\right)^2 = P\left(\frac{23}{20}\right)^2$$

$$= P \times \frac{23}{20} \times \frac{23}{20}$$

$\therefore$ $\text{C.I.} = \left(P \times \frac{23}{20} \times \frac{23}{20}\right) - P$

$$= P\left(\frac{529}{400}-1\right)$$

But, C.I. = Rs 1290

$\therefore \quad P\left(\frac{529}{400}-1\right) = 1290$

or $P\left(\frac{529-400}{400}\right) = 1290$

or $P\left(\frac{129}{400}\right) = 1290$

or $P = \frac{129\times 400}{129}$

or $P = 10 \times 400 = 4000$

Hence, Principal = Rs 4,000.

Ex.8 : In how many years will Rs 800 amount to Rs 882 at 5% per annum compounded annually ?

Sol. : Here, P = Rs 800

A = Rs 882

r = 5% p.a.

Let number of years be n.

Since, $A = P\left(1+\frac{r}{100}\right)^n$

$\therefore \quad 882 = 800\left(1+\frac{5}{100}\right)^n = 800\left(1+\frac{1}{20}\right)^n$

or $\frac{882}{800} = \left(1+\frac{1}{20}\right)^n$

or $\frac{441}{400} = \left(\frac{21}{20}\right)^n$

or $\left(\frac{21}{20}\right)^n = \left(\frac{21}{20}\right)^n$ [$\because$ 441 = 21^2 and 400 = 20^2]

Since the bases are same on both sides,

hence n = 2

Since interest is compounded annually

$\therefore$ Time = 2 years.

Ex.9 : Determine the rate per cent per annum if Rs 25,000 amounts to 26,010 in 6 months, interest being compounded quarterly.

Sol. : Here, n = 2 [$\because$ 6 months = 2 quarters]

Now, $A = P\left(1+\frac{r}{100}\right)^n$, where r is the rate per quarter.

$\therefore \quad 26010 = 25000\left(1+\frac{r}{100}\right)^2$

or $\left(1+\frac{r}{100}\right)^2 = \frac{26010}{25000} = \frac{2601}{2500} = \left(\frac{51}{50}\right)^2$

or $\left(1+\frac{r}{100}\right) = \frac{51}{50}$

or $\frac{r}{100} = \frac{51}{50} - 1 = \frac{51-50}{50} = \frac{1}{50}$

or $r = \frac{1}{50}\times 100 = 2\%$

Hence, the required rate is 2% p.a.

Introduction -

In our daily life, we come across some phrases such as :
"The more you buy, the more you spend."
"The less you buy, the less you spend."
"The faster the spend of a car, the lesser is the time taken to cover a given distance."
"The more men working on a project, the shorter is the time to complete it."
"The efficiency of a machine decreases with time."
The quantities mentioned in these examples, depend on each other. A change in one brings a change in the other. Thus, we conclude that, if two quantities are related such that a change i one causes a corresponding change in the other, then we say that one varies as the other.
There are two types of variation :
(i) Direct variation
(ii) Indirect or Inverse variation.

Direct Variation

Consider the following table which shows various numbers of books (each of same cost) denoted by x and the corresponding cost denoted by y.

x (No. of Books)	2	3	5	10	15
y (Cost in Rupees)	15	75	125	250	375

Here, we note that there is an increase in cost corresponding to the increase in the number of books. Hence, it is a case of direct variation.
In this case, if we compare the ratio of different number of books to the corresponding costs, then we have :

$$\frac{2}{50}, \quad \frac{3}{75}, \quad \frac{5}{125}, \quad \frac{10}{250}, \quad \frac{15}{375},$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

or $\frac{1}{25}, \quad \frac{1}{25}, \quad \frac{1}{25}, \quad \frac{1}{25}, \quad \frac{1}{25},$

Thus is, each ratio reduces to $\frac{1}{25}$ which is constant. We may express is in a general form as:

$$\frac{x}{y} = k \text{ (constant)}$$

Thus, we conclude that,

When two quantities x and y vary such that the ratio $\frac{x}{y}$ remains constant and positive, then we say that x and y vary directly and the variation is called a Direct Variation.
In Mathematical language, it may be written as,

$$\frac{x}{y} = k \text{ or } x = ky$$

Let us consider any two values of x, say x_1 and x_2 with their corresponding values of y as y_1 and y_2. We have

and $x_1 = ky_1$

$x_2 = ky_2$

$\therefore \quad \frac{x_1}{x_2} = \frac{ky_1}{ky_2}$

or $\frac{x_1}{x_2} = \frac{y_1}{y_2}$, which helps us to find the value of any one of x_1, x_2, y_1 and y_2, when other three are known.

❖ EXAMPLES ❖

Ex.1 : If the cost of 15 pens of the same value is Rs 600, find the cost of -
(i) 20 pens (ii) 3 pens.

Sol. : Let us denote the required cost by x. Now, writing the like terms together, we have :

(i)

No. of Pens	Cost in rupees
15	600
20	x

Ratio of pens $= \frac{15}{20} = \frac{3}{4}$

Ratio of rupees $= \frac{600}{x}$

Since, more pens cost more money, so this is a case of direct variation.

Therefore, $\frac{3}{4} = \frac{600}{x}$

or $3 \times x = 600 \times 4$

or $x = \frac{600 \times 4}{3}$

or $x = 200 \times 4 = 800$

$\therefore$ The cost of 20 pens is Rs 800.

(ii) Again, ratio of pens $= \frac{15}{3} = \frac{5}{1}$

ratio of rupees $= \frac{600}{x}$

$\therefore$ $\frac{5}{1} = \frac{600}{x}$

or $5 \times x = 600 \times 1$

or $x = \frac{600}{5} = 120$

$\therefore$ The cost of 3 pens is Rs 120.

Ex.2 : Reema types 540 words during half an hour. How many words would she type in 6 minutes ?

Sol. : Suppose she types x words in 6 minutes. Then, the given information can be represented int he following tabular form :

Number of words	540	x
Time (in minutes)	30	6

Since in more time more words can be typed, it is case of direct variation.

$\therefore$ Ratio of number of words = Ratio of number of minutes

$\Rightarrow$ $\frac{540}{x} = \frac{30}{6}$

$\Rightarrow$ $x = \frac{6 \times 540}{30}$

$\Rightarrow$ $x = 108.$

Hence, she types 108 words in 6 minutes.

Consider the following table showing various number of men and the corresponding number of days to complete the work.

x (No. of men)	40	20	10	8	5	1
y (No. of days)	1	2	4	5	8	40

Here, the number of men are denoted by x and the corresponding number of days by y.
In this case, when the number of men increases, the corresponding number of days decreases. But, by a careful observation, we find that the product of the corresponding number of men and days is always the same :

$40 \times 1 = 40$
$20 \times 2 = 40$
$10 \times 4 = 40$
$8 \times 5 = 40$
$5 \times 8 = 40$
$1 \times 40 = 40$

That is the product (40) is constant.
In general, it may be expressed as $xy = k$(constant)
Let x_1 and x_2 be two values of x and their corresponding values of y be $y_1$and y_2.
Then, $x_1y_1 = k$ and $x_2y_2 = k$

$\therefore \quad \frac{x_1y_1}{x_2y_2} = \frac{k}{k} = 1$

or $x_1y_1 = x_2y_2$ or $\frac{x_1}{x_2} = \frac{y_2}{y_1}$

Hence, we conclude that, if two quantities x and y vary such that their product xy remains constant, then we say that x and y vary inversely and the variation is called inverse variation.

The relation $\frac{x_1}{x_2} = \frac{y_2}{y_1}$ is used to find the value of any one of x_1, x_2, y_1 and y_2, if the other three are known.

❖ EXAMPLES ❖

Ex.1 : In a boarding house of 80 boys, there is food provisions for 30 days. If 20 more boys join the boarding house, how long will the provisions last ?

Sol. : Obviously, more the boys the sooner would the provisions exhaust. It is, therefore, the case of inverse variation. The number of boys in the two situations are :
80 and (80 + 20), i.e., 100 respectively. If the provisions last for x days when the number of boys increased from 80 to 100, we can have the following table :

Number of Boys	Number of Days
80	30
100	x

Here, the ratio between the like terms are :

$\frac{80}{100}$ and $\frac{30}{x}$

Since, the problem is of inverse variation, we will invert the ratio and then equate them :

$\frac{x}{30} = \frac{80}{100}$

or $\frac{x}{30} = \frac{4}{5}$

or $x = \frac{4 \times 30}{5} = \frac{4 \times 6}{1}$

or $x = 24$

Therefore, the provisions will last for 24 days.

Ex.2 : A jeep finishes a journey in 9 hours at a speed of 60 km per hour. by how much should its speed be increased so that it may take only 6 hours to finish the same journey ?

Sol. : Let the desired speed of the jeep be x km per hour, then we have :

Number of Hours	Speed of the Jeep (in km per hour)
9	60
6	x

Since, the greater the speed, the lesser the time taken. Therefore, the number of hours and speed vary inversely.

$\therefore \quad \frac{9}{6} = \frac{x}{60}$

or $\quad \frac{x}{60} = \frac{9}{6}$

or $\quad x = \frac{9}{6} \times 60 = \frac{9 \times 10}{1} = 90$

$\therefore$ Increase in speed = (90 – 60) km per hour
= 30 km per hour

Thus, the required increase in speed is 30 km per hour.

Problems on Time and Distance

The speed of a moving body is the distance moved in unit time. It is usually represented either in km/h or m/s.

Relation among Speed, Time and Distance

The relation among speed, distance and time is given by Distance covered = Speed × Time taken. If any two of them are given, it is easy to determine the third one. The above relation can also be expressed in the following manners :

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

or $$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

We talk about speed, say 27 km/h, it means that we are actually talking about its average speed. By average speed of a vehicle, we mean that constant speed at which the vehicle would cover a distance of 27 km in an hour. Unless mentioned otherwise, by speed we shall mean an average speed.

❖ EXAMPLES ❖

Ex.1 : A man takes 12 hours to travel 48 kilometers. How long will he take to travel 72 kilometers ?

Sol. : Since the man travels 48 km in 12 hours, therefore, one kilometer is travelled in $\frac{12}{48}$ hours.

$\therefore$ He travels 72 km in $\frac{12 \times 72}{48}$ hours

or in 18 hours.

Ex.2 : A train of 320 metres length, is running at a speed of 72 km/h. How much time will it take to cross a pole ?

Sol. : Speed of the train = 72 km/h
= 72 × 1000 m/h

$= \frac{72000}{60 \times 60}$ m/s = 20 m/s

Length of the train = 320 m

Since the train of length 320 m has to cross the pole of negligible dimension, it has to cross the length of itself, i.e., 320 m.

Thus, distance to be covered = 320 m

Now, using the relation time $= \frac{\text{Distance}}{\text{Speed}}$, we get the required time for the train to cross a distance of 320 m $= \frac{320}{20}$ [$\because$ Speed of the train is 20 m/s (found above)]

Hence, the train takes 16 seconds to cross the pole.

We use the principles of direct and indirect variations to solve problems on 'time and work', such as :

"More men do more work and less men do less work"
(Direct variation)

"More men take less time to do a work and less men take more time to do the same work."
(Indirect variation)

The problems on "time and work" are divided in two categories:

(i) To find the work done in a given period of time.

(ii) To find the time required to complete a given job.

Working Rules

We shall use the unitary method by considering the following fundamental rules for solving problems regarding time and work :

(i) A complete job or work is taken to be one.

(ii) Time to complete a work

$$= \frac{\text{Total work to be done}}{\text{Part of the work done in one day}}.$$

❖ EXAMPLES ❖

Ex.1 : Ratan takes 5 days to complete a certain job and shankar takes 8 days to do the same job. If both of them work together, how long will they take to complete the work ?

Sol. : Since, Ratan takes 5 days to complete the given work

$\therefore$ Ratan finishes $\frac{1}{5}$ part in 1 day.

Similarly, Shankar takes 8 days to complete the work.

Therefore, Shankar finishes $\frac{1}{8}$ part in 1 day.

$\therefore$ In a day, they together will finish

$$= \frac{1}{5} + \frac{1}{8} = \frac{8+5}{40} = \frac{13}{40}$$

i.e., $\frac{13}{40}$ part of the work.

So, they both will take $\frac{40}{13}$ days $3\frac{1}{13}$ days to complete the work. Hence, the complete work will be finished by them together in $3\frac{1}{13}$ days.

Ex.2 : Kshitij can do a piece of work in 20 days and Rohan can do the same work in 15 days. They work together for 5 days and then Rohan leaves. In how many days will Kshitij alone finish the remaining work ?

Sol. : Since, Kshitij completes the work in 20 days

$\therefore$ Kshitij's 1 day work $= \frac{1}{20}$ part

Now, Rohan completes the work in 15 days.

Similarly, Rohan's 1 day work $= \frac{1}{15}$ part

$\therefore$ Their combined work for 1 day

$$= \frac{1}{20} + \frac{1}{15} = \frac{3+4}{60} = \frac{7}{60}$$

$\therefore$ Their combined work for 5 days

$$= 5 \times \frac{7}{60} = \frac{7}{12} \text{ part}$$

Remaining work

= Complete work – Work done in 5 days

$$= 1 - \frac{7}{12}$$

$$= \frac{12-7}{12} = \frac{5}{12} \text{ part}$$

Now, the remaining work is to be completed by Kshitij alone.

Kshitij can complete the whole work in 20 days.

So, he will complete $\frac{5}{12}$ work in $\left(\frac{5}{12} \times 20\right)$ days, i.e., $\frac{25}{3}$ days or $8\frac{1}{3}$ days.

Ex.3 : A and B can do a piece of work in 10 days; B and C in 15 days; C and A in 12 days. How long would A and B take separately to do the same work ?

Sol. : A and B can complete the work in 10 days.

$\therefore$ (A and B)'s one day work $= \frac{1}{10}$ part

Similarly,

(B and C)'s one day work $= \frac{1}{15}$ part

(C and A)'s one day work $= \frac{1}{12}$ part

Adding up, we get

2(A and B and C)'s work in 1 day

$$= \left(\frac{1}{10} + \frac{1}{15} + \frac{1}{12}\right) \text{part}$$

$$= \frac{6+4+5}{60} = \frac{15}{60} = \frac{1}{4} \text{ part}$$

$\therefore$ (A and B and C) can do in 1 day

$$= \frac{1}{4} \times \frac{1}{2} = \frac{1}{8} \text{ part}$$

Now,

Part of work A can do in 1 day

= (1 day work of A and B and C)

– (1 day work of B and C)

$$= \left(\frac{1}{8}\right) - \left(\frac{1}{15}\right)$$

$$= \frac{15-8}{120} = \frac{7}{120} \text{ part}$$

Hence, A can complete the work in $\left(1 \times \frac{120}{7}\right)$ days, i.e., $\frac{120}{7}$ or $17\frac{1}{7}$ days.

Similarly,

Part of the work B can do in 1 day

= (1 day work of A and B and C)

– (1 day work of A and C)

$$=\left(\frac{1}{8}\right)-\left(\frac{1}{12}\right)=\frac{3-2}{24}=\frac{1}{24}$$

Hence, B can complete the work in $\left(1\times\frac{24}{1}\right)$ days, i.e., 24 days.

Ex.4 : A contractor undertakes to construct a road in 20 days and engages 12 workers. After 16 days, he finds that only $\frac{2}{3}$ part of the work has been done. How many more workers should he now engage in order to finish the job in time ?

Sol. : From the question, it is clear that $\frac{2}{3}$ part of the work has been completed by 12 workers in 16 days.

$\therefore$ Remaining work = $1-\frac{2}{3}=\frac{1}{3}$

Remaining number of days = 20 – 16 = 4

Thus, $\frac{1}{3}$ part of the work is to be finished in 4 days.

$\therefore$ Number of workers required to complete $\frac{2}{3}$ part of work in 16 days = 12

Number of workers required to complete 1 work in 16 days

$$= 12\times\frac{3}{2}\times 16$$

Number of workers required to complete $\frac{1}{3}$ work in 1 day

$$= 12\times\frac{3}{2}\times 16\times\frac{1}{3}$$

Number of workers required to complete $\frac{1}{3}$ work in 4 days

$$= 12\times\frac{3}{2}\times 16\times\frac{1}{3}\times\frac{1}{4}$$

$\therefore$ Number of additional workers required

$$= 24 - 12 = 12$$

Hence, the contractor will have to engage 12 more workers to complete the work in time.

EXERCISE -1

Q.1 In which of the following tables, a and b vary directly. Also, find the constant of variation if a and b are in direct variation.

(i)

a	4	7	21	28
b	12	21	63	84

(ii)

a	2.5	5	7.5	10	15
b	10	20	30	40	60

(iii)

a	1	2	3	4	5
b	2	1	6	3	2/5

Q.2 A car travels 432 km on 48 litres of petrol. How far would it travel on 20 litres of petrol ?

Q.3 A private taxi charges a fare of Rs 260 for a Journey of 200 km. How much would it travel for Rs 279.50 ?

Q.4 Reema types 540 words during half an hour. How many words would she type in 6 minutes ?

Q.5 In which of the following tables a and b vary inversely :

(i)

a	8	16	32	256
b	32	16	8	1

(ii)

a	9	18	2	12
b	8	4	30	6

(iii)

a	2	16	8	4
b	40	5	10	20

Q.6 If a and b vary inversely, fill in the blanks :

(i)

a	8	2	.....	5	1
b	10	.....	20	.....	80

(ii)

a	16	32	8	128
b	4	.....	20	0.5

Q.7 1000 soldiers in a fort had enough food for 20 days. But some soldiers were transferred to another fort and the food lasted for 25 days. How many soldiers were transferred ?

Q.8 120 men had food provision for 200 days. After 5 days, 30 men died due to an epidemic. How long will the remaining food last ?

Q.9 If x and y vary inversely as each other, and x = 10 when y = 6. Find y when x = 15.

Time & Work

Q.10 Amit can do a piece of work in 4 days and Sumit can do it in 6 days. How long will they take, if both Amit and Sumit work together ?

Q.11 Kami, Karya and Kirti can together weave a carpet in 4 days. Kami by herself can weave the same sized carpet in 12 days and Kirti can do it in 10 days. How long will Karya take to do the work by herself ?

Q.12 A and B can do a piece of work in 12 days; B and C in 15 days; C and A in 20 days. In how many days will they finish it together and separately ?

Q.13 P and Q together can do a piece of work in 10 days, Q and R can do the same work together in 12 days, while P and R can do together in 15 days. How long each will take to do it separetely ?

Q.14 A can do a piece of work in 25 days and B can finish it in 20 days. They work together for 5 days and then A goes away. In how many days will B finish the remaining work ?

Q.15 A and B can polish the floors of a building in 25 days, A alone can do $\frac{1}{3}$ of this job in 15 days. In how many ays can B alone polish the floors of the building ?

Q.16 15 boys earn Rs 900 in 5 days, how much will 20 boys earn in 7 days ?

Q.17 Spinning 3 hours daily, Kanta can spin 2 kg cotton-balls in 12 days. Spinning 4 hours daily, how many days will she take to spin 10 kg cotton balls ?

Q.18 Somari sweeps 600 m long railway platform in $2\frac{1}{2}$ hours. His wife Imarati sweeps $\frac{2}{3}$rd of the same platform in $1\frac{1}{2}$ hours. Who sweeps more speedily ?

Q.19 A cistern can be filled by one tap in 4 hours and by another in 3 hours. How long will it take to fill it if both taps are opened together ?

Q.20 Pipe A can fill an empty tank in 6 hours and pipe B in 8 hours. if both the pipes are opened and after 2 hours pipe A is closed, how much time B will take to fill the remaining tank ?

Q.21 A cistern can be filled by a tap in 6 hours and emptied by an outlet pipe in 8 hours. How long will it take to fill the cistern if both the tap and the pipe are opened together ?

Q.22 A pipe can fill a cistern in 6 hours. Due to a leak in the bottom it is filled in 7 hours. When the cistern in full, in how much time will it be emptied by the leak ?

Q.23 A tank can be filled by two taps A and B in 12 hours and 16 hours respectively. The full tank can be emptied by a third tap in 8 hours. if all the taps be turned on t the same time, in how much time will the empty tank be filled by completely ?

Percentage

Q.24 If 23% of a is 46, then find a.

Q.25 72% of 25 students are good at Mathematics. How many are not good at it ?

Q.26 If Chameli had Rs 600 left after spending 75% of her money, how much did she have in the beginning ?

Q.27 Malvika gets 98 marks in her exams. This amounts to 56% of the total marks. What are the maximum marks ?

Q.28 A certain company has 80 employees who are engineers. In this company engineers constitute 40% of its work force. how many people are employed in the company ?

Q.29 Kishan spends 30% of his salary on food and donates 3% of his salary in a temple. In a particular month, he spends Rs 231 on these two items. What is his total salary for this month ?

Q.30 A man loses 20% of his money. After spending 25% of the remainder, he has Rs 480.00 left. How much money did he originally have ?

Q.31 An alloy contains 36% zinc, 40% copper and the rest is nicket. Find in grams the quantity of each of the contents in a sample of 1 kg alloy.

Q.32 Rani's weight is 25% that of Meena's and 40% that of Tara's. What percentage of Tara's weight is Meena's weight ?

Q.33 The value of a machine depreciates every year by 10%. What will be its value after 2 years if its present value is Rs 50,000 ?

Q.34 The population of a town increases by 6% every year. If the present population is 15900, find its population a year ago.

Q.35 A number is increased by 10% and then it is decreased by 10%. Find the net increase or decrease percent.

Q.36 Find the percent of pure gold in 22-carat gold, if 24 carat gold is hundred percent pure gold.

Profit & Loss

Q.37 If 60% people in a city line cricket, 30% like football and remaining like other games. What percent like the other games ? If the total number of people is 56 lakhs, find the exact number who like each type of game.

Q.38 A shopkeeper buys a toy for Rs 250 and sells it for Rs 285. Find his gain and gain percent.

Q.39 Rishi bought a wrist watch for Rs 2200 and sold it for Rs 1980. Find has loss and loss percent.

Q.40 If the cost price of 18 mangoes is the same as the selling price of 16 mangoes, find the gain percent.

Q.41 A girl buys lemons at 4 for Rs 3 and sells them at 5 for Rs 4. How much percent loss or gain does she make ?

Q.42 A person sells an article for Rs 550, gaining $\frac{1}{10}$ of its C.P. Find gain percent.

Q.43 200 kg of sugar was purchased at the rate of Rs 15 per kg and sold at a profit of 5%. Compute the profit and the selling price per kg.

Q.44 A man purchases two fans for Rs 2160.By selling one fan at a profit of 15% and the other at a los of 9% he neigher gains nor losses in the whole transaction. Find the cost price of each fan.

Q.45 A man bought TWO T.V. sets for Rs 42500. He sold one at a loss of 10% and other at a profit of 10%. if the selling price of each T.V. set is same, determine the C.P. of each set.

Q.61 I mark up the computers I am selling by 20% and sell them at a discount of 15%. What is my net gain percent ?

Q.62 Articles are marked at a price which gives a profit of 25%. After allowing a certain discount, the profit reduces to $12\frac{1}{2}\%$. Find the discount percent.

Q.63 A cycle merchant allows 25% commission on his advertised price and still makes a profit of 20%. If he gains Rs 60 over the sale of one cycle, find his advertised price.

Q.64 How much percent more than the C.P. should a manufacturer mark his goods so that after allowing a discount of 20% on the marked price, he gains 10% ?

Q.65 A shopkeeper allows a discount of 10% to his customers and still gains 20%. Find the marked price of an article which costs Rs 450 to the shopkeeper.

Q.66 A dealer of scientific instruments allows 20% discount on the marked price of the instruments and still makes a profit of 25%. If his gain over the sale of an instrument is Rs 150, find the marked price of the instrument.

Compound Interest

Q.67 Find the compound interest on Rs 1000 for two years at 4% per annum.

Q.68 Maria invests Rs 93750at 9.6% per annum for 3 years and the interest is compounded annually. Calculate :
(i) The amount standing to her credit at the end of second year.
(ii) The interest for the third year.

Q.69 Find the compound interest on Rs 8000 for $1\frac{1}{2}$ years at 10% per annum, interest being payable half-yearly.

Q.70 Find the compound interest on Rs 10000 for 1 year at 20% per annum compounded quarterly.

Q.71 Find the compound interest on Rs 12000 for 3 years at 10% per annum compounded annually.

Q.72 Abhay lent Rs 8000 to his friend for 3 years at the rate of 5% per annum compound interest. What amount does Abhay get after 3 years ?

Q.73 Vijay obtains a loan of Rs 64000 against his fixed deposits. if the rate of interest be 2.5 paise per rupee per annum, calculate the compound interest payable after 3 years.

Q.74 Simple interest on a sum of money for 3 years at $6\frac{1}{4}\%$ per annum is Rs 2400. What will be the compound interest on that sum at the same rate for the same period ?

Q.75 Compute the compound interest on Rs 12000 for 2 years at 20% per annum when compounded half-yearly.

Q.76 Find the compound interest on Rs 1000 at the rate of 10% per annum for 18 months when interest is compounded half-yearly.

Q.77 Find the compound interest on Rs 320000 for one year at the rate of 20% per annum, if the interest is compounded quarterly.

Q.78 Ramesh deposited Rs 7500 in a bank which pays him 12% interest per annum compounded quarterly. What is the amount which he receives after 9 months ?

Q.79 Ram Singh buys a refrigerator for Rs 4000 on credit. The rate of interest for the first year is 5% and of the second year is 15%. How much will it cost him if he pays the amount after two years ?

Q.80 Find the compound interest on Rs 24000 at 15% per annum for $2\frac{1}{3}$ years.

Q.81 Find the principal, if the compound interest compounded annually at the rate of 10% per annum for three years is Rs 331.

Q.82 The difference between the compound interest and simple interest on a certain sum of money at 10% per annum for 2 years is Rs 500. Find the sum when the interest is compounded annually.

Q.83 In what time will Rs 800 amount to Rs 882 at 5% per annum compounded annually ?

Q.84 At what rate percent per annum, compound interest will Rs 10000 amount to Rs 13310 in three years ?

Q.85 Reena borrowed from kamal certain sum for two years at simple interest. Reena lent this sum to Hamid at the same rate for two years compound interest. At the end of two years she received Rs 110 as compound interest but paid Rs 100 as simple interest. Find the sum and rate of interest.

Q.86 The population of a town is increasing at the rate of 5% per annum. What will be the population of the town onthis basis after two years, if the present population is 16000 ?

Q.87 The population of a village is 20000. If the annual birth rate is 4% and the annual death rate 2%, calculate the population after two years.

Q.88 The population of a town was 160000 three years ago. If it had increased by 3%, 2.5% and 5% in the last three years, find the present population of the town.

Q.89 The present population of a city is 9261000. if it has been increasing at the rate of 5% per annum, find its population 3 years ago.

Q.90 In a factory the production of scooters rose to 48400 from 40000 in 2 years. Find the rate of growth per annum.

Q.91 The bacteria in a culture grows by 10% in the first hour, decreases by 10% in the second hour and again increases by 10% in the third hour. If the original count of the bacteria in a sample is 10000, find the bacterial count at the end of 3 hours.

Q.92 10000 workers were employed to construct a river bridge in four years. At the end of first year, 10% workers were retrenched. At the end of the second year, 5% of the workers at that time were retrenched. However to complete the project in time, the number of workers was increased by 10% at the end of the third year. How many workers were working during the fourth year ?

Q.93 A factory increased its production of three wheelers from 80000 in 1999 to 92610 in 2002. Find the annual rate of growth of production of three wheelers.

Q.94 Given that Carbon – $14(C_{14})$ decays at a constant rate in such a way that it reduces to 50% in 5568 years. Find the age of an old wooden piece in which the carbon is ony 12.5% of the original.

Q.95 The value of a residential flat constructed at a cost of Rs 100000 is depreciating at the rate of 10% pr annum. What will be its value 3 years after construction ?

Q.96 A new car costs Rs 360000. Its price depreciates at the rate of 10% a year during the first two years and at the rate of 20% a year thereafter. What will be the price of the car after 3 years ?

Q.97 The value of a property increases every year at the rate of 5%. If its value at the end of 3 years be Rs 411540, what was its original value at the beginning of these years ?

Q.98 Afridi purchased an old scooter for Rs 160000. If the cost of scooter after 2 years depreciates to Rs 14440, find the rate of depreciation.

ANSWERS

2. 180 **3.** 215 Km. **4.** 108 **7.** 200

8. 260 **9.** 4 **10.** 12/5 days **11.** 15 days

14. 11 days **15.** 225/4 days **16.** Rs. 1680 **17.** 45 days

18. $266\frac{2}{3}$ m. **19.** 12/7 hrs. **20.** 10/3 hrs. **22.** 42 hrs.

23. 48 hrs. **24.** 200 **25.** 18 **26.** 2400

27. 175 **28.** 200 **29.** 700 **30.** Rs. 800

32. 160% **33.** Rs. 40050 **34.** 15000 **35.** 1%

38. Rs. 35 & 14% **39.** Rs. 220 & 10% **40.** 12.5% **41.** $\frac{20}{3}$%

42. 10% **44.** Rs. 1350 **46.** 1200 **47.** 1650

48. 500 **56.** 330 **57.** 200 **58.** 308

59. 500 **60.** 40% **61.** 2% **62.** 10%

63. 480 **64.** 37.5% **65.** 600 **66.** 937.5

67. 81.6 **69.** 1261 **73.** 2155.06 **74.** 2553.13

75. 5569.20 **76.** 157.63 **77.** 68962 **78.** 8195.45

79. 4830 **80.** 9327 **81.** 1000 **82.** 50000

83. 2 years **84.** 10% **85.** 250 & 20% **86.** 17640

87. 20808 **88.** 177366 **89.** 8000000 **90.** 10%

91. 10890 **92.** 9405 **93.** 5% **94.** 16704

96. 233280 **97.** 355503.72 **98.** 5%

EXERCISE - 2

Q.1 The ratio 5 : 4 expressed as a percent equals:
(A) 12.5% (B) 40%
(C) 80% (D) 125%

Q.2 3.5 can expressed in terms of percentage as:
(A) 0.35% (B) 3.5%
(C) 35% (D) 350%

Q.3 Half of 1 percent written as a decimal is :
(A) 0.005 (B) 0.05 (C) 0.02 (D) 0.2

Q.4 What is 15 percent of Rs. 34 ?
(A) Rs. 3.40 (B) Rs. 3.75
(C) Rs. 4.50 (D) Rs. 5.10

Q.5 63% of $3\frac{4}{7}$ is:
(A) 2.25 (B) 2.40
(C) 2.50 (D) 2.75

Q.6 88% of 370 + 24% of 210 – ? = 118
(A) 256 (B) 258 (C) 268 (D) 358

Q.7 860% of 50 + 50% of 860 = ?
(A) 430 (B) 516
(C) 860 (D) 960

Q.8 45% of 750 – 25% of 480 = ?
(A) 216 (B) 217.50
(C) 236.50 (D) 245

Q.9 40% of 1640 + ? = 35% of 980 + 150% of 850
(A) 372 (B) 842
(C) 962 (D) 1052

Q.10 218% of 1674 = ? × 1800
(A) 0.5 (B) 4
(C) 6 (D) None of these

Q.11 60% of 264 is the same as :
(A) 10% of 44 (B) 15% of 1056
(C) 30% of 132 (D) None of these

Q.12 270% candidates appeared for an examination, of which 252 passed. The pass percentage is :

(A) 80% (B) $83\frac{1}{2}\%$

(C) $90\frac{1}{3}\%$ (D) $93\frac{1}{3}\%$

Q.13 5 out of 2250 parts of earth is sulphur. What is the percentage of sulphur in earth?

(A) $\frac{11}{50}$ (B) $\frac{2}{9}$ (C) $\frac{1}{45}$ (D) $\frac{2}{45}$

Q.14 What percent of 7.2 kg is 18 gms ?
(A) .025% (B) .25%
(C) 2.5% (D) 25%

Q.15 0.01 is what percent of 0.1 ?
(A) $\frac{1}{100}$ (B) $\frac{1}{10}$
(C) 10 (D) 100

Q.16 What percent of Rs. 2650 is Rs. 1987.50 ?
(A) 60% (B) 75%
(C) 80% (D) 90%

Q.17 What percent of a day is 3 hours?
(A) $12\frac{1}{10}\%$ (B) $16\frac{2}{3}\%$
(C) $18\frac{2}{3}\%$ (D) $12\frac{1}{2}\%$

Q.18 It costs Rs. 1 to photocopy a sheet of paper. However, 2% discount is allowed on all photocopies done after first 1000 sheets. How much will it cost to copy 5000 sheets of paper?
(A) Rs. 3920 (B) Rs. 3980
(C) Rs. 4900 (D) Rs. 4920

Q.19 A housewife saved Rs. 2.50 in buying an item on sale. If she spent Rs. 25 for the item, approximately how much percent she saved in the transaction ?
(A) 8% (B) 9% (C) 10% (D) 11%

Q.20 How many litres of pure acid are there in 8 litres of a 20% solution ?
(A) 1.4 (B) 1.5 (C) 1.6 (D) 2.4

Q.21 Rajeev buys goods worth Rs. 6650. He gets a rebate of 6% on it. After getting the rebate, he pays sales tax @ 10%. Find the amount he will have to pay for the goods.
(A) Rs. 6876.10 (B) Rs. 6999.20
(C) Rs. 6654 (D) Rs.7000

Q.22 Which one of the following shows the best percentage ?
(A) $\frac{384}{540}$ (B) $\frac{425}{500}$
(C) $\frac{570}{700}$ (D) $\frac{480}{660}$

Q.23 5% of (25% of Rs. 1600) is -
(A) Rs. 5 (B) Rs. 17.50
(C) Rs. 20 (D) Rs. 25

Q.24 0.15% of $33\frac{1}{3}\%$ of Rs. 10,000 is -
(A) Rs. 0.05 (B) Rs. 5
(C) Rs. 105 (D) Rs. 150

Q.25 30% of 28% of 480 is the same as -
(A) 15% of 56% of 240
(B) 60% of 28% of 240
(C) 60% of 56% of 240
(D) None of these

Q.26 What is 25% of 25% equal to ?
(A) 0.00625 (B) 0.0625
(C) 0.625 (D) 6.25

Q.27 What percent is 3% of 5% ?
(A) 15% (B) 30%
(C) 50% (D) 60%

Q.28 4598 is 95% of ?
(A) 4800 (B) 4840
(C) 4850 (D) 4880

Q.29 ?% of 360 = 129.6
(A) 36 (B) 64 (C) 72 (D) 77

Q.30 ?% of 932 + 30 = 309.6
(A) 25 (B) 30 (C) 35 (D) 40

Q.31 45% of 1500 + 35% of 1700 = ?% of 3175
(A) 30 (B) 35
(C) 45 (D) None of these

Q.32 65% of ? = 20 % of 422.50
(A) 84.5 (B) 130
(C) 139.425 (D) 200

Q.33 An agent gets a commission of 2.5% on the sale of cloth. If on a certain day, he gets Rs. 12.50 as commission, the cloth sold through him on that day is worth
(A) Rs. 250 (B) Rs. 500
(C) Rs. 750 (D) Rs. 1250

Q.34 If Rs. 2800 is $\frac{2}{7}$ percent of the value of a house, the worth of the house (in Rs.) is :
(A) 8,00,000 (B) 9,80,000
(C) 10,00,000 (D) 12,00,000

Q.35 15% of (?)% of 582 = 17.46
(A) 2 (B) 10
(C) 20 (D) None of these

Q.36 $\sqrt{784}$ +? = 78% of 500 :
(A) 342 (B) 352 (C) 362 (D) 372

Q.37 If 120 is 20% of a number, then 120% of that number will be:
(A) 20 (B) 120 (C) 360 (D) 720

Q.38 If 35% of a number is 175, then what percent of 175 is that number ?
(A) 35% (B) 65%
(C) 280% (D) None of these

Q.39 Two-fifth of one-third of three-seventh of a number is 15. What is 40 percent of that number?
(A) 72 (B) 84
(C) 136 (D) None of these

Q.40 The difference between a number and its two-fifth is 510. What is 10% of that number ?
(A) 12.75 (B) 85
(C) 204 (D) None of these

Q.41 If 15% of 40 is greater than 25% of a number by 2, then the number is :
(A) 12 (B) 16 (C) 24 (D) 32

Q.42 Subtracting 40% of a number from the number, we get the result as 30. The number is :
(A) 28 (B) 50 (C) 52 (D) 70

Q.43 If 35% of a number is 12 less than 50% of that number, then the number is :
(A) 40 (B) 50 (C) 60 (D) 80

Q.44 The number which exceeds 16% of it by 42 is :
(A) 50 (B) 52 (C) 58 (D) 60

Q.45 What percentage of numbers from 1 to 70 have squares that end in the digit 1 ?
(A) 1 (B) 14 (C) 20 (D) 21

Q.46 By how much percent is four-fith of 70 lesser than five-seventh of 112 ?
(A) 24% (B) 30% (C) 36% (D) 42%

Q.47 If a number x is 10% less than another number y and y is 10% more than 125, then x is equal to:
(A) 123.75 (B) 140.55
(C) 143 (D) 150

Q.48 If 75% of a number is added to 75, then the result is the number itself. The number is :
(A) 50 (B) 60 (C) 300 (D) 400

Q.49 A number, when 35 is subtracted from it, reduces to its 80 percent. What is four-fifth of that number ?
(A) 70 (B) 90 (C) 120 (D) 140

Q.50 Which of the following multipliers will cause a number to be increased by 29.7% ?
(A) 1.297 (B) 12.97
(C) 129.7 (D) 1297

Q.51 I gain 70 paise on Rs. 70. My gain percent is :
(A) 0.1% (B) 1%
(C) 7% (D) 10%

Q.52 In terms of percentage profit, which is the best transaction ?

	C.P. (in Rs.)	**Profit (in Rs.)**
(A)	36	17
(B)	50	24
(C)	40	19
(D)	60	29

Q.53 If books bought at prices ranging from Rs.200 to Rs. 350 are sold at prices ranging from Rs.300 to Rs. 425, what is the greatest possible profit that might be made in selling eight books ?
(A) Rs. 400
(B) Rs. 600
(C) Cannot be determined
(D) None of these

Q.54 A shopkeeper sold an article for Rs. 2090.42. Approximately, what will be the percentage profit if the sold that article for Rs. 2602.58 ?
(A) 15% (B) 20%
(C) 25% (D) 30%

Q.55 Alfred buys an old scooter for Rs. 4700 and spends Rs. 800 on its repairs. If he sells the scooter for Rs. 5800, his gain percent is :
(A) $4\frac{4}{7}\%$ (B) $5\frac{5}{11}\%$
(C) 10% (D) 12%

Q.56 A shopkeeper purchased 70 kg of potatoes for Rs. 420 and sold the whole lot at the rate of Rs. 6.50 per kg. What will be his gain percent ?
(A) $4\frac{1}{6}\%$ (B) $6\frac{1}{4}\%$
(C) $8\frac{1}{3}\%$ (D) 20%

Q.57 Sam purchased 20 dozens of toys at the rate of Rs. 375 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit ?
(A) 3.5 (B) 4.5
(C) 6.5 (D) None of these

Q.58 100 oranges are bought at the rate of Rs. 350 and sold at the rate of Rs. 48 per dozen. The percentage of profit or loss is :
(A) $14\frac{2}{7}\%$ gain (B) 15% gain
(C) $14\frac{2}{7}\%$ loss (D) 15% loss

Q.59 A man buys a cycle for Rs. 1400 and sells it at a loss of 15%. What is the selling price of the cycle ?
(A) Rs. 1090 (B) Rs. 1160
(C) Rs. 1190 (D) Rs. 1202

Q.60 A sells an article which costs him Rs. 400 to B at a profit of 20%. B then sells it to C, making a profit of 10% on the price he paid to A. How much does C pay B ?
(A) Rs. 472 (B) Rs. 476
(C) Rs. 528 (D) Rs. 532

Q.61 Peter purchased a machine for Rs. 80,000 and spent Rs. 5000 on repair and Rs. 1000 on transport and sold it with 25% profit. At what price did he sell the machine ?
(A) Rs. 1,05,100
(B) Rs. 1,06,250
(C) Rs. 1,07,500
(D) Rs. 1,17, 500

Q.62 By selling an article for Rs. 100, a man gains Rs. 15. Then, his gain% is:

(A) 15% (B) $12\frac{2}{3}\%$

(C) $17\frac{11}{17}\%$ (D) $17\frac{1}{4}\%$

Q.63 When a commodity is sold for Rs. 34.80, there is a loss of 2%. What is the cost price of the commodity ?

(A) Rs. 26.10 (B) Rs. 43

(C) Rs. 43.20 (D) Rs. 46.40

Q.64 A shopkeeper expects a gain of $22\frac{1}{2}\%$ on his cost price. If in a week, his sale was of Rs. 392, what was his profit ?

(A) Rs. 18.20 (B) Rs. 70

(C) Rs. 72 (D) Rs. 88.25

Q.65 The sale price of an article including the sales tax is Rs. 616. The rate of sales tax is 10%. If the shopkeeper has made a profit of 12%, then the cost price of the article is :

(A) Rs. 500 (B) Rs. 515

(C) Rs 550 (D) Rs. 600

Q.66 Saransh purchased 120 reams of paper at Rs. 80 per ream. He spent Rs. 280 on transportion, paid octroi at rate of 40 paise per ream and paid Rs. 72 to the coolie. If he wants to have a gain of 8%, what must be the selling price per ream ?

(A) Rs. 86 (B) Rs. 87.48

(C) Rs. 89 (D) Rs. 90

Q.67 A person bought 20 litres of milk at the rate of Rs. 8 per litre. He got it churned after spending Rs. 10 and 5 kg of cream and 20 litres of toned milk were obtained. If he sold the cream at Rs. 30 per kg and toned milk at Rs. 4 per litre, his profit in the transation is:

(A) 25% (B) 35.3%

(C) 37.5% (D) 42.5%

Q.68 Jacob bought a scooter for a certain sum of money. He spent 10% of the cost on repairs and sold the scooter for a profit of Rs. 1100. How much did he spend on repairs if the made a profit of 20% ?

(A) Rs. 400 (B) Rs. 440

(C) Rs. 500 (D) Rs. 550

Q.69 A manufacturer undertakes to supply 2000 pieces of a particular component at Rs. 25 per piece. According to his estimates, even if 5% fail to pass the quality tests, then he will make a profit of 25%. However, as it turned out. 50% of the components were rejected. What is the loss to the manufacture ?

(A) Rs. 12,000 (B) Rs. 13,000

(C) Rs. 14,000 (D) Rs. 15,000

Q.70 A trader buys a chair for Rs. 600 and sells it for Rs. 765 at a cerdit of 4 months. Reckoning money worth 6% p.a., his gain percent is :

(A) 20% (B) $22\frac{1}{2}\%$

(C) 25% (D) $27\frac{1}{2}\%$

Q.71 When a plot is sold for Rs. 18,700, the owner loses 5%. At what price per kg, he should have sold them to make a profit of 5% ?
(A) Rs. 21,000 (B) Rs. 22,500
(C) Rs. 25,300 (D) Rs. 25,800

Q.72 A fruitseller sells mangoes at the rate of Rs. 9 per kg and thereby loses 20%. At what price per kg, he should have sold them to make a profit of 5% ?
(A) Rs. 11.81 (B) Rs. 12
(C) Rs. 12.25 (D) Rs. 12.31

Q.73 A property dealer sells a house for Rs. 6,30,000 and in the bargain makes a profit of 5%. Had he sold it for Rs. 5,00,000, then what percentage of loss or gain he would have made ?
(A) $2\frac{1}{4}\%$ gain (B) 10% loss
(C) $12\frac{1}{2}\%$ loss (D) $16\frac{2}{3}\%$ loss

Q.74 A shopkeeper sells one transistor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. His total gain or loss percent is :
(A) $5\frac{15}{17}\%$ loss
(B) $5\frac{15}{17}\%$ gain
(C) $6\frac{2}{3}\%$ gain
(D) None of these

Q.75 If selling price of an article is $\frac{4}{3}$ of its costs price, the profit in the transaction is :
(A) $16\frac{2}{3}\%$ (B) $20\frac{1}{2}\%$
(C) $25\frac{1}{2}\%$ (D) $33\frac{1}{3}\%$

Q.76 The ratio of the cost price and the selling price is 4 : 5. The profit percent is :
(A) 10% (B) 20%
(C) 25% (D) 30%

Q.77 The ratio between the sale price and the cost price of an article is 7 : 5. What is the ratio between the profit and the cost price of that article ?
(A) 2 : 7 (B) 5 : 2
(C) 7 : 2 (D) None of these

Q.78 A man gains 20% by selling an article for a certain price. If he sells it at double the price, the percentage of profit will be :
(A) 40 (B) 100
(C) 120 (D) 140

Q.79 If selling price is doubled, the profit triples. Find the profit percent :
(A) $66\frac{2}{3}$ (B) 100
(C) $105\frac{1}{3}$ (D) 120

Q.80 At what profit percent must an article be sold so that by selling at half that price, there may be a loss of 30% ?
(A) 25% (B) 36%
(C) 40% (D) 42%

Q.81 The C.P. of an article is 40% of the S.P. The percent that the S.P. is of C.P. is :
(A) 250 (B) 240
(C) 60 (D) 40

Q.82 By selling a pen for Rs. 15, a man loses one-sixteenth of what it costs him. The cost price of the pen is :
(A) Rs. 16 (B) Rs. 18
(C) Rs. 20 (D) Rs. 21

Q.83 By selling an article, Michael earned a profit equal to one-fouth of the price he bought it. If he sold it for Rs. 375, what was the cost price ?
(A) Rs. 281.75 (B) Rs. 300
(C) Rs. 312.50 (D) Rs. 350

Q.84 10% loss on selling price is what percent loss on the cost price ?
(A) $9\frac{1}{11}\%$ (B) $9\frac{2}{11}\%$
(C) 10% (D) 11%

Q.85 If loss is $\frac{1}{3}$ of S.P., the loss percentage is :
(A) $16\frac{2}{3}\%$ (B) 20%
(C) 25% (D) $33\frac{1}{3}\%$

Q.86 If A : B = 5 : 7 and B : C = 6 : 11, then A : B : C is :
(A) 55 : 77 : 66 (B) 30 : 42 : 77
(C) 35 : 49 : 42 (D) None of these

Q.87 If A : B = 3 : 4 and B : C = 8 : 9, then A : C is:
(A) 1 : 3 (B) 3 : 2
(C) 2 : 3 (D) 1 : 2

Q.88 If A : B = 8 : 15, B : C = 5 : 8 and C : D = 4 : 5, then A : D is equal to :
(A) 2 : 7 (B) 4 : 15
(C) 8 : 15 (D) 15 : 4

Q.89 If A : B : C = 2 : 3 : 4, then $\frac{A}{B} : \frac{B}{C} : \frac{C}{A}$ is equal to :
(A) 4 : 9 : 16 (B) 8 : 9 : 12
(C) 8 : 9 : 16 (D) 8 : 9 : 24

Q.90 If A : B = $\frac{1}{2} : \frac{3}{8}$, B : C = $\frac{1}{3} : \frac{5}{9}$ and C : D = $\frac{5}{6} : \frac{3}{4}$, then the ratio A : B : C : D is:
(A) 4 : 6 : 8 : 10 (B) 6 : 4 : 8 : 10
(C) 6 : 8 : 9 : 10 (D) 8 : 6 : 10 : 9

Q.91 If A : B = 2 : 3, B : C = 4 : 5 and C : D = 6 : 7, then A : B : C : D is :
(A) 16 : 22 : 30 : 35 (B) 16 : 24 : 15 : 35
(C) 16 : 24 : 30 : 35 (D) 18 : 24 : 30 : 35

Q.92 If 2A = 3B = 4C , then A : B : C is :
(A) 2 : 3 : 4 (B) 4 : 3 : 2
(C) 6 : 4 : 3 (D) 20 : 15 : 2

Q.93 If $\frac{A}{3} = \frac{B}{4} = \frac{C}{5}$, then A : B : C is :
(A) 4 : 3 : 5 (B) 5 : 4 : 3
(C) 3 : 4 : 5 (D) 20 : 15 : 2

Q.94 If 2A = 3B and 4B = 5C, then A : C is :
(A) 4 : 3 (B) 8 : 15
(C) 15 : 8 (D) 3 : 4

Q.95 The ratio of $4^{3.5} : 2^5$ is same as :
(A) 2 : 1 (B) 4 : 1
(C) 7 : 5 (D) 7 : 10

Q.96 If $\frac{1}{5} : \frac{1}{x} = \frac{1}{x} : \frac{1}{1.25}$, then the value of x is :
(A) 1.5 (B) 2
(C) 2.5 (D) 3.5

Q.97 If 0.75 : x : : 5 : 8, then x is equal to :
(A) 1.12 (B) 1.20
(C) 1.25 (D) 1.30

Q.98 If x : y = 5 : 2, then (8x + 9y) : (8x + 2y) is :
(A) 22 : 29 (B) 26 : 61
(C) 29 : 22 (D) 61 : 26

Q.99 If 15% of x = 20% of y, then x : y is :
(A) 3 : 4 (B) 4 : 3
(C) 17 : 16 (D) 16 : 17

Q.100 If (x : y) =2 : 1, then $(x^2 - y^2) : (x^2 + y^2)$ is :
(A) 3 : 5 (B) 5 : 3
(C) 1 : 3 (D) 3 : 1

Q.101 If $(4x^2 - 3y^2) : (2x^2 + 5y^2) = 12 : 19$, then (x : y) is :
(A) 2 : 3 (B) 1 : 2
(C) 3 : 2 (D) 2 : 1

Q.102 If $x^2 + 4y^2 = 4xy$, then x : y is :
(A) 2 : 1 (B) 1 : 2
(C) 1 : 1 (D) 1 : 4

Q.103 If $5x^2 - 13xy + 6y^2 = 0$, then x : y is :
(A) (2 : 1) only (B) (3 : 5) only
(C) (5 : 3) or (1 : 2) (D) (3 : 5) or (2 : 1)

Q.104 If $\frac{x}{5} = \frac{y}{8}$, then $(x + 5) : (y + 8)$ is equal to :
(A) 3 : 5 (B) 13 : 8
(C) 8 : 5 (D) 5 : 8

Q.105 If $\frac{a}{3} = \frac{b}{4} = \frac{c}{7}$, then $\frac{a+b+c}{c}$ is equal to :
(A) 7 (B) 2 (C) $\frac{1}{2}$ (D) $\frac{1}{7}$

Q.106 If $(a + b) : (b + c) : (c + a) = 6 : 7 : 8$ and $(a + b + c) = 14$, then the value of c is :
(A) 6 (B) 7 (C) 8 (D) 14

Q.107 The salaries of A, B and C are in the ratio 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be the new ratio of their salaries ?
(A) 3 : 3 : 10 (B) 10 : 11 : 20
(C) 23 : 33 : 60 (D) Cannot be determined

Q.108 If Rs. 782 be divided into three parts, proportional to $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$, then the first point is :
(A) Rs. 182 (B) Rs. 190
(C) Rs. 196 (D) Rs. 204

Q.109 If 76 is divided into four parts proportional to 7, 5, 3, 4, then the first part is :
(A) 12 (B) 15 (C) 16 (D) 19

Q.110 Two numbers are in the ratio 3 : 5. If 9 is subtracted from each, the new numbers are in the ratio 12 : 23. The smaller numbr is :
(A) 27 (B) 33 (C) 49 (D) 55

Q.111 Two numbers are in the ratio 1 : 2. If 7 is added to both, their ratio changes to 3 : 5. The greatest number is :
(A) 24 (B) 26 (C) 28 (D) 32

Q.112 Rs. 1210 were divided among, A , B, C so that A : B = 5 : 4 and B : C = 9 : 10. Then, C gets :
(A) Rs. 340 (B) Rs. 400
(C) Rs. 450 (D) Rs. 475

Q.113 In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 1 : 2 : 3. If there are Rs. 30 in all, how many 5 p coins are there ?
(A) 50 (B) 100 (C) 150 (D) 200

Q.114 The ratio of three numbers is 3 : 4 : 5 and the sum of their squares is 1250. The sum of the numbers is :
(A) 30 (B) 50 (C) 60 (D) 90

Q.115 The ratio of three numbers is 3 : 4 : 7 and their product is 18144. The numbers are :
(A) 9, 12, 21 (B) 15, 20, 25
(C) 18 , 24, 42 (D) None of these

Q.116 Salaries of Ravi and Sumit are in the ratio 2 : 3. If the salary of each is increased by Rs. 4000, the new ratio becomes 40 : 57. What is Sumit's present salary ?
(A) Rs. 17,000 (B) Rs. 20,000
(C) Rs. 25, 500 (D) None of these

Q.117 If Rs. 510 be divided among A, B, C in such a way that A gets $\frac{2}{3}$ of what B gets and B gets $\frac{1}{4}$ of what C gets, then their shares are respectively :
(A) Rs. 120, Rs. 240, Rs. 150
(B) Rs. 60, Rs. 90, Rs. 360
(C) Rs. 150, Rs. 300, Rs. 60
(D) None of these

Q.118 The sum of three numbers is 98. If the ratio of the first to the second is 2 : 3 and that of the second to the third is 5 : 8, then the second number is :
(A) 20 (B) 30 (C) 48 (D) 58

Q.119 A fraction which bears the same ratio to $\frac{1}{27}$ that $\frac{3}{11}$ does to $\frac{5}{9}$, is equal to :
(A) $\frac{1}{55}$ (B) $\frac{1}{11}$
(C) $\frac{3}{11}$ (D) 55

Q.120 Rs. 366 are divided amongst A, B and C so that A may get $\frac{1}{2}$ as much as B and C together, B may get $\frac{2}{3}$ as much as A and C together, then the share of A is :
(A) Rs. 122 (B) Rs. 129. 60
(C) Rs. 146.60 (D) Rs. 183

Q.121 A sum of Rs. 1300 is divided amongst P, Q, R and S such that $\frac{\text{P's share}}{\text{Q's share}} = \frac{\text{Q's share}}{\text{R's share}} = \frac{\text{R's share}}{\text{S's share}} = \frac{2}{3}$. Then, P's share is :
(A) Rs. 140 (B) Rs. 160
(C) Rs. 240 (D) Rs. 320

Q.122 A and B together have Rs. 1210. If $\frac{4}{15}$ of A's amount is equal to $\frac{2}{5}$ of B's amount, how much amount does B have ?
(A) Rs. 460 (B) Rs. 484
(C) Rs. 550 (D) Rs. 664

Q.123 Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is :
(A) 2 : 5 (B) 3 : 5
(C) 4 : 5 (D) 6 : 7

Q.124 Two whole numbers whose sum is 72 cannot be in the ratio :
(A) 5 : 7 (B) 3 : 5
(C) 3 : 4 (D) 4 : 5

Q.125 If a carton containing a dozen mirrors is dropped, which of the following cannot be the ratio of broken mirrors to unbroken mirrors ?
(A) 2 : 1 (B) 3 : 1
(C) 3 : 2 (D) 7 : 5

Q.126 Seats for Mathematics, Physics and Biology in a school are in the ratio 5 : 7 : 8. There is a proposal to increase these seats by 40%, 50% and 75% respectively. What will be the ratio of increased seats ?
(A) 2 : 3 : 4 (B) 6 : 7 : 8
(C) 6 : 8 : 9 (D) None of these

Q.127 The ratio of the number of boys and girls in a college is 7 : 8. If the percentage increase in the number of boys and girls be 20% and 10% respectively, what will be the new ratio ?
(A) 8 : 9 (B) 17 : 18
(C) 21 : 22 (D) Cannot be determined

Q.128 A sum of money is to be distributed among, A,B,C,D in the proportion of 5 : 2 : 4 ; 3. If C gets Rs. 1000 more than D, what is B's share ?
(A) Rs. 500 (B) Rs. 1500
(C) Rs. 2000 (D) None of these

Q.129 If 40% of a number is equal to two-third of another number, what is the ratio of first number to the second number ?
(A) 2 : 5(B) 3 : 7(C) 5 : 3 (D) 7 : 3

Q.130 Ratio of the earnings of A and B is 4 : 7. If the earnings of A increase by 50% and those of B decrease by 25%, the new ratio of their earnings becomes 8 : 7. What are A's earnings ?
(A) Rs. 21,000 (B) Rs. 26,000
(C) Rs. 28,000 (D) Data inadequate

Q.131 What least number must be subtracted from each of the numbers 14, 17, 34 and 42 so that the remainders may be proportional ?
(A) 0 (B) 1 (C) 2 (D) 7

Q.132 In a mixture of 60 litres, the ratio of milk and water is 2 : 1. If this ratio is to be 1 : 2, then the quantity of water to be further added is :
(A) 20 litres (B) 30 litres
(C) 40 litres (D) 60 litres

Q.133 The fourth proportional to 5, 8, 15 is :
(A) 18 (B) 24 (C) 19 (D) 20

Q.134 The mean proportional between 234 and 104 is :
(A) 12 (B) 39
(C) 54 (D) None of these

Q.135 The third proportional to 0.36 and 0.48 is:
(A) 0.64 (B) 0.1728
(C) 0.42 (D) 0.94

Q.136 A does a work in 10 days and B does the same work in 15 days. In how many days they together will do the same work ?
(A) 5 days (B) 6 days
(C) 8 days (D) 9 days

Q.137 A can finish a work in 18 days and B can do the same work in half the time taken by A. Then, working together, what part of the same work they can finish in a day ?

(A) $\frac{1}{6}$ (B) $\frac{1}{9}$

(C) $\frac{1}{9}$ (D) $\frac{2}{7}$

Q.138 A tyre has two punctures. The first puncture alone would have made the tyre flat in 9 minutes and the second alone would have done it in 6 minutes. If air leaks out at a constant rate, how long does it take both the punctures together to make if flat ?

(A) $1\frac{1}{2}$ minutes (B) $3\frac{1}{2}$ minutes

(C) $3\frac{3}{5}$ minutes (D) $4\frac{1}{4}$ minutes

Q.139 A, B and C can complete a piece of work in 24, 6 and 12 day respectively. Working together, they will complete the same work in :

(A) $\frac{1}{24}$ days (B) $\frac{7}{24}$ day

(C) $3\frac{3}{7}$ days (D) 4 days

Q.140 A man can do a job in 15 days. His father takes 20 days and his son finishes it in 25 days. How long will they to complete the job if they all work together ?

(A) Less than 6 days
(B) Exactly 6 days
(C) Approximately 6.4 days
(D) More than 10 days

Q.141 A man can do a piece of work in 5 days, but with the help of his son, he can do it in 3 days. In what time can the son do it alone ?

(A) $6\frac{1}{2}$ days (B) 7 days

(C) $7\frac{1}{2}$ days (D) 8 days

Q.142 A can lay railway track between two given stations in 16 days and B can do the same job in 12 days. With the help of C, they did the job in 4 days only. Then, C alone can do the job in:

(A) $9\frac{1}{5}$ days (B) $9\frac{2}{5}$ days

(C) $9\frac{3}{5}$ (D) 10 days

Q.143 A takes twice as much time as B or thrice as much time to finish a piece of work. Working together, they can finish the work in 2 days. B can do the work alone in :

(A) 4 days (B) 6 days
(C) 8 days (D) 12 days

Q.144 X can do $\frac{1}{4}$ of a work in 10 days, Y can do 40% of the work in 40 days and Z can do $\frac{1}{3}$ of the work in 13 days. Who will complete the work first ?

(A) X (B) Y
(C) Z (D) X and Z both

Q.145 P, Q and R are three typists who working simultaneously can type 216 pages in 4 hours. In one hours, R can type as many pages more than Q as Q can type more than P. During a period of five hours, R can type as many pages as P can during seven hours. How many pages does each of them type per hours ?
(A) 14, 17, 20 (B) 15, 17, 22
(C) 15, 18, 21 (D) 16, 18, 22

Q.146 Ronald and Elan are working on an assignment. Ronald takes 6 hours to type 32 pages on a computer, while Elan takes 5 hours to type 40 pages. How much time will they take, working together on two different computers to type an assignment of 110 pages ?
(A) 7 hours 30 minutes
(B) 8 hours
(C) 8 hours 15 minutes
(D) 8 hours 25 minutes

Q.147 Two workers A and B are engaged to do a work. A working alone takes 8 hours more to complete the job than if both woked together. If B worked alone, he would need $4\frac{1}{2}$ hours more to complete the job than they both working together. What time would they take to do the work together ?
(A) 4 hours (B) 5 hours
(C) 6 hours (D) 7 hours

Q.148 P can complete a work in 12 days working 8 hours a day. Q can complete the same work in 8 days working 10 hours a day. If both P and Q work together, working 8 hours a day, in how many days can they complete the work ?
(A) $5\frac{5}{11}$ (B) $5\frac{6}{11}$
(C) $6\frac{5}{11}$ (D) $6\frac{6}{11}$

Q.149 A and B can do a work in 12 days, B and C in 15 days, C and A in 20 days. If A, B and C work together, they will complete the work in :
(A) 5 days (B) $7\frac{5}{6}$ days
(C) 10 days (D) $15\frac{2}{3}$ days

Q.150 A and B can do work in 8 dyas, B and C can do the same work in 12 days. A, B and C together can finish it in 6 days. A and C together will do it in :
(A) 4 days (B) 6 days
(C) 8 days (D) 12 days

Q.151 A and B can do a piece of work in 72 days; B and C can do it in 120 days; A and C can do it in 90 days. In what time can A alone do it ?
(A) 80 days (B) 100 days
(C) 120 days (D) 150 days

Q.152 A and B can do a piece of work in 5 days; B and C can do it in 7 days; A and C can do it in 4 days. Who among these will take the least time if put to do it alone ?
(A) A (B) B
(C) C (D) Data inadequate

Q.153 A can do a piece of work in 4 hours; B and C together can do it in 3 hours, while A and C together can do it in 2 hours. How long will B alone take to do it ?
(A) 8 hours (B) 10 hours
(C) 12 hours (D) 24 hours

Q.154 A can do a certain work in the same time in which B and C together can do it. If A and B together could do it in 10 days and C alone in 50 days, then B alone could do it in:
(A) 15 days (B) 20 days
(C) 25 days (D) 30 days

Q.155 A works twice as fast as B. If B can complete a work in 12 days independently, the number of days in which A and B can together finish the work is :
(A) 4 days (B) 6 days
(C) 8 days (D) 18 days

Q.156 A is twice as good a workman as B and together they finish a piece of work in 14 days. The number of days taken by A alone to finish the work is :
(A) 11 (B) 21 (C) 28 (D) 42

Q.157 A is thrice as good a workman as B and therefore is able to finish a job in 60 days less than B. Working together, they can do it in :
(A) 20 days (B) $22\frac{1}{2}$ days
(C) 25 days (D) 30 days

Q.158 A and B can do a job together in 7 days. A is $1\frac{3}{4}$ times as effiecient as B. The same job can be done by A alone in :
(A) $9\frac{1}{3}$ days (B) 11 days
(C) $12\frac{1}{4}$ days (D) $16\frac{1}{3}$ days

Q.159 Sakshi can do a piece of work in 20 days. Tanya is 25% more efficient than Sakshi. The number of days taken by Tanya to do the same piece of work is :
(A) 15 (B) 16 (C) 18 (D) 25

Q.160 A is 30% more efficient than B. How much time will they, working together, take to complete a job which A alone could have done in 23 days?
(A) 11 days (B) 13 days
(C) $20\frac{3}{17}$ days (D) None of these

Q.161 P and Q started a business investing Rs. 85,000 and Rs. 15,000 respectively. In what ratio the profit earned after 2 years be divided between P and Q respectively ?
(A) 3 : 4 (B) 3 : 5
(C) 15 : 23 (D) None of these

Q.162 Anand and Deepak started a business investing Rs. 22,500 and s. 35,000 respectively. Out of a total profit of Rs. 13,800, Deepak's share is :
(A) Rs. 5400 (B) Rs. 7200
(C) Rs. 8400 (D) Rs. 9600

Q.163 A, B, C enter into a partnership investing Rs. 35,000, Rs. 45,000 and Rs. 55,000 respectively. The respective shares of A, B, C in an annual profit of Rs. 40,500 are :
(A) Rs. 10,500, Rs. 13,500, Rs. 16,500
(B) Rs. 11,500, Rs. 13,000, Rs. 16,000
(C) Rs. 11,000, Rs. 14,000, Rs. 15,500
(D) Rs. 11,500, Rs. 12,500, Rs. 16,500

Q.164 Reena and Shaloo are partners in a business. Reena invests Rs. 35,000 for 8 months and Shaloo invests Rs 42,000 for 10 months. Out of a profit of Rs. 31,570, Reena's share is :
(A) Rs. 9471 (B) Rs. 12,628
(C) Rs. 18,040 (D) Rs. 18,942

Q.165 Kamal started a business investing Rs. 9000. After five months, Sameer joined with a capital of Rs. 8000. If at the end of the year, they earn a profit of Rs. 6970, then what will be the share of Sameer in the profit ?
(A) Rs. 1883.78 (B) Rs. 2380
(C) Rs. 3690 (D) Rs. 3864

Q.166 Simarn started a software business by investing Rs. 50,000. After six months, Nanda joined her with a capital of Rs. 80,000. After 3 years, they earned a profit of Rs. 24,500. What was Simran's share in the profit ?
(A) Rs. 9423
(B) Rs. 10, 250
(C) Rs. 12,500
(D) None of these

Q.167 A and B started a business in partnership investing Rs. 20,000 and Rs. 15,000 respectively. After six months, C joined them with Rs. 20,000. What will be B's share in the total profit of Rs.25,000 earned at the end of 2 years from the starting of the business ?
(A) Rs. 7500 (B) Rs. 9000
(C) Rs. 9500 (D) Rs. 10,000

Q.168 Aman started a business investing Rs. 70,000. Rakhi joined him after six months with an amount of Rs. 1,05,000 and Sagar joined them with Rs. 1.4 lakhs after another six months. The amount of profit earned should be distributed in what ratio among Aman, Rakhi and Sagar respectively, 3 years after Aman started the business ?
(A) 7 : 6 : 10
(B) 12 : 15 : 16
(C) 42 : 45 : 56
(D) None of these

Q.169 Arun, Kamal and Vinay invested Rs. 8000, Rs. 4000 and Rs. 8000 respectively in a business. Arun left after six months. If after eight months, there was a gain of Rs. 4005, then what will be the share of Kamal ?
(A) Rs. 890 (B) Rs. 1335
(C) Rs. 1602 (D) Rs. 1780

Q.170 A, B and C enter into a parternship. They invest Rs. 40,000 Rs. 80,000 and Rs. 1,20,000 respectively. At the end of the first year, B withdraws Rs. 40,000, while at the end of the second year, C withdraws Rs. 80,000. In what ratio will the profit be shared at the end of 3 years ?
(A) 2 : 3 : 5
(B) 3 : 4 : 7
(C) 4 : 5 : 9
(D) None of these

Q.171 A, B and C enter into a partnership. A initially invests Rs. 25 lakhs and adds another Rs.10 lakhs after 2 years and C invests Rs. 30 lakhs. In what ratio should the profits be divided at the end of 3 years ?
(A) 10 : 10 : 9
(B) 20 : 20 : 19
(C) 20 : 19 : 18
(D) None of these

Q.172 Shekhar started a business investing Rs. 25,000 in 1999. In 2000, he invested an additional amount of Rs. 10,000 and Rajeev joined him with an amount of Rs. 35,000. In 2001, Shekhar invested another additional amount of Rs. 10,000 and Jatin joined them with an amount of Rs. 35,000. What will be Rajeev's share in the profit of Rs. 1,50,000 earned at the end of 3 years from the start of the business in 1999 ?
(A) Rs. 45,000 (B) Rs. 50,000
(C) Rs. 70,000 (D) Rs. 75,000

Q.173 A and B entered into a partnership investing Rs. 16,000 and Rs. 12,000 respectivly. After 3 months, A withdrew Rs. 5000 while B invested Rs. 5000 more. After 3 more months, C joins the business with a capital of Rs. 21,000. The share of B exceeds that of C, out of a total profit of Rs. 26,400 after one year by :
(A) Rs. 2400 (B) Rs. 3000
(C) Rs. 3600 (D) Rs. 4800

Q.174 A and B start a business with investments of Rs. 5000 and Rs. 4500 respectively. After 4 months, A takes out half of his capital. After two more months, B takes out one-third of his capital while C joins them with a capital of Rs. 7000. At the end of a year, they earn a profit of Rs. 5080. Find the share of each member in the profit.
(A) A – Rs. 1400, B – Rs. 1900, C – Rs. 1780
(B) A – Rs. 1600, B – Rs. 1800, C – Rs. 1680
(C) A – Rs. 1800, B – Rs. 1500, C – Rs. 1780
(D) A – Rs. 1680, B – Rs. 1600, C – Rs. 1800

Q.175 A, B , C subscribe Rs. 50,000 for a business. A subscribes Rs. 4000 more than B and B Rs. 5000 more than C. Out of a total profit of Rs.35,000, A receives :
(A) Rs. 8400 (B) Rs. 11,900
(C) Rs. 13,600 (D) Rs. 14,700

ANSWER KEY

Q.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	D	D	A	D	A	B	C	B	C	D	B	D	B	A	C	B	D	D	B	C
Q.No	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	A	B	C	B	B	B	D	B	A	B	D	B	B	B	C	C	D	D	D	B
Q.No	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	B	B	D	A	C	B	C	C	D	A	B	D	D	C	B	C	D	A	C	C
Q.No	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	C	C	D	C	A	D	B	C	B	C	C	A	D	B	D	C	D	D	B	C
Q.No	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans.	A	A	B	A	C	B	C	B	D	D	C	C	C	C	B	C	B	C	B	A
Q.No	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	C	A	D	D	B	A	C	D	A	B	C	B	C	C	C	D	B	B	A	A
Q.No	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans.	B	B	C	C	C	A	C	C	C	D	C	D	B	D	A	B	A	C	C	C
Q.No	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans.	C	C	D	C	C	C	C	A	C	C	C	A	C	C	A	B	B	B	B	B
Q.No	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175					
Ans.	D	C	A	B	B	D	A	B	A	B	D	B	C	B	D					

HINTS & SOLUTION - 1

Sol.4 Suppose she types x words in 6 minutes. Then, the given information can be exhibited in the following tabular form.

Number of words:	540	x
Time (in minutes):	30	6

Since in more time more words can be typed. So, it is a case of direct variation.

$\therefore$ Ratio of number of words = Ratio of number of minutes

$\Rightarrow \quad \frac{540}{x} = \frac{30}{6}$

$\Rightarrow \quad x = \frac{6 \times 540}{30}$

$\Rightarrow \quad x = 108$

Hence, she types 108 words in 6 minutes.

Sol.6 (i) Since a and b vary inversely, so the product ab remains constant and is equal to $8 \times 10 = 80$.

$\therefore$ First blank space is to be filled by $\frac{80}{2} = 40$

Second blank space is to be filled by $\frac{80}{20} = 4$

Third blank space is to be filled by $\frac{80}{5} = 16$.

(ii) Proceeding as in (i), we find that

First blank space is to be filled by $\frac{64}{32} = 2$

Second blank space is to be filled by $\frac{64}{8} = 8$

Sol. 7 Suppose x soldiers were left in the fort after transferring some soldiers.

Then, Number of transferred soldiers = 1000 – x.

The given information may be put int he following tabular form.

Number of soldiers	1000	x
Number of days	20	25

Since more soldiers wil finish the food in less days.

$\therefore$ Ratio of number of soldiers = Inverse ratio of nubmer of days.

$\Rightarrow \quad 1000 : x = 25 : 20$

$\Rightarrow \quad \frac{1000}{x} = \frac{25}{20}$

$\Rightarrow \quad 25 \times x = 1000 \times 20$

$\Rightarrow \quad x = \frac{1000 \times 20}{25}$

$\Rightarrow \quad x = 800$

Hence, the number of transferred soldiers

$= 1000 - 800 = 200.$

Sol.8 Since 30 men die after 5 days. Therefore, the remaining food is sufficient for 120 men for 195 days.
Suppose the remaining food lasts for x days for the remaining 90 men.
Thus, we have the following table :

Number of men	120	90
Number of days	195	x

We note that more men will consume gthe food in less number of days and less number of men will consume the food in more number of days. So, it is a case of inverse variation.

$\therefore$ Ratio of number of men
= Inverse ratio of number of days

$\Rightarrow$ $120 : 90 = x : 195$

$\Rightarrow$ $\frac{120}{90} = \frac{x}{195}$

$\Rightarrow$ $x = \frac{120 \times 195}{90} = 260$

Hence, the remaining men will consume the food in 260 days.

Sol.10 We have,
Time taken by Amit to do the work = 4 days
Time taken by Sumit to do the work = 6 days

$\therefore$ Work done by Amit in 1 day $= \frac{1}{4}$

$\therefore$ Work done by Sumit in 1 day $= \frac{1}{6}$

So, work done by Amit and Sumit in one day

$$= \frac{1}{4} + \frac{1}{6} = \frac{3+2}{12} = \frac{5}{12}$$

Hence, Amit and Sumit can do the piece of work $\frac{12}{5}$ in days i.e., $2\frac{2}{5}$ days.

Sol.11 We have,
Time taken by Kami, Karya and Kirti to weave the carpet = 4 days.
Time taken by Kami to weave the carpet
= 12 days
and, Time taken by Kirti to weave the carpet
= 10 days

$\therefore$ Kami, Karya and Kirti's 1 day's work $= \frac{1}{4}$

Kami's day's work $= \frac{1}{12}$ and,

Kirti's 1 day's work $= \frac{1}{10}$

Now,
Karya's 1 day's work =
(Kami, Karya and Kirti's 1 day's work)
– (Kami's 1 day's work) – (Kirti's 1 days work)

$$= \frac{1}{4} - \frac{1}{12} - \frac{1}{10} = \frac{15-5-6}{60} = \frac{4}{60} = \frac{1}{15}$$

Hence, Karya can weave the carpet in 15 days.

Sol.12 We have,

A and B can finish the work in 12 days, B and C can finish the work in 15 days, C and A can finish the work in 20 days

$\therefore$ A and B's 1 day's work $= \frac{1}{12}$,

B and C's 1 day's work $= \frac{1}{15}$

C and A's 1 day's work $= \frac{1}{20}$

Adding, we get

2(A + B + C)'s 1 day's work

$$= \frac{1}{12} + \frac{1}{15} + \frac{1}{20} = \frac{5+4+3}{60} = \frac{12}{60} = \frac{1}{5}$$

$\therefore$ (A + B + C)'s 1 day's work $= \frac{1}{2 \times 5} = \frac{1}{10}$

Now,

A's 1 day's work = (A, B and C's 1 day's work)

– (B and C's 1 day's work)

$$= \frac{1}{10} - \frac{1}{15} = \frac{3-2}{30} = \frac{1}{30}$$

So, A alone can finish the work in 30 days.

Now,

B's 1 day's work = (A, B and C's 1 day's work)

– (A and C's 1 day's work)

$$= \frac{1}{10} - \frac{1}{20} = \frac{2-1}{60} = \frac{1}{20}$$

So, B alone can finish the work in 20 days.

Now,

C's 1 day's work = (A, B and C's 1 day's work)

– (A and B's 1 day's work)

$$= \frac{1}{10} - \frac{1}{12} = \frac{6-5}{60} = \frac{1}{60}$$

So, C alone can finish the work in 60 days.

Sol.14 We have,

A can finish the work in 25 days,

B can finish the work in 20 days.

$\therefore$ A's 1 day's work $= \frac{1}{25}$,

B's 1 day's work $= \frac{1}{20}$.

So, (A + B)'s 1 day's work $= \frac{1}{25} + \frac{1}{20} = \frac{4+5}{100} = \frac{9}{100}$

$\therefore$ (A + B)'s 5 day's work $= 5 \times \frac{9}{100} = \frac{9}{20}$

Remaining work $= 1 - \frac{9}{20} = \frac{11}{20}$

The remaining work is done by B.

$\therefore$ Complete work is done by B is 20 days.

$\therefore$ $\frac{11}{20}$ of the work is done by

B in $\left(20 \times \frac{11}{20}\right)$ days = 11 days.

Hence, the remaining work is done by B in 11 days.

Sol.15 It is given that A and B can polish the floors of the building in 25 days.

$\therefore$ (A + B)'s 1 day's work $= \frac{1}{25}$

Now, A alone can do $\frac{1}{3}$ of the work in 15 days.

$\therefore$ A alone can do the complete work in (3×15)
$= 45$ days

$\Rightarrow$ A's 1 day's work $= \frac{1}{45}$

Now B's 1 day's work = (A + B)'s 1 day's work
$-$ A's 1 day's work

$$= \frac{1}{25} - \frac{1}{45} = \frac{9-5}{225} = \frac{4}{225}$$

Hence, B alone can polish the floor in $\frac{225}{4}$ days

$= 56\frac{1}{4}$ days.

Sol.18 We have,

Length of the platform = 600 m

$\therefore$ $\frac{2}{3}$rd of the platform $= 600 \times \frac{2}{3}$ m $= 400$ m

In $2\frac{1}{2}$ horus, Somari sweeps 600 m.

$\therefore$ In 1 hour, Somari sweeps $\left(\frac{600}{2\frac{1}{2}}\right)$ m

$$= \left(\frac{600}{5/2}\right) \text{m} = \left(600 \times \frac{2}{5}\right) = 240 \text{ m}$$

In $1\frac{1}{2}$ hours, Imarati sweeps 400 m.

$\therefore$ In 1 hour, Imarati sweeps $\left(\frac{400}{1\frac{1}{2}}\right)$ m

$$= \left(\frac{400}{3/2}\right) \text{m} = \left(400 \times \frac{2}{3}\right) \text{m} = 266\frac{2}{3} \text{m}$$

Clearly, Imarati sweeps more length in 1 hour than Somari sweeps in the same time.
Hence, imarati sweeps more speedily than Somari.

Sol.19 We have,

Time taken by the first tap to fill the cistern
$= 4$ hours

Time taken by the second tap to fill the cistern
$= 3$ hours

$\therefore$ Work done by the first tap in 1 hour $= \frac{1}{4}$

Work done by the second tap in 1 hour $= \frac{1}{3}$

Thus, work done by both the taps in 1 hour

$$=\frac{1}{4}+\frac{1}{3}=\frac{3+4}{12}=\frac{7}{12}$$

$\therefore$ Both the taps together will fill the cistern in $\frac{12}{7}$ hours.

Sol.23 We have,
Time taken by tap A to fill the tank = 12 hours
Time taken by tap B to fill the tank = 16 hours
Time taken by tap C to empty the tank = 8 hours

$\therefore$ Tap A fills up $\frac{1}{12}$ th part of the tank in 1 hour,

Tap B fills up $\frac{1}{16}$ th part of the tank in 1 hour,

Tap C empties out $\frac{1}{8}$ th part of the tank in 1 hour.

Thus, in 1 hour $\left(\frac{1}{12}+\frac{1}{16}-\frac{1}{8}\right)$ th part of the tank is filled.

We have, $\frac{1}{12}+\frac{1}{16}-\frac{1}{8}=\frac{4+3-6}{48}=\frac{1}{48}$

$\therefore$ In 1 hour $\frac{1}{48}$ th part of the tank is filled.

Hence, the tank will be filled completely in 48 hours, when all the three are opened together.

Sol.26 Suppose Chameli had Rs x in the beginning. Then,
Money spent by Chameli = 75% of x

$$= \text{Rs} \times \frac{75}{100} \times x = \text{Rs}\frac{3x}{4}$$

$\therefore$ Money left with Cameli $= \text{Rs}\left(x-\frac{3x}{4}\right)$

$$= \text{Rs}\frac{4x-3x}{4} = \text{Rs}\frac{x}{4}$$

But, it is given that she had Rs 600 left after spending 75% of her money.

$\therefore \frac{x}{4} = 600 \Rightarrow x = 600 \times 4 = 2400$

Hence, Chameli had Rs 2400.

Sol.29 Suppose Kishan's total salary is Rs 100 per month.
Expenditure per month on food
= 30% of Rs 100 = Rs 30
Donation per month to temple Rs.
= 3% of Rs 100 = Rs 3.
Total expenditure = Rs (30 + 3) = Rs 33.
If expenditure is Rs 33, then total salary = Rs 100

If expenditure is Rs 1, then total salary = $\text{Rs}\frac{100}{33}$

If expenditure is Rs 231, then total salary

$$= \text{Rs}\left(\frac{100}{33}\times 231\right) = \text{Rs } 700$$

Hence, Kishan's total salary for the given month is Rs 700.

Sol.30 Suppose, he originally had Rs 100

Amount lost = 20% of Rs 100 = Rs 20

Remainder = Rs (100 – 20) = Rs 80 Expenditure = 25% of the remainder

$= 25\%$ of Rs 80 $= \text{Rs}\left(\frac{25}{100}\times 80\right)$

$= \text{Rs } 20$

Reminder = Rs (80 – 20) = Rs 60

If reminder is Rs 60, he originally had Rs 100

If remainder is Re 1, he originally had $\text{Rs}\frac{100}{60}$

If remainder is Rs 480,

he originally had $\text{Rs}\left(\frac{100}{60}\times 480\right) = \text{Rs } 800$

Hence, the man had Rs 800

Sol.31 We have,

Zinc in the alloy = 36%,

Copper in the alloy = 40%

$\therefore$ Nickel in the alloy = [100 – (36 + 40)]%

= 24%

Now, Quantity of zinc in 1 kg of alloy

= 36% of 1 kg = 36% of 1000 grams

$= \left(\frac{36}{100}\times 1000\right)$ grams = 360 grams

Quantity of copper in the alloy

= 40% of 1 kg = 40% of 1000 grams

$= \left(\frac{40}{100}\times 1000\right)$ grams = 400 grams

and, Quantity of nickel in the alloy

= 24% of 1 kg

= 24% of 1000 grams

$= \left(\frac{24}{100}\times 1000\right)$ grams = 240 grams.

Sol.32 Let Meena's weight be x kg and Tara's weight be y kg. Then,

Rani's weight = 25% of Meena's weight

$= \frac{25}{100}\times x$ ... (i)

Also, Rani's weight = 40% of Tara's weight

$= \frac{40}{100}\times y$ ... (ii)

From (i) and (ii), we get

$= \frac{25}{100}\times x = \frac{40}{100}\times y$

$\Rightarrow 25x = 40y$ [Multiplying both sides by 100]

$\Rightarrow 25x = 8y$ [Dividing both sides by 5]

$\Rightarrow x = \frac{8}{5}y$ ... (iii)

We have to find Meena's weight as the percentage of Tara's weight i.e.,

$\frac{x}{y}\times 100 = \frac{\frac{8}{5}y}{y}\times 100 = \frac{8}{5}\times 100 = 160$ [Using (iii)]

Hence, Meena's weight is 160% of Tara's weight.

Sol.33 Present value of the machine = Rs 50,000
Decrease in value after 1 year = 10% of Rs 50,000

$$= \text{Rs}\left(\frac{10}{100}\times 50{,}000\right) = \text{Rs } 5000$$

$\therefore$ Depreciated value after one year
= Rs (50,000 – 5000) = Rs 45000
Decrease in value after 2 years
= 10% of Rs 45000

$$= \text{Rs}\left(\frac{10}{100}\times 45000\right) = \text{Rs } 4500$$

$\therefore$ Depreciated value after 2 years
= Rs (45000 4500) = Rs 40050
Thus, the value of the machine after 2 years
= Rs 40050.

Sol.35 Let the numbr be 100
Increase in the number = 10% = 10% of 100 = 10
$\therefore$ Increased number = 100 + 10 = 110
This number is decrease by 10%.
$\therefore$ Decrease in the number

$$= 10\% \text{ of } 110 = \left(\frac{10}{110}\times 100\right) = 11$$

$\therefore$ New number = 110 – 11 = 99
Thus, net decrease = 100 – 99 = 1
Hence net percentage decrease

$$= \left(\frac{1}{100}\times 100\right)\% = 1\%$$

Sol.37 It is given that 60% people like cricket, 30% like football.
$\therefore$ Percentage of people who like other games
= (100 – 60 – 30)% = 10%
Total number of people = 56,00,000
Number of people who like cricket
= 60% of 5600000

$$= \frac{60}{100}\times 5600000 = 33{,}60{,}000$$

Number of people who like football
= 30% of 5600000

$$= \frac{30}{100}\times 5600000 = 16{,}80{,}000$$

Number of people who like other games
= (10% of 5600000) = 5,60,000

Sol.38 We have,
C.P. of the toy = Rs 250
S.P. of the toy = Rs 285
Since S.P. > C.P. So, there is gain given by
Gain = S.P. – C.P.
= Rs 285 – Rs 250 = Rs 35.

Now, Gain % $= \left(\frac{\text{Gain}}{\text{C.P.}}\times 100\right)\%$

$\Rightarrow$ Gain% $= \left(\frac{35}{250}\times 100\right)\% = 14\%$

Hence, Gain = Rs 35 and Gain % = 14%.

Sol.39 We have,
C.P. of watch = Rs 2200
S.P. of watch = Rs 1980
Since S.P. < C.P. So, there is loss given by
Loss = C.P. – S.P.
= Rs 2200 – Rs 1980 = Rs 220

Now, Loss % $= \left(\frac{\text{Loss}}{\text{C.P.}} \times 100\right)\%$

$= \left(\frac{220}{2200} \times 100\right)\% = 10\%$

Hence, Loss = Rs 220 and Loss% = 10%

Sol.41 It is given that the girl buys lemons at 4 for Rs 3 and sells them at 5 for Rs 4. Therefore, to avoid fractions assume that the girl buys and sells 4 times 5 = 20 lemons.
We have,
C.P. of 4 lemons = Rs 3

$\therefore$ C.P. of 1 lemon = Rs $\frac{3}{4}$

$\therefore$ C.P. of 20 lemons = Rs $\left(\frac{3}{4} \times 20\right)$ = Rs 15

S.P. of 5 lemons = Rs 4

$\therefore$ S.P. of 1 lemon = Rs $\left(\frac{4}{5} \times 20\right)$ = Rs 16

Clearly, S.P. > C.P.
$\therefore$ Gain = S.P. – C.P. = Rs (16 – 15) = Re 1

Hence, Gain % $= \left(\frac{\text{Gain}}{\text{C.P.}} \times 100\right)\%$

$= \left(\frac{1}{15} \times 100\right)\% = 6\frac{2}{3}\%$

Sol.43 We have,
C.P. of 200 kg of sugar = Rs (200 × 15) Rs 3000
Profit % = 5%
$\therefore$ Profit = 5% of Rs 3000

$\Rightarrow$ Profit = Rs $\left(\frac{5}{100} \times 3000\right)$

$\Rightarrow$ Profit = Rs 150
Now, S.P. = C.P. + Profit
$\Rightarrow$ S.P. = Rs (3000 + 150) = Rs 3150

Hence, S.P. per kg = Rs $\left(\frac{3150}{200}\right)$ = Rs 15.75

Aliter We have,
C.P. = Rs 3000 and Gain = 5%

$\therefore$ S.P. = $\left(\frac{100 + \text{Gain}\%}{100}\right) \times$ C.P.

$\Rightarrow$ S.P. = Rs $\left(\frac{100+5}{100}\right) \times 3000$ = Rs 3150

Hence, S.P. per kg = Rs $\left(\frac{3150}{200}\right)$ = Rs 15.75

Sol.44 Let the cost price of first fan be Rs x. Then,
Cost price of second fan = Rs (2160 – x)
It is given that
In the whole transaction, the man neither gains nor loses.
$\therefore$ Gain on the sale of first fan = Loss in the sale of second fan
$\Rightarrow$ 15% of Rs x = 9% of Rs (2160 – x)
$\Rightarrow \frac{15}{100} \times x = \frac{9}{100} \times (2160 - x)$
$\Rightarrow$ 15x = 9 (2160 – x)
$\Rightarrow$ 5x = 3 (2160 – x) [Dividing both sides by 3]
$\Rightarrow$ 5x = 6480 – 3x
$\Rightarrow$ 5x + 3x = 6480 $\Rightarrow$ 8x = 6480
$\Rightarrow x = \frac{6480}{8} \Rightarrow x = 810$
$\therefore$ C.P. of first fan = Rs 810
C.P. of second fan = Rs (2160 – x)
= Rs (2160 – 810)
= Rs 1350.

Sol.46 We have,
S.P. of the Cart = 720
Loss = 25%
$\therefore$ C.P. $= \left(\frac{100}{100 - \text{Loss}} \times \text{S.P.}\right)$
$\Rightarrow$ C.P. = Rs $\left(\frac{100}{100-25} \times 720\right)$
= Rs $\left(\frac{4}{3} \times 720\right)$ = Rs 960
Thus, C.P. of the cart = Rs 960
Desired gain = 25%
$\therefore$ S.P. $= \frac{100 + \text{Gain\%}}{100} \times$ C.P.
$\Rightarrow$ S.P. = Rs $\left(\frac{100+25}{100} \times 960\right)$
= Rs $\left(\frac{125}{100} \times 960\right)$ = Rs $\left(\frac{5}{4} \times 960\right)$
= Rs 1200

Sol.47 Let the C.P. of the toy be Rs x.
Gain % = 12%
$\therefore$ Gain = 12% of Rs x = Rs $\frac{12x}{100}$ = Rs $\frac{3x}{25}$
$\therefore$ S.P. = C.P. + Gain = Rs $\left(x + \frac{3x}{25}\right)$ = Rs $\frac{28x}{25}$
New Gain % = 14%
$\therefore$ New Gain = 14% of Rs x = Rs $\frac{14x}{100}$ = Rs $\frac{7x}{50}$

$\therefore$ New S.P. = Rs$\left(x+\frac{7x}{50}\right)$ = Rs$\frac{57x}{50}$

It is given that difference between new S.P. and the original S.P. is Rs 33.

$\Rightarrow \frac{57x-56x}{50} = 33 \Rightarrow \frac{x}{50} = 33$

$\Rightarrow x = 33 \times 50 \quad \Rightarrow x = 1650$

Hence, the C.P. of the toy is Rs 1650

Sol.48 Let the C.P. of the article be Rs x.

Gain = 10% of Rs x = Rs$\left(\frac{10}{100}\times x\right)$ = Rs$\frac{x}{10}$

$\therefore$ Original S.P. = Rs$\left(x+\frac{x}{10}\right)$ = Rs$\frac{11x}{10}$

New C.P. = {Rs x – 20% of Rs x}

= Rs$\left(x-\frac{20x}{100}\right)$ = Rs$\frac{4x}{5}$

Gain percent = 40%

$\therefore$ New S.P. $=\frac{100+\text{Gain\%}}{100}\times$ C.P.

= Rs$\left(\frac{100+40}{100}\times\frac{4x}{5}\right)$ = Rs$\frac{28x}{25}$

It is given tht new S.P. is Rs 10 more than the original S.P.

$\therefore$ New S.P. – Original S.P. = 10

$\Rightarrow -\frac{28x}{25}=\frac{11x}{10} = 10$

$\Rightarrow \frac{56x-55x}{50} = 10 \quad \Rightarrow x = 500$

Hence, C.P. = Rs 500

Sol.49 We have,

S.P. of the towel = Rs 126.90, Loss % = 6%

$\therefore$ C.P. of the towel $=\left(\frac{100}{100-\text{Loss\%}}\times\text{S.P.}\right)$

$=\left(\frac{100}{100-6}\times 126.90\right)$

$=\left(\frac{100}{94}\times 126.90\right)$ = Rs 135

Now, C.P. of the towel = Rs 135 and, Required gain % = 4%

$\therefore$ S.P. $=\left(\frac{100+\text{Gain}}{100}\right)\times$ C.P.

$\therefore$ S.P. = Rs$\left(\frac{100+4}{100}\times 135\right)$ = Rs$\left(\frac{104}{100}\times 135\right)$

= Rs 140.40

Hence, the drapper should sell the towel for Rs 140.40

Sol.50 We have,

S.P. = Rs 67.50 and Loss % = 10

$\therefore$ C.P. $= \frac{100}{100 - \text{Loss}\%} \times$ S.P.

$\Rightarrow$ C.P. $= \text{Rs}\left(\frac{100}{100-10} \times 67.50\right) = \text{Rs } 75$

If S.P. = Rs 82.50, then S.P. > C.P.

So, there is gain given by

Gain = S.P. – C.P.

= Rs 82.50 – Rs 75 = Rs 7.50

$\therefore$ Gain % $= \left(\frac{\text{Gain}}{\text{C.P.}} \times 100\right) = \frac{7.50}{75} \times 100 = 10\%$

Sol.52 Let he original selling price of the article be Rs x. It is given that on this S.P. there is a gain of 5%.

$\therefore$ C.P. $= \left(\frac{100}{100+5}\right) x = \frac{20x}{21}$

$\left[\text{Using: C.P.} = \frac{100}{100 + \text{Gain}\%} \times \text{S.P.}\right]$ ... (i)

When S.P. is reduced by Rs 50, there is loss of 5%.

$\therefore$ C.P. $= \frac{100}{100-5} \times (x - 50) = \frac{20}{19}(x - 50)$

$\left[\text{Using: C.P.} = \frac{100}{100 - \text{Loss}\%} \times \text{S.P.}\right]$ ... (ii)

From (i) and (ii), we get

$\frac{20x}{21} = \frac{20}{19}(x - 50)$

$\Rightarrow \frac{x}{21} = \frac{1}{19}(x - 50)$ [Dividing both sides by 20]

$\Rightarrow 19x = 21(x - 50)$ [Using cross multiplication],

$\Rightarrow 19x = 21x - 1050$

$\Rightarrow 21x - 19x = 1050$

$\Rightarrow 2x = 1050 \Rightarrow x = \frac{1050}{2} = 525$ Hence, the original S.P. of the article is Rs 525.

Sol.56 We have,

M.P. = Rs 600, Discount = 45%

$\therefore$ Discount = 45% of Rs 600 $= \text{Rs}\left(\frac{45}{100} \times 100\right)$

= Rs 270

$\therefore$ S.P. = M.P. – Discount

$\Rightarrow$ S.P. = Rs 600 – Rs 270 = Rs 330

Thus, the amount I need to pay is Rs 330.

Sol.57 We have,

Marked price = Rs 280, Discount = 10%

$\therefore$ S.P. = M.P. $\times \left(\frac{100 - \text{Discount}\%}{100}\right)$

$\Rightarrow$ S.P. $= \text{Rs}\left\{280 \times \left(\frac{100-10}{100}\right)\right\}$

$= \text{Rs}\left\{\frac{280 \times 90}{100}\right\} = \text{Rs } 252$

Now, S.P. = Rs 252 and Gain = 26%

$\therefore$ C.P. $= \frac{100}{100+\text{Gain\%}} \times$ S.P.

$\Rightarrow$ C.P. $= \text{Rs}\left(\frac{100}{100+26} \times 252\right) = \text{Rs}\left(\frac{100}{126} \times 252\right)$

$= \text{Rs } 200$

Hence, the actual cost of the article is Rs 200

Sol. 58 We have,

C.P. of the article = Rs 245, Gain = 10%

$\therefore$ S.P. $= \frac{100+\text{Gain\%}}{100} \times$ C.P.

$\Rightarrow$ S.P. $= \text{Rs}\left(\frac{100+10}{100} \times 245\right) = \text{Rs}\left(\frac{110}{100} \times 245\right)$

$= \text{Rs } 269.50$

Let the marked price be Rs 100. Then,

Discount allowed = 12.5% of M.P. = Rs 12.5

$\therefore$ S.P. of the article = M.P. – Discount

$= \text{Rs } 100 - \text{Rs } 12.5 = \text{Rs } 87.5$

Thus,

When S.P. is Rs 87.5, M.P. = Rs 100

When S.P. is Re 1, M.P. $= \text{Rs}\frac{110}{87.5}$

When S.P. is Rs 269.50, M.P.

$= \text{Rs}\left(\frac{110}{87.5} \times 269.50\right) = \text{Rs } 308$

Hence, marked price of the article is Rs 308

Sol.59 We have, C.P. of the article = 380, Gain = 25%

$\therefore$ S.P. of the article $= \left(\frac{100+\text{Gain\%}}{100} \times \text{C.P.}\right)$

$\Rightarrow$ S.P. of the article $= \text{Rs}\left(\frac{100+25}{100} \times 380\right)$

$= \text{Rs}\left(\frac{125}{100} \times 380\right) = \text{Rs } 475$

Now, suppose the dealer marks Rs 100 as the price of the article.

He allows 5% discount on it.

$\therefore$ Discount = Rs 5

$\therefore$ S.P. = M.P. – Discount = Rs 100 – Rs 5

$= \text{Rs } 95$

Thus,

If S.P. is Rs 95, then M.P. = Rs 100

If S.P. is Re 1, then M.P. $= \text{Rs}\frac{100}{95}$

If S.P. is Rs 475, then M.P. $= \text{Rs}\left(\frac{100}{95} \times 475\right)$

$= \text{Rs } 500$

Sol.60 Let the C.P. be Rs 100

We have, Gain = 19% of C.P. = Rs 19

$\therefore$ S.P. = C.P. + Gain = Rs 100 + Rs 19 = Rs 119

The trader allows a discount of 15%. This means that when mrked price is Rs 100, then S.P. is Rs 85.

Now,

If Rs 85 is the S.P., then marked price = Rs 100

If Re 1 is the S.P., then marked price = Rs $\frac{100}{85}$

If Rs 119 is the S.P., then marked price

$$= \text{Rs}\left(\frac{100}{85}\times 119\right) = \text{Rs } 140$$

Hence, the trader must mark his goods 40% above the cost price.

Sol.61 Let the cost price be Rs 100. Then,

Marked price = 20% more than the C.P.

= C.P. + 20% of C.P.

= Rs 100 + Rs 20 = Rs 120

Discount = 15% of M.P. = 15% of Rs 120

$\therefore$ Net discount = $\text{Rs}\left(\frac{15}{100}\times 120\right) = \text{Rs } 18$

$\therefore$ S.P. = M.P. – discount = Rs 120 – Rs 18

= Rs 102

Now, Porofit = S.P. – C.P. = Rs 102 – Rs 100

= Rs 2

Hence, Gain % = $\left(\frac{2}{100}\times 100\right)\% = 2\%$

Sol.63 Let the advertised price be Rs 100

Commission on advertised price = 25% = Rs 25

$\therefore$ S.P. = Advertised price – Commission

= Rs 100 – Rs 25 = Rs 75

We have, profit = 20%

$\therefore$ C.P. $= \frac{100}{100+\text{Gain}\%}\times$ S.P.

$\Rightarrow$ C.P. = $\text{Rs}\left(\frac{100}{100+20}\times 75\right) = \text{Rs}\left(\frac{100}{120}\times 75\right)$

= Rs 62.5

$\therefore$ Gain = S.P. – C.P. = Rs 75 – Rs 62.5 = Rs 12.5

Now,

If the gain is Rs 12.5, advertised price = Rs 100

If the gain is Re 1, advertised price = Rs $\frac{100}{12.5}$

If the gain is Rs 60, advertised price

$$= \text{Rs}\frac{100}{12.5}\times 60 = \text{Rs } 480$$

Hence, advertised price of the cycle is Rs 480.

Sol.64 Let the C.P. be Rs 100

Gain percent required = 10%

$\therefore$ S.P. = Rs (100 + 10) = Rs 110

Discount allowed = 20%

Let the Marked price be Rs x. Then,

$$\text{Discount} = 20\% \text{ of Rs } x = \text{Rs}\,\frac{20}{100}\times x = \text{Rs}\,\frac{x}{5}$$

$$\therefore \text{ S.P.} = \text{M.P.} - \text{Discount} = \text{Rs}\left(x - \frac{x}{5}\right) = \text{Rs}\,\frac{4x}{5}$$

But, S.P. = Rs 110

$$\therefore \frac{4x}{5} = 110 \quad \Rightarrow x = \frac{550}{4} = 137.50$$

Thus, marked price = Rs 137.50

Hence, the manufacturer should mark 37.50% more than the C.P.

Sol.65 We have,

C.P. = Rs 450 and, Gain % = 20%

$$\therefore \text{ S.P.} = \frac{100 + \text{Gain}\%}{100} \times \text{C.P.}$$

$$\Rightarrow \text{S.P.} = \text{Rs}\left(\frac{100+20}{100}\times 450\right)$$

$\Rightarrow$ S.P. = Rs 540

Now,

S.P. = Rs 540 and, Discount = 10%

$$\therefore \text{ M.P.} = \frac{100\times \text{S.P.}}{100 - \text{Discount }\%} = \text{Rs}\left(\frac{100\times 540}{100-10}\right)$$

= Rs 600

Hence, marked price of the article is Rs 600

Sol.66 We have,

Gain % = 25 and Gain = Rs 150

$$\therefore \text{ Gain }\% = \frac{\text{Gain}}{\text{C.P.}} \times 100$$

$$\Rightarrow 25 = \frac{15}{\text{C.P.}} \times 100$$

$$\Rightarrow \text{C.P.} = \text{Rs}\left(\frac{150\times 100}{25}\right) = \text{Rs } 600$$

Thus, we have

Gain % = 25 and C.P. = Rs 600

Now,

$$\text{S.P.} = \frac{100 + \text{Gain}\%}{100} \times \text{C.P.}$$

$$\Rightarrow \text{S.P.} = \text{Rs}\left(\frac{100+25}{100}\times 600\right) \times \text{Rs}\left(\frac{125}{100}\times 600\right)$$

= Rs 750

Thus, we have

S.P. = Rs 750 and, Discount % = 20

$$\therefore \text{ M.P.} = \frac{100\times \text{S.P.}}{(100 - \text{Discount}\%)}$$

$$\therefore \text{ M.P.} = \text{Rs}\left(\frac{100\times 750}{100-20}\right) = \text{Rs}\left(\frac{75000}{80}\right)$$

= 937.50

Hence, marked price of the instrument is Rs 937.50

Sol.67 Principal for the first year = Rs $\frac{1000\times4\times1}{100}$

$\left[\text{Using: Interest} = \frac{P\times R\times T}{100}\right]$

= Rs 40

Amount at the end of first year

= Rs 1000 + Rs 40 = Rs 1040

Interest for the second year = Rs $\left(\frac{1040\times4\times1}{100}\right)$

= Rs 41.60

Principal for the second year = Rs 1040

Amount at the end of second year

= Rs 1040 + Rs 41.60 = Rs 1081.60

∴ Compound interest = Rs (1081.60 – 1000)

= Rs 81.60

Sol.69 We have,

Rate of interest = 10% per annum

= 5% per half-year.

Time = $1\frac{1}{2}$ years = 3 half-years

Original principal = Rs 8000

Interest for the first half-year

= Rs $\left(\frac{8000\times5\times1}{100}\right)$ = Rs 400

Amount at the end of the first half-year

= Rs 8000 + Rs 400 = Rs 8400

Principal for the second half-year = Rs 8400

Interest for the second half-year

= Rs $\left(\frac{8400\times5\times1}{100}\right)$ = Rs 420

Amount at the end of the second half-year

= Rs 8400 + Rs 420

= Rs 8820

Principal for the third half-year = Rs 8820

Interest for the third half-year

= Rs $\left(\frac{8820\times5\times1}{100}\right)$ = Rs 441

Amount at the end of third half-year

= Rs 8820 + Rs 441

= Rs 9261

∴ Compound interest = Rs 9261 – Rs 8000

= Rs 1261

Sol.70 We have,

Rate of interest = 20% per annum = $\frac{20}{4}$ %

= 5% per quarter

Time = 1 year = 4 quarters.

Principal for the first quarter = Rs 10000

Interest for the first quarter

= Rs $\left(\frac{10000\times5\times1}{100}\right)$ = Rs 500

Amount at the end of first quarter

= Rs 10000 + Rs 500 = Rs 10500

Principal for the second quarter = Rs 10500

Interest for the second quarter

$$= \text{Rs}\left(\frac{10500\times5\times1}{100}\right) = \text{Rs } 525$$

Amount at the end of second quarter

= Rs 10500 + Rs 525 = Rs 11025

Principal for the third quarter = Rs 11025

Interest for the third quarter

$$= \text{Rs}\left(\frac{11025\times5\times1}{100}\right) = \text{Rs } 551.25$$

Amount at the end of third quarter

= Rs 11025 + Rs 551.25

= Rs 11576.25

Principal for the fourth quarter = Rs 11576.25

Interest for the fourth quarter

$$= \text{Rs}\left(\frac{11576.25\times5\times1}{100}\right)$$

= Rs 578.8125

Amount at the end of fourth quarter

= Rs 11576.25 + Rs 578.8125

= Rs 12155.0625

$\therefore$ Compound interest

= Rs 12155.0625 – Rs 10000

= Rs 2155.0625

= Rs 2155.06

Sol.73 Here, P = Rs 64000, n = 3 years, and

R = 2.5 paise per rupee per annum

$\Rightarrow$ R = (2.5 × 100) paise per hundred rupees per annum

$\Rightarrow$ $R = \left(\frac{2.5\times100}{100}\right)$ Rs per hundred rupees per annum

$\Rightarrow$ R = 2.5% per annum.

$\therefore$ Amount A after 3 years

$$= P\left(1+\frac{R}{100}\right)^3$$

$$= \text{Rs } 64000 \times \left(1+\frac{2.5}{100}\right)^3$$

$$= \text{Rs } 64000 \times \left(1+\frac{25}{1000}\right)^3$$

$$= \text{Rs } 64000 \times \left(1+\frac{1}{40}\right)^3$$

$$= \text{Rs } 64000 \times \left(\frac{41}{40}\right)^3$$

$$= \text{Rs } 64000 \times \frac{41}{40}\times\frac{41}{40}\times\frac{41}{40}$$

= Rs 68921

Hence, compound interest payable after 3 years

= Rs 68921 – Rs 64000

= Rs 4921

Sol.74: Let the sum of money be Rs P.

This sum of money gives Rs 2400 as S.I. in 3 years at the rate of $6\frac{1}{4}\%$ per annum.

$\therefore \quad P = \frac{S.I. \times 100}{R \times T}$

$\Rightarrow P = \frac{2400 \times 100}{\frac{25}{4} \times 3} = 12800$

$[\because$ S.I. = 2400, $R = 6\frac{1}{4}\%$

$= \frac{25}{4}\%$ and T = 3 years]

Now, we have

$P = 12800, R = \frac{25}{4}\%$ and $n = 3$

$\therefore$ Amount after 3 years $= P\left(1+\frac{R}{100}\right)^n$

$= Rs\left[12800 \times \left(1+\frac{25}{400}\right)^3\right]$

$= Rs\left[12800 \times \left(1+\frac{1}{16}\right)^3\right]$

$= Rs\left[12800 \times \left(\frac{17}{16}\right)^3\right]$

$= Rs\left[12800 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}\right]$

$= Rs\left[\frac{25 \times 17 \times 17 \times 17}{8}\right]$

= Rs 15353.125

$\therefore$ Compound interest

= Rs 15353.125 – Rs 12800

= Rs 2553.125 = Rs 2553.13

Sol.75: Here, Principal P = Rs 12000, R = 20% per annum and n = 2 years.

$\therefore$ Amount after 2 years $= P\left(1+\frac{R}{200}\right)^{2n}$

$= Rs\ 12000 \times \left(1+\frac{20}{200}\right)^{2\times 2}$

$= Rs\ 12000 \times \left(1+\frac{1}{10}\right)^4$

$= Rs\ 12000 \times \left(\frac{11}{10}\right)^4$

$= Rs\ 12000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$

$= Rs\ 12000 \times \frac{14641}{10000}$

= Rs 17569.20

$\therefore$ Compound interest

= Rs 17569.20 – Rs 12000
= 5569.20

Sol.76: Here, P = Rs 1000, R = 10% per annum and,

$$n = \frac{18}{12} \text{ years} = \frac{3}{2} \text{ years}$$

$\therefore$ Amount after 18 months $= P\left(1+\frac{R}{200}\right)^{2n}$

$$= \text{Rs } 1000 \times \left(1+\frac{10}{200}\right)^{2\times\frac{3}{2}}$$

$$= \text{Rs } 1000 \times \left(1+\frac{1}{20}\right)^{3}$$

$$= \text{Rs } 1000 \times \left(\frac{21}{20}\right)^{3}$$

$$= \text{Rs } 1000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$$

= Rs 1157.63

Hence, Compound interest = Amount – Principal
= Rs 1157.63 – Rs 1000
= Rs 157.63

Sol.78: Here, P = Rs 7500, R = 12% per annum and

$$n = 9 \text{ months} = \frac{9}{12} \text{ years} = \frac{3}{4} \text{ year.}$$

$\therefore$ Amount after 9 months $= P\left(1+\frac{R}{400}\right)^{4n}$

$$= \text{Rs } 7500 \times \left(1+\frac{12}{400}\right)^{4\times\frac{3}{4}}$$

$$= \text{Rs } 7500 \times \left(1+\frac{3}{100}\right)^{3}$$

$$= \text{Rs } 7500 \times \left(\frac{103}{100}\right)^{3}$$

$$= \text{Rs } 7500 \times \frac{103}{100} \times \frac{103}{100} \times \frac{103}{100}$$

= Rs 8195.45

Sol.79: Here, P = Rs 4000, R_1 = 5% per annum and
R_2 = 15% per ammum.

$\therefore$ Amount after 2 years $= P\left(1+\frac{R_1}{100}\right)\left(1+\frac{R_2}{100}\right)$

$$= \text{Rs } 4000 \times \left(1+\frac{5}{100}\right)\left(1+\frac{15}{100}\right)$$

$$= \text{Rs } 4000 \times \left(1+\frac{1}{20}\right)\left(1+\frac{3}{20}\right)$$

$$= \text{Rs } 4000 \times \frac{21}{20} \times \frac{23}{20} = \text{Rs } 4830$$

Thus, the refrigerator will cost Rs 4830 to Ram Singh.

Sol.81: Let the principal be Rs 100. Then,

$$\text{Amount after three years} = \text{Rs}\left[100\times\left(1+\frac{10}{100}\right)^3\right]$$

$$= \text{Rs}\left[100\times\left(\frac{11}{100}\right)^3\right]$$

$$= \text{Rs } 133.10$$

$\therefore$ Compound interest = Rs (133.10 – 100)
= Rs 33.10

Now,
If compound interest is Rs 33.10, principal = Rs 100
If compound interest is Re 1, principal

$$= \text{Rs}\frac{100}{33.10}$$

If compound interest is Rs 331, principal

$$= \text{Rs}\left(\frac{100}{33.10}\times 331\right)$$

$$= \text{Rs } 1000$$

Hence, principal = Rs 1000

Sol.82: Let the sum be Rs 100.
Computation of compound interest:
We have, Principal = Rs 100,
R = 10% per annum and n = 2 years.

$$\text{Amount} = \text{Rs}\left[100\times\left(1+\frac{10}{100}\right)^2\right]$$

$$= \text{Rs}\left[100\times\left(\frac{11}{10}\right)^2\right] = \text{Rs } 121$$

$\therefore$ C.I. = Rs 121 – Rs 100 = Rs 21
Computation of simple interest:
We have, Principal = Rs 100,
R = 10% and Time = 2 years.

$$\therefore \text{ S.I.} = \text{Rs}\left(\frac{100\times 10\times 2}{100}\right) = \text{Rs } 20$$

Thus, difference in C.I. and S.I. = Rs (21 – 20)
= Re 1

Now,
If difference between C.I. and S.I. is Re 1, sum
= Rs 100
If difference between C.I. and S.I. is Rs 500, Sum = Rs (100 × 500) = Rs 50000.

Sol.83: Here, amount A = Rs 882, Principal P = Rs 800 and rate R = 5% per annum.

$$\therefore \text{ A} = \text{P}\left(1+\frac{\text{R}}{100}\right)^n$$

$$\Rightarrow 881 = 800\left(1+\frac{5}{100}\right)^n$$

$$\Rightarrow \frac{882}{800} = \left(1+\frac{1}{20}\right)^n$$

$$\Rightarrow \frac{882}{800}=\left(\frac{21}{20}\right)^n$$

$$\Rightarrow \frac{441}{400}=\left(\frac{21}{20}\right)^2$$

$$\Rightarrow \left(\frac{21}{20}\right)^n=\left(\frac{21}{20}\right)^2$$

$\Rightarrow n = 2$

Hence, required time is 2 years.

Sol.85: Let the principal be Rs P and the rate of interest be R% per annum.

We have, C.I. = Rs 110, S.I. = Rs 100 and Time = 2 years.

$$\therefore \quad 110 = P\left(1+\frac{R}{100}\right)^2 - P \text{ and } 100 = \frac{P\times R\times 2}{100}$$

$$\Rightarrow 110 = P\left\{\left(1+\frac{R}{100}\right)^2 - 1\right\} \text{ and } 100 = \frac{PR}{50}$$

$$\Rightarrow 110 = P\left\{\left(1+\frac{R}{100}\right)^2 - 1\right\} \text{ and } PR = 5000$$

$$\Rightarrow 110 = P\left\{1+\frac{2R}{100}+\frac{R^2}{10000} - 1\right\} \text{ and } PR = 5000$$

$$\Rightarrow 110 = \frac{2PR}{100}+\frac{PR^2}{10000} \text{ and } PR = 5000$$

$$\Rightarrow 110 = \frac{PR}{50}+\frac{PR}{10000}\times R \text{ and } PR = 5000$$

$$\Rightarrow 110 = \frac{5000}{50}+\frac{5000}{10000}\times R$$

$$\Rightarrow 110 = 100 + \frac{R}{2}$$

$$\Rightarrow 10 = \frac{R}{2} \qquad \Rightarrow 10 = \frac{R}{2} \qquad \Rightarrow \quad R = 20$$

Putting R = 20 in PR = 5000, we get 20P = 5000

$\Rightarrow P = 250$

Hence, principal = Rs 250 and rate = 20% per annum.

Sol.87 We have,

Annual birth rate = 4%, Annual death rate = 2%

$\therefore$ Annual growth = (4 – 2)% = 2%

Thus, we have

P = Initial population = 20000,

R = Rate of growth = 2% per annum,

n = 2 years

$$\therefore \text{ Population after 2 years} = P\left(1+\frac{R}{100}\right)^n$$

$$= 20000 \times \left(1+\frac{2}{100}\right)^2$$

$$= 20000 \times \left(1+\frac{1}{50}\right)^2$$

$$= 20000 \times \left(\frac{51}{50}\right)^2$$

$$= 20000 \times \frac{51}{50} \times \frac{51}{50} = 20808$$

Hence, population of the town after 2 years
$= 20808.$

Sol.90: Let the rate of growth be R% per annum.
We have, Present production = 48400 scooters.
Previous production = 40000 scooters,
Number of years = 2.

$$\therefore \quad 48400 = 40000 \times \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \quad \frac{484}{400} = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \quad \frac{121}{100} = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \quad \left(1+\frac{R}{100}\right)^2 = \left(\frac{11}{10}\right)^2$$

$$\Rightarrow 1+\frac{R}{100} = \frac{11}{10} \quad \Rightarrow \quad \frac{R}{100} = \frac{11}{10} - 1 \quad \Rightarrow \quad \frac{R}{100} = \frac{1}{10} \quad \Rightarrow \quad R = \frac{100}{10} = 10$$

Hence, required rate of growth = 10% per annum.

Sol.91: We have,
P = Original count of bacteria = 10000
$\therefore$ Bacteria count after 3 hours

$$= 10000 \times \left(1+\frac{10}{100}\right) \times \left(1-\frac{10}{100}\right) \times \left(1+\frac{10}{100}\right)$$

$$= 10000 \times \frac{11}{10} \times \frac{9}{10} \times \frac{11}{10}$$

$$= 10 \times 11 \times 9 \times 11 = 10890.$$

Sol.92: We have,
Initial number of workers = 10000
Reduction of workers at the end of first year
= 10%
Reduction of workers at the end of second year
= 5%
Reduction of workers at the end of third year
= 10%
$\therefore$ Number of workers working during the fourth year

$$= 10000\left(1-\frac{10}{100}\right)\left(1-\frac{5}{100}\right)\left(1+\frac{10}{100}\right)$$

$$= 10000 \times \frac{9}{10} \times \frac{19}{20} \times \frac{11}{10} = 9405.$$

Hence, the number of workers working during the fourth year was 9405.

Sol.94: Let the rate of decay be R% per annum and the age of wooden piece be n years. let the original amount of carbon in the wooden piece be P. Then, in 5568 years the amount left is $\frac{P}{2}$.

$$\therefore \quad \frac{P}{2} = P\left(1-\frac{R}{100}\right)^{5568}$$

$$\Rightarrow \quad \frac{1}{2} = \left(1-\frac{R}{100}\right)^{5568}$$

After n years, the carbon left in the wooden piece is 12.5% of P i.e., $\frac{12.5P}{100} = \frac{P}{8}$.

$$\therefore \quad \frac{P}{8} = P\left(1-\frac{R}{100}\right)^{n}$$

$$\Rightarrow \quad \frac{P}{8} = \left(1-\frac{R}{100}\right)^{n}$$

$$\Rightarrow \quad \left(\frac{1}{2}\right)^{3} = \left(1-\frac{R}{100}\right)^{n}$$

$$\Rightarrow \quad \left\{\left(1-\frac{R}{100}\right)^{5568}\right\}^{3} = \left(1-\frac{R}{100}\right)^{n}$$

$$\Rightarrow \quad \left(1-\frac{R}{100}\right)^{5568\times 3} = \left(1-\frac{R}{100}\right)^{n}$$

$\Rightarrow$ n = 5568 × 3 = 16704 years.

Hence, the age of the wooden piece is 16704 years.

Sol.95: We have,

V_0 = Initial value = Rs 100000,

R = Rate of depreciation = 10% per annum

$$\therefore \quad \text{Value after 3 years} \quad = V_0\left(1-\frac{R}{100}\right)^{3}$$

$$= \text{Rs}\left\{100000\times\left(1-\frac{10}{100}\right)^{3}\right\}$$

$$= \text{Rs}\left\{100000\times\left(1-\frac{1}{10}\right)^{3}\right\}$$

$$= \text{Rs}\left\{100000\times\left(\frac{9}{10}\right)^{3}\right\}$$

$$= \text{Rs}\left\{100000\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\right\}$$

$$= \text{Rs } 72900$$

Hence, value of the flat after 3 years = Rs 72900.

Sol.96: We have,

Cost of the car = Rs 360000

Rate of depreciation in first two years

= 10% per annum.

Rate of depreciation in third year = 20%

$\therefore$ Price of the car after 3 years

$$= \text{Rs}\left\{360000\times\left(1-\frac{10}{100}\right)\times\left(1-\frac{10}{100}\right)\times\left(1-\frac{20}{100}\right)\right\}$$

$$= \text{Rs}\left\{360000\times\left(1-\frac{1}{10}\right)\times\left(1-\frac{1}{10}\right)\times\left(1-\frac{1}{5}\right)\right\}$$

$$= \text{Rs}\left\{360000\times\frac{9}{10}\times\frac{9}{10}\times\frac{4}{5}\right\} = \text{Rs } 233280$$

Hence, the price of the car after 3 years

= Rs 233280.

Sol.97: Let the original value be Rs P.

It is given that

R = rate of increase = 5% per annum.

Present value = Rs 411540, n = Period = 3 years.

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

$$\Rightarrow 411540 = P\left(1+\frac{5}{100}\right)^3$$

$$\Rightarrow 411540 = P\left(\frac{21}{20}\right)^3$$

$$\Rightarrow P = 411540\times\left(\frac{21}{20}\right)^3 = \frac{411540\times 8000}{9261}$$

$$= 355503.72$$

Hence, the original value of the property was Rs 355503.72

Sol.98: Let the rate of depreciation be R% per year. Then,

$$14440 = 16000\left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \frac{1444}{1600} = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \frac{361}{400} = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \left(\frac{19}{20}\right)^2 = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \frac{19}{20} = 1 + \frac{R}{100}$$

$$\Rightarrow \frac{R}{100} = \frac{1}{20}$$

$$\Rightarrow R = 5$$

Hence, the rate of depreciation is 5% per annum.

Hints & Solution - 2

Sol.6 Let 88% of 370 + 24% of 210 – x = 118.

Then, $x = \left(\frac{88}{100}\times 370\right) + \left(\frac{24}{100}\times 210\right) - 118$

$= 325.60 + 50.40 - 118 = 376 - 118 = 258$

Sol.9 Let 40% of 1640 + x = 35% of 980 + 150% of 850

Then, x

= 35% of 980 + 150 % of 850 – 40% of 1640

$= \left(\frac{35}{100}\times 980 + \frac{150}{100}\times 850\right) - \left(\frac{40}{100}\times 1640\right)$

$= (343 + 1275 - 656) = (1618 - 656) = 962.$

Sol.10 Let 218% of 1674 = x × 1800.

Then, $x = \left(\frac{218}{100}\times 1674\times \frac{1}{1800}\right) = 2.0274.$

Sol.11 60% of 264 $= \left(\frac{60}{100}\times 264\right) = 158.40$; 10% of 44

$= \left(\frac{10}{100}\times 44\right) = 4.40;$

15% of 1056 $= \left(\frac{15}{100}\times 1056\right)$

$= 158.40$; 30% of 132 $= \left(\frac{30}{100}\times 132\right) = 39.60$

∴ 60% of 264 = 15% of 1056

Sol.18 Total cost = Rs.[1 × 1000 + (100 – 2)% of 1 × 4000]

= Rs. (1000 + 0.98 × 4000) = Rs. (1000 + 3920)

= Rs. 4920.

Sol.19 Actual price = Rs. (25 + 2.50) = Rs. 27.50.

∴ Saving $= \left(\frac{2.50}{27.50}\times 100\right)\% = \frac{100}{11}\% = 9\frac{1}{11}\%$

$\approx 9\%$

Sol.20 Quantity of pure aicd = 20% of 8 litres

$= \left(\frac{20}{100}\times 8\right)$ litres = 1.6 litres.

Sol.21 Rebate = 6% of Rs. 6650 = Rs. $\left(\frac{6}{100}\times 6650\right)$

= Rs. 399

Sales tax = 10% of Rs. (6650 – 399)

= Rs. $\left(\frac{10}{100}\times 6251\right)$ = Rs. 625.10.

∴ Final amount = Rs. (6251 + 625.10) = Rs. 6876.10.

Sol.22 $\frac{384}{540} = \left(\frac{384}{540}\times 100\right)\% = 71\frac{1}{9}\%$; $\frac{425}{500}$

$= \left(\frac{425}{500}\times 100\right)\% = 85\%$;

$\frac{570}{700} = \left(\frac{570}{700}\times 100\right)\% = 81\frac{3}{7}\%$;

$\frac{480}{660} = \left(\frac{480}{660}\times 100\right)\% = 72\frac{8}{11}\%$.

$\therefore$ $\frac{425}{500}$ shows the best percentage.

Sol.28 Let 95%of x = 4598. Then, $\frac{95}{100} \times x = 4598$ or

$x = \left(4598\times\frac{100}{95}\right) = 4840.$

Sol.33 Let the total sale be Rs. x.

Then, 2.5 of x = 12.50 $\Leftrightarrow \left(\frac{25}{100}\times\frac{1}{100}\times x\right) = \frac{125}{10} \Leftrightarrow x = \left(\frac{125}{10}\times\frac{100\times 10}{25}\right) = 500.$

Sol.34 Let the worth of the house be Rs. x.

Then, $\frac{2}{7}\%$ of x = 2800 $\Leftrightarrow \left(\frac{2}{7}\times\frac{1}{100}\times x\right) = 2800 \Leftrightarrow x = \left(\frac{2800\times 100\times 7}{2}\right) = 9{,}80{,}000.$

Sol.37 Let the number be x.

Then, 20% of x = 120 $\Leftrightarrow \left(\frac{20}{100}\times x\right) = 120$

$\Leftrightarrow x = \left(\frac{120\times 100}{20}\right) = 600.$

$\therefore$ 120% of x = $\left(\frac{120}{100}\times 600\right) = 720.$

Sol.38 Let the number be x.

Then, 35% of x = 175 $\Leftrightarrow \left(\frac{35}{100}\times x\right) = 175$

$\Leftrightarrow x = \left(\frac{175\times 100}{35}\right) = 500.$

Now, let y% of 175 = 500.

Then, $\left(\frac{y}{100}\times 175\right) = 500 \Leftrightarrow y = \left(\frac{500\times 100}{175}\right)$

$= \frac{2000}{7} = 285\frac{5}{7}.$

Sol.39 Let the number be x. Then, $\frac{2}{5}$ of $\frac{1}{3}$ of $\frac{3}{7}$ of x = 15

$\Leftrightarrow x = \left(15\times\frac{7}{3}\times 3\times\frac{5}{2}\right) = \frac{525}{2}.$

Sol.40 Let the number be x. Then, $x - \frac{2}{5}x = 510$

$$\Leftrightarrow \frac{3}{5}x = 510 \Leftrightarrow x = \left(\frac{510\times5}{3}\right) = 850.$$

$\therefore$ 10% of 850 = 85.

Sol.41 Let the number be x. Then,

$$15\% \text{ of } 40 - 25\% \text{ of } x = 2 \Leftrightarrow \frac{25}{100}x$$

$$= \left(\frac{15}{100}\times40\right) - 2 \Leftrightarrow \frac{x}{4} = 4 \Leftrightarrow x = 16.$$

Sol.42 Let the number be x. Then, x – 40% of x = 30

$$\Leftrightarrow x - \frac{40}{100}x = 30 \Leftrightarrow x - \frac{2}{5}x = 30 \Leftrightarrow \frac{3x}{5} = 30$$

$$\Leftrightarrow x = \left(\frac{30\times5}{3}\right) = 50.$$

Sol.43 Let the number be x. Then, 50% of x – 35% of x = 12

$$\Leftrightarrow \frac{50}{100}x - \frac{35}{100}x = 12 \Leftrightarrow \frac{15}{100}x = 12$$

$$\Leftrightarrow x = \left(\frac{12\times100}{15}\right) = 80.$$

Sol.44 Let the number x. Then, x – 16% of x = 42

$$\Leftrightarrow x - \frac{16}{100}x = 42 \Leftrightarrow x - \frac{4}{25}x = 42$$

$$\frac{21x}{25} = 42 \Leftrightarrow x = \left(\frac{42\times25}{21}\right) = 50.$$

Sol.45 Clearly, the numbers which have 1 or 9 in the unit's digit, have squars that end in the digit 1. Such numbers from 1 to 70 are 1, 9, 11, 19, 21, 29, 31, 39, 41, 49, 51, 59, 61, 69.
Number of such numbers = 14.

$\therefore$ Required percentage $= \left(\frac{14}{70}\times100\right)\% = 20\%.$

Sol.46 $\frac{4}{5} \times 70 = 56$ and $\frac{5}{7} \times 112 = 80.$

$\therefore$ Required percentage $= \left(\frac{80-56}{80}\times100\right)\%$

$$= \left(\frac{24}{80}\times100\right)\% = 30\%.$$

Sol.48 Let the number be x. Then,

$$75\% \text{ of } x + 75 = x \Leftrightarrow x - \frac{75}{100}x = 75$$

$$\Leftrightarrow x - \frac{3}{4}x = 75 \Leftrightarrow \frac{x}{4} = 75$$

$$\Leftrightarrow x = 300.$$

Sol.49 Let the number be x.

Then, $x - 35 = \frac{80}{100}x \Leftrightarrow x - \frac{80}{100}x = 35$

$\Leftrightarrow x = \frac{35\times100}{20} = 175 \Leftrightarrow \frac{4}{5}x = 140.$

Sol.50 Let the number be 100 and required multiplier be y.

Then, $100y = 129.7$ or $y = \frac{129.7}{100} = 1.297.$

Sol.53 Least C.P. = Rs. (200 × 8) = Rs. 1600. Greatest S.P. = Rs. (425 × 8) = Rs. 3400.
Required profit = Rs. (3400 – 1600) = Rs. 1800.

Sol.54 Profit = Rs. (2602.58 – 2090.42) = Rs. 512.16.

$\text{Profit\%} = \left(\frac{512.16}{2090.42}\times100\right)\% = \left(\frac{512160}{209042}\times10\right)\%$
$= 24.5\% \approx 25\%.$

Sol.56 C.P. of 1 kg = Rs. $\left(\frac{420}{70}\right)$ = Rs. 6 S.P. of 1 kg
= Rs. 6.50.

$\therefore$ Gain % = $\left(\frac{0.50}{6}\times100\right)\% = \frac{25}{3}\% = 8\frac{1}{3}\%.$

Sol.57 C.P. of 1 toy = Rs. $\left(\frac{375}{12}\right)$ = Rs. 31.25. S.P. of 1 toy = Rs. 33.

$\therefore$ Profit % = $\left(\frac{1.75}{31.25}\times100\right)\% = \frac{28}{5}\% = 5.6\%.$

Sol.58 C.P. for 1 of orange = Rs. $\left(\frac{350}{100}\right)$ = Rs. 3.50. S.P. of 1 orange = Rs. $\left(\frac{48}{12}\right)$ = Rs. 4.

$\therefore$ Gain % = $\left(\frac{0.50}{3.50}\times100\right)\% = \frac{100}{7}\% = 14\frac{2}{7}\%$

Sol.59 S.P. = 85% of Rs. 1400 = Rs. $\left(\frac{85}{100}\times1400\right)$
= Rs. 1190.

Sol.60 C. P. for B = 120 % of Rs. 400 = Rs. $\left(\frac{120}{100}\times400\right)$
= Rs. 480.

C.P. for C = 110% of Rs. 480 = Rs. $\left(\frac{110}{100}\times480\right)$
= Rs. 528.

Sol.61 C.P. = Rs. (80000 + 5000 + 1000) = Rs. 86,000, Profit = 25%

$\therefore$ S.P. = 125% of Rs. 86000 = Rs. $\left(\frac{125}{100}\times86000\right)$
= Rs. 107500.

Sol.62 S.P. = Rs. 100, gain = Rs. 15.
$\therefore$ C.P. = Rs. (100 – 15) = Rs. 85.

$\text{Gain\%} = \left(\frac{15}{85}\times100\right)\% = \frac{300}{17}\% = 17\frac{11}{17}\%$

Sol.66 Total investment

$= \text{Rs.}\left(120\times80+280+\frac{40}{100}\times120+72\right)$

= Rs. (9600 + 280+ 48+ 72) = Rs. 10000.

S.P. of 120 reams = 108% of Rs. 10000 = Rs. 10800.

$\therefore$ S.P. per ream = $\left(\frac{10800}{120}\right)$ = Rs. 90.

Sol.67 Investment = Rs. (20 × 8 + 10) = Rs. 170.

Receipt = Rs. (30 × 5 + 20 × 4) = Rs. 230.

$\therefore$ Gain % = $\left(\frac{60}{170}\times100\right)\%$ = 35.29% = 35.3%

Sol.68 Let the C.P. be Rs. x. Then, 20% of x = 1100

$\Rightarrow \frac{20}{100} \times x = 1100 \Rightarrow x = 5500.$

C.P. = Rs. 5500, Expenditure on repairs = 10%

Actual price = Rs. $\left(\frac{100}{110}\times5500\right)$ = Rs. 5000.

$\therefore$ Expenditure on repairs = Rs. (5500 – 5000)

= Rs. 500.

Sol.69 Total cost incurred

= Rs. $\left[\frac{100}{125}\times25\times(95\%\text{ of }2000)\right]$

= Rs. $\left(\frac{100}{125}\times25\times1900\right)$ = Rs. 38000.

Loss to the manufacturer

= Rs. [38000 – (25 × 1000)] = Rs. 13000.

Sol.70 C.P. =Rs. $\left(600+\frac{600\times6\times4}{100\times12}\right)$ = Rs. 612.

Gain = Rs. (765 – 612) = Rs. 153.

$\therefore$ Gain % = $\left(\frac{153}{612}\times100\right)\%$ = 25%.

Sol.74 C.P. of 1st transistor = Rs. $\left(\frac{100}{120}\times840\right)$ = Rs. 700.

C.P. of 2nd transistor = Rs. $\left(\frac{100}{96}\times960\right)$ = Rs. 1000

So, total C.P. = Rs. (700 + 1000) = Rs. 1700.

Total S.P. = Rs. (840 + 960) = Rs. 1800.

$\therefore$ Gain % = $\left(\frac{100}{1700}\times100\right)\%$ = $5\frac{15}{17}\%$.

Sol.75 Let C.P. = Rs. x. Then, S.P. = Rs. $\frac{4x}{3}$.

Gain = Rs. $\left(\frac{4x}{3}-x\right)$ = Rs. $\frac{x}{3}$.

$\therefore$ Gain% = $\left(\frac{x}{3}\times\frac{1}{x}\times100\right)\%$ = $33\frac{1}{3}\%$.

Sol.78 Let C.P. = Rs. x. Then, S.P. = Rs.(120% of x)

$$= \text{Rs. } \frac{6x}{5}.$$

$$\text{New S.P.} = \text{Rs. } \left(2\times\frac{6x}{5}\right) = \text{Rs. } \frac{12x}{5}.$$

$$\text{Profit} = \text{Rs. } \left(\frac{12x}{5}-x\right) = \text{Rs. } \frac{7x}{5}.$$

$$\therefore \text{ Profit\%} = \left(\frac{7x}{5}\times\frac{1}{x}\times100\right)\% = 140\%.$$

Sol.79 Let C.P. be Rs. x and S.P. be Rs. y.
Then, $3(y-x) = (2y-x) \Rightarrow y = 2x$.
Profit = Rs. $(y-x)$ = Rs. $(2x-x)$ = Rs. x.

$$\therefore \text{ Profit\%} = \left(\frac{x}{x}\times100\right)\% = 100\%.$$

Sol.80 Let S.P. = Rs. x. New S.P. = Rs. $\frac{x}{2}$, Loss = 30%.

$$\text{So, C.P.} = \text{Rs. } \left(\frac{100}{70}\times\frac{x}{2}\right) = \text{Rs. } \frac{5x}{7}.$$

$$\text{Profit} = \text{Rs. } \left(x-\frac{5x}{7}\right) = \text{Rs. } \frac{2x}{7}$$

$$\therefore \text{ Profit\%} = \left(\frac{2x}{7}\times\frac{7}{5x}\times100\right)\% = 40\%.$$

Sol.83 S.P. = C.P. + $\frac{1}{4}$C.P. = $\frac{5}{4}$C.P.

$$\therefore \frac{5}{4}\text{C.P.} = 375 \Rightarrow \text{C.P.} = \text{Rs. } \left(375\times\frac{4}{5}\right) = \text{Rs. } 300.$$

Sol.84 Let S.P. = Rs. 100.
Then, Loss = 10, C.P. = Rs. (100 + 10) = Rs. 110.

$$\therefore \text{ Loss\%} = \left(\frac{10}{110}\times100\right)\% = 9\frac{1}{11}\%.$$

Sol.85 Let S.P. = Rs. x.

$$\text{Then, Loss} = \text{Rs. } \frac{x}{3}. \text{ C.P.} = \text{Rs. } \left(x+\frac{x}{3}\right) = \text{Rs. } \frac{4x}{3}.$$

$$\therefore \text{ Loss\%} = \left(\frac{x}{3}\times\frac{3}{4x}\times100\right)\% = 25\%$$

Sol.86 $A : B = 5 : 7$, $B : C = 6 : 11 = \left(6\times\frac{7}{6}\right) : \left(11\times\frac{7}{6}\right)$

$$= 7 : \frac{77}{6}.$$

$$\therefore A : B : C = 5 : 7 : \frac{77}{6} = 30 : 42 : 77.$$

Sol.87 $\left(\frac{A}{B}=\frac{3}{4}, \frac{B}{C}=\frac{8}{9}\right) \Rightarrow \frac{A}{C} = \left(\frac{A}{B}\times\frac{B}{C}\right) = \left(\frac{3}{4}\times\frac{8}{9}\right)$

$= \frac{2}{3} \Rightarrow A : C = 2 : 3.$

Sol.88 $\frac{A}{B} = \frac{8}{15}$, $\frac{B}{C} = \frac{5}{8}$ and $\frac{C}{D} = \frac{4}{5}$

$\Rightarrow \frac{A}{D} = \left(\frac{A}{B} \times \frac{B}{C} \times \frac{C}{D}\right) = \left(\frac{8}{15} \times \frac{5}{8} \times \frac{4}{5}\right) = \frac{4}{15}$

$\Rightarrow A : D = 4 : 15.$

Sol.89 Let A = 2x, B = 3x and C = 4x.

Then, $\frac{A}{B} = \frac{2x}{3x} = \frac{2}{3}$, $\frac{B}{C} = \frac{3x}{4x} = \frac{3}{4}$

and $\frac{C}{A} = \frac{4x}{2x} = \frac{2}{1}$

$\Rightarrow \frac{A}{B} : \frac{B}{C} : \frac{C}{A} = \frac{2}{3} : \frac{3}{4} : \frac{2}{1} = 8 : 9 : 24.$

Sol.90 $A : B = \frac{1}{2} : \frac{3}{8} = 4 : 3$, $B : C = \frac{1}{3} : \frac{5}{9} = 3 : 5$,

$C : D = \frac{5}{6} : \frac{3}{4} = 10 : 9$

$\Rightarrow A : B = 4 : 3, B : C = 3 : 5$ and $C : D = 5 : \frac{9}{2}$

$\Rightarrow A : B : C : D = 4 : 3 : 5 : \frac{9}{2} = 8 : 6 : 10 : 9.$

Sol.96 $\frac{1}{5} : \frac{1}{x} = \frac{1}{x} : \frac{100}{125} \Rightarrow \left(\frac{1}{x} \times \frac{1}{x}\right) = \left(\frac{1}{5} \times \frac{100}{125}\right)$

$= \frac{4}{25}$

$\Rightarrow \frac{1}{x^2} = \frac{4}{25} \Rightarrow x^2 = \frac{25}{4} \Rightarrow x = \frac{5}{2} = 2.5$

Sol.98 Let x = 5k and y = 2k. Then,

$\frac{8x+9y}{8x+2y} = \frac{(8\times5k)+(9\times2k)}{(8\times5k)+(2\times2k)} = \frac{58k}{44k} = \frac{29}{22}.$

$\Rightarrow (8x + 9y) : (8x + 2y) = 29 : 22.$

Sol.100 $\frac{x}{y} = \frac{2}{1} \Leftrightarrow \frac{x^2}{y^2} = \frac{4}{1} \Leftrightarrow \frac{x^2+y^2}{x^2-y^2} = \frac{4+1}{4-1}$

[By componendo and dividendo]

$\Rightarrow \frac{x^2-y^2}{x^2+y^2} = \frac{3}{5} \Leftrightarrow (x^2 - y^2) : (x^2 + y^2) = 3 : 5.$

Sol.101 $\frac{4x^2-3y^2}{2x^2+5y^2} = \frac{12}{19} \Leftrightarrow 19(4x^2 - 3y^2) = 12(2x^2 + 5y^2)$

$\Leftrightarrow 52x^2 = 117y^2 \Leftrightarrow 4x^2 = 9y^2 \Leftrightarrow \frac{x^2}{y^2} = \frac{9}{4}$

$\Leftrightarrow \frac{x}{y} = \frac{3}{2}$

$\therefore$ Required ratio is 3 : 2.

Sol.103 $5x^2 - 13xy + 6y^2 = 0 \Leftrightarrow 5x^2 - 10xy - 3xy + 6y^2 = 0$

$\Leftrightarrow 5x(x - 2y) - 3y(x - 2y) = 0$

$\Leftrightarrow (x - 2y)(5x - 3y) = 0$

$\Leftrightarrow x = 2y$ or $5x = 3y \Leftrightarrow \frac{2}{1}$ or $\frac{x}{y} = \frac{3}{5}$.

$\therefore (x : y) = (2 : 1)$ or $(3 : 5)$.

Sol.104 Let $\frac{x}{5} = \frac{y}{8} = k$, Then, $x = 5k$ and $y = 8k$.

$\therefore \frac{x+5}{y+8} = \frac{5k+5}{8k+8} = \frac{5(k+1)}{8(k+1)} = \frac{5}{8}$

$\Rightarrow (x + 5) : (y + 8) = 5 : 8$.

Sol.105 Let $\frac{a}{3} = \frac{b}{4} = \frac{c}{7} = k$. Then, $a = 3k$, $b = 4k$, $c = 7k$.

$\therefore \frac{a+b+c}{c} = \frac{3k+4k+7k}{7k} = \frac{14k}{7k} = 2$.

Sol.110 Let the numbers be 3x and 5x. Then, $\frac{3x-9}{5x-9} = \frac{12}{23}$

$\Leftrightarrow 23(3x - 9) = 12(5x - 9) \Leftrightarrow 9x = 99 \Leftrightarrow x = 11$.

$\therefore$ The smaller number $= (3 \times 11) = 33$.

Sol.111 Let the numbers be x and 2x. Then, $\frac{x+7}{2x+7} = \frac{3}{5}$ $\Leftrightarrow 5(x + 7) = 3(2x + 7)$

$\Leftrightarrow x = 14$.

$\therefore$ Greatest number = 28.

Sol.112 $A : B = 5 : 4$, $B : C = 9 : 10 = \left(9 \times \frac{4}{9}\right) : \left(10 \times \frac{4}{9}\right)$

$= 4 : \frac{40}{9}$.

$\therefore A : B : C = 5 : 4 : \frac{40}{9} = 45 : 36 : 40$.

Sum of ratio terms $= (45 + 36 + 40) = 121$.

$\therefore$ C's share $= \text{Rs.} \left(1210 \times \frac{40}{121}\right) = \text{Rs. } 400$.

Sol.113 Let the number of 25 p, 10 p and 5 p coins be x, 2x and 3x respectively.

Then, sum of their values

$= \text{Rs.} \left(\frac{25x}{100} + \frac{10 \times 2x}{100} + \frac{5 \times 3x}{100}\right) = \text{Rs.} \frac{60x}{100}$.

$\therefore \frac{60x}{100} = 30 \Leftrightarrow x = \frac{30 \times 100}{60} = 50$.

Hence, the number of 5 p coins $= (3 \times 50) = 150$.

Sol.114 Let the numbers be 3x, 4x and 5x. Then,

$9x^2 + 16x^2 + 25x^2 = 1250 \Leftrightarrow 50x^2 = 1250$

$\Leftrightarrow x^2 = 25 \Leftrightarrow x = 5$.

$\therefore$ Sum of numbers $= (3x + 4x + 5x) = 12x$

$= (12 \times 5) = 60.$

Sol.115 Let the numbers be 3x, 4x and 7x. Then,

$3x \times 4x \times 7x = 18144 \Leftrightarrow x^3 = 216 \Leftrightarrow x^3 = 6^3$

$\Leftrightarrow x = 6.$

$\therefore$ The numbers are 18, 24, and 42.

Sol.116 Let the original salaries of Ravi and Sumit be Rs. 2x and Rs. 3x respectively. Then,

$\frac{2x+4000}{3x+4000} = \frac{40}{57} \Leftrightarrow 57\ (2x + 4000)$

$= 40\ (3x + 4000) \Leftrightarrow 6x = 68000 \Leftrightarrow 3x = 34000.$

Sumit's present salary = $(3x + 4000)$

= Rs. $(34000 + 4000)$ = Rs. 38,000.

Sol.117 $\left(A = \frac{2}{3}B \text{ and } B = \frac{1}{4}C\right) \Leftrightarrow \frac{A}{B} = \frac{2}{3}$ and $\frac{B}{C} = \frac{1}{4}$

$\Rightarrow A : B = 2 : 3$ and $B : C = 1 : 4 = 3 : 12$

$\Rightarrow A : B : C = 2 : 3 : 12.$

$\therefore$ A's share = Rs. $\left(510 \times \frac{2}{17}\right)$ = Rs. 60;

B's share = Rs. $\left(510 \times \frac{3}{17}\right)$ = Rs. 90;

C's share = Rs. $\left(510 \times \frac{12}{17}\right)$ = Rs. 360.

Sol.118 Let the three parts be A, B, C. Then,

$A : B = 2 : 3$ and $B : C = 5 : 8 = \left(5 \times \frac{3}{5}\right) : \left(8 \times \frac{3}{5}\right)$

$= 3 : \frac{24}{5}$

$\Rightarrow A : B : C = 2 : 3 : \frac{24}{5} = 10 : 15 : 24$

$\Rightarrow B = \left(98 \times \frac{15}{49}\right) = 30.$

Sol.121 Let $P = 2x$ and $Q = 3x$. Then, $\frac{Q}{R} = \frac{2}{3} \Rightarrow R = \frac{2}{3}Q$

$= \left(\frac{3}{2} \times 3x\right) = \frac{9x}{2}.$

Also, $\frac{R}{S} = \frac{2}{3} \Rightarrow S = \frac{3}{2}R = \left(\frac{3}{2} \times \frac{9x}{2}\right) = \frac{27x}{4}.$

Thus, $P = 2x$, $Q = 3x$, $R = \frac{9x}{2}$ and $S = \frac{27x}{4}.$

Now, $P + Q + R + S = 1300$

$\Leftrightarrow \left(2x + 3x + \frac{9x}{2} + \frac{27x}{4}\right) = 1300$

$\Leftrightarrow (8x + 12x + 18x + 27x) = 5200$

$\Leftrightarrow 65x = 5200 \Leftrightarrow x = \frac{5200}{65} = 80.$

$\therefore$ P's share = Rs. (2×80) = Rs. 160.

Sol.122 $\frac{4}{15}A = \frac{2}{5}B \Leftrightarrow A = \left(\frac{2}{5}\times\frac{15}{4}\right)B \Leftrightarrow A = \frac{3}{2}B$

$\Leftrightarrow \frac{A}{B} = \frac{3}{2} \Leftrightarrow A : B = 3 : 2$

$\therefore$ B's share = Rs. $\left(1210\times\frac{2}{5}\right)$ = Rs. 484.

Sol.125 For dividing 12 into two whole numbers, the sum of the ratio terms must be a factor of 12. So, they cannot be in the ratio 3 : 2.

Sol.126 Originally, let the number of seats for mathematics, Physics and Biology be 5x, 7x and 8x respectively.

Number of increased seats are (140% of 5x), (150% of 7x) and (175% of 8x)

i.e. $\left(\frac{140}{100}\times 5x\right)$, $\left(\frac{150}{100}\times 7x\right)$ and $\left(\frac{175}{100}\times 8x\right)$ i.e. 7x,

$\frac{21x}{2}$ and 14x.

$\therefore$ Required ratio = $7x : \frac{21x}{2} : 14x$

= 14x : 21x : 28x = 2 : 3 : 4.

Sol.127 Originally, let the number of boys and girls in the college be 7x and 8x respectively. Their increased number is (120% of 7x) and (110% of 8x)

i.e. $\left(\frac{120}{100}\times 7x\right)$ and $\left(\frac{110}{100}\times 8x\right)$ i.e. $\frac{42x}{5}$ and $\frac{44x}{5}$.

$\therefore$ Required ratio = $\frac{42x}{5} : \frac{44x}{5}$ = 21 : 22.

Sol.128 Let the shares of A, B,C and D be Rs. 5x, Rs. 2x, Rs. 4x and Rs. 3x respectively.

Then, 4x – 3x = 1000 $\Leftrightarrow$ x = 1000.

$\therefore$ B's share = Rs. 2x = Rs. (2 × 1000) = Rs. 2000.

Sol.129 Let 40% of A = $\frac{2}{3}$B. Then, $\frac{40A}{100} = \frac{2B}{3}$

$\Leftrightarrow \frac{2A}{5} = \frac{2B}{3} \Leftrightarrow \frac{A}{B} = \left(\frac{2}{3}\times\frac{5}{2}\right) = \frac{5}{3}$.

$\therefore$ A : B = 5 : 3.

Sol.130 Let the original earnings of A and B be Rs. 4x and Rs. 7x.

New earnings of A = 150% or Rs. 4x

$$= \text{Rs.}\left(\frac{150}{100}\times 4x\right) = \text{Rs. } 6x.$$

New earning of B = 75% of Rs. 7x

$$= \text{Rs.}\left(\frac{75}{100}\times 7x\right) = \text{Rs. } \frac{21x}{4}.$$

$\therefore 6x : \frac{21x}{4} = 8 : 7 \Leftrightarrow \frac{6x\times 4}{21x} = \frac{8}{7}$.

This does not give x. So, the given data is inadequate.

Sol.132 Quantity of milk = $\left(60\times\frac{2}{3}\right)$ litres = 40 litres.

Quantity of water in it = (60 – 40) litres = 20 litres.
New Ratio required = 1 : 2.

Let quantity of water to be added further be x litres. Then, milk : water = $\frac{40}{(20+x)}$.

Now, $\frac{40}{(20+x)} = \frac{1}{2} \Leftrightarrow 20 + x = 80 \Leftrightarrow x = 60.$

Quantity of water to be further added = 60 litres.

Sol.133 Let the fourth proportional to 5, 8, 15 be x.
Then, 5 : 8 : : 15 : x $\Leftrightarrow 5x = (8 \times 15)$

$\Leftrightarrow x = \frac{(8\times15)}{5} = 24.$

Sol.135 Let the third proportional to 0.36 and 0.48 be x.
Then, 0.36 : 0.48 : : 0.48 : x

$\Leftrightarrow x = \left(\frac{0.48\times0.48}{0.36}\right) = 0.64$

Sol.136 A's 1 day's work = $\frac{1}{10}$ and B's 1 day's work = $\frac{1}{15}$.

$\therefore$ (A + B)'s 1 day's work = $\left(\frac{1}{10}+\frac{1}{15}\right) = \frac{1}{6}$.

So, both together will finish the work in 6 days.

Sol.137 A's 1 day's work = $\frac{1}{18}$ and B's 1 day's work = $\frac{1}{9}$.

$\therefore$ (A + B)'s 1 day's work = $\left(\frac{1}{18}+\frac{1}{9}\right) = \frac{1}{6}$.

Sol.139 (A + B + C)'s 1 day's work = $\left(\frac{1}{24}+\frac{1}{6}+\frac{1}{12}\right) = \frac{7}{24}$.

So, A , B and C together will complete job in $\frac{24}{7} = 3\frac{3}{7}$ days .

Sol.140 1 day's work of the three persons

$= \left(\frac{1}{15}+\frac{1}{20}+\frac{1}{25}\right) = \frac{47}{300}$

So, all the three together will complete the work in $\frac{300}{47} \approx 6.4$ days.

Sol.142 (A + B + C)'s 1 day's work = $\frac{1}{4}$,

A's 1 day's work = $\frac{1}{16}$, B's 1 day's work = $\frac{1}{12}$.

$\therefore$ C's 1 day's work = $\frac{1}{4} - \left(\frac{1}{16}+\frac{1}{12}\right) = \left(\frac{1}{4}-\frac{7}{48}\right)$

$= \frac{5}{48}$.

So, C alone can do the work in $\frac{48}{5} = 9\frac{3}{5}$ days.

Sol.143 Suppose A, B and C take x, $\frac{x}{2}$ and $\frac{x}{3}$ hours respectively to finish the work.

Then, $\left(\frac{1}{x}+\frac{2}{x}+\frac{3}{x}\right) = \frac{1}{2} \Rightarrow \frac{6}{x} = \frac{1}{2} \Rightarrow x = 12.$

So, B takes 6 hours to finish the work.

Sol.144 Whole work will be done by X in (10×4)
$= 40$ days.

Whole work will be done by Y in $\left(40\times\frac{100}{40}\right)$
$= 100$ days.

Whole work will be done by Z in (13×3)
$= 39$ days.

$\therefore$ Z will complete the work first.

Sol.145 Let the number of pages typed in one hour by P, Q and R be x, y and z respectively. Then,

$x + y + z = \frac{216}{4} \Rightarrow x + y + z = 54$...(i)

$z - y = y - x \Rightarrow 2y = x + z$ ...(ii)

$5z = 7x \Rightarrow x = \frac{5}{7}z$ ...(iii)

Soliving (i), (ii) and (iii), we get $x = 15$, $y = 18$, $z = 21$.

Sol.146 Number of pages typed by Ronald in 1 hour

$= \frac{32}{6} = \frac{16}{3}.$

Number of pages typed by Elan in 1 hour

$= \frac{40}{5} = 8.$

Number of pages typed by both in 1 hour

$= \left(\frac{16}{3}+8\right) = \frac{40}{3}.$

$\therefore$ Time taken by both to type 110 pages

$= \left(110\times\frac{3}{40}\right)$ hrs $= 8\frac{1}{4}$ hrs $= 8$ hrs 15 min.

Sol.147 Let A and B together take x hours to complete the work. Then,

A alone takes $(x + 8)$ hrs and B and alone takes $\left(x+\frac{9}{2}\right)$ hrs to complete the work. Then,

$$\frac{1}{(x+8)} + \frac{1}{\left(x+\frac{9}{2}\right)} = \frac{1}{x} \Rightarrow \frac{1}{(x+8)} + \frac{2}{(2x+9)}$$

$$= \frac{1}{x} \Rightarrow x(4x + 25) = (x + 8)(2x + 9)$$

$$\Rightarrow 2x^2 = 72 \Rightarrow x^2 = 36 \Rightarrow x = 6.$$

Sol.148 P can complete the work in (12×8)hrs. $= 96$ hrs.

Q can complete the work in (8×10)hrs. = 80 hrs.

$\therefore$ P's 1 hour's work = $\frac{1}{96}$

and Q's 1 hour's work = $\frac{1}{80}$.

(P + Q)'s 1 hour's work = $\left(\frac{1}{96}+\frac{1}{80}\right) = \frac{11}{480}$.

So, both P and Q will finish the work in $\left(\frac{480}{11}\right)$ hrs.

$\therefore$ Number of days of 8 hours each = $\left(\frac{480}{11}\times\frac{1}{8}\right)$

$= \frac{60}{11}$ days = $5\frac{5}{11}$ days.

Sol.149 (A + B)'s 1 day's work = $\frac{1}{12}$; (B + C)'s 1 day's work = $\frac{1}{15}$; (A + C)'s 1 day's work $= \frac{1}{20}$.

Adding, we get : 2(A + B + C)'s 1 day's work = $\left(\frac{1}{12}+\frac{1}{15}+\frac{1}{20}\right) = \frac{12}{60} = \frac{1}{5}$.

$\therefore$ (A + B + C)'s 1 day's work = $\frac{1}{10}$.

So, A, B and C together can complete the work in 10 days.

Sol.150 (A + B + C)'s 1 day's work = $\frac{1}{6}$; (A + B)'s 1 day's work = $\frac{1}{8}$;

(B + C)'s 1 day's work = $\frac{1}{12}$.

$\therefore$ (A + C)'s 1 day's work = $\left(2\times\frac{1}{6}\right) - \left(\frac{1}{18}+\frac{1}{12}\right)$

$= \left(\frac{1}{3}-\frac{5}{24}\right) = \frac{3}{24} = \frac{1}{8}$.

So, A and C together will do the work in 8 days.

Sol.151 (A+ B)'s 1 day's work = $\frac{1}{72}$; (B + C)'s 1 day's work = $\frac{1}{120}$; (A + C)'s 1 day's work $= \frac{1}{90}$.

Adding, we get : 2 (A + B + C)'s 1 day's work

$= \left(\frac{1}{72}+\frac{1}{120}+\frac{1}{90}\right) = \frac{12}{360} = \frac{1}{30}$.

$\Rightarrow$ (A + B + C)' 1 day's work = $\frac{1}{60}$.

So, A's 1 day's work = $\left(\frac{1}{60}-\frac{1}{120}\right) = \frac{1}{120}$.

$\therefore$ A alone can do the work in 120 days.

Sol.152 (A + B)'s 1 day's work = $\frac{1}{5}$; (B + C)'s 1 day's work = $\frac{1}{7}$; (A + C)'s 1 day's work

$= \frac{1}{4}$.

Adding , we get : 2 (A + B + C)'s 1 day's work $= \left(\frac{1}{5}+\frac{1}{7}+\frac{1}{4}\right) = \frac{83}{140}$.

(A + B + C)'s 1 day's work $= \frac{83}{280}$.

A's 1 day's work $= \left(\frac{83}{280}-\frac{1}{7}\right) = \frac{43}{280}$; B's 1 day's work $= \left(\frac{83}{280}-\frac{1}{4}\right) = \frac{13}{280}$;

C's 1 day's work $= \left(\frac{83}{280}-\frac{1}{5}\right) = \frac{27}{280}$.

Thus time taken by A, B, C is $\frac{280}{43}$ days, $\frac{280}{13}$ days , $\frac{280}{27}$ days respectively.
Clearly, the time taken by A is least.

Sol.153 A's 1 hour's work $= \frac{1}{4}$; (B + C)'s 1 hour's work $= \frac{1}{3}$; (A + C)'s 1 hour's work $= \frac{1}{2}$.

(A + B + C)'s 1 hour's work $= \left(\frac{1}{4}+\frac{1}{3}\right) = \frac{7}{12}$.

B's 1 hour's work $= \left(\frac{7}{12}-\frac{1}{2}\right) = \frac{1}{12}$.
$\therefore$ B alone will take 12 hours to do the work.

Sol.154 (A + B)'s 1 day's work $= \frac{1}{10}$; C's 1 day's work $= \frac{1}{50}$.

(A + B + C)'s 1 day's work $= \left(\frac{1}{10}+\frac{1}{50}\right)$

$= \frac{6}{50} = \frac{3}{25}$ ...(i)

Also, A's 1 day's work
= (B + C)'1 day's work ...(ii)
From (i) and (ii), we get : 2 × (A's 1 day's work)
$= \frac{3}{25}$.

$\Rightarrow$ A's 1 day's work $= \frac{3}{50}$.

$\therefore$ B's 1 day's work $= \left(\frac{1}{10}-\frac{3}{50}\right) = \frac{2}{50} = \frac{1}{25}$.

So, B alone could do the work in 25 days.

Sol.155 Ratio of rates of working of A and B = 2 : 1. So, ratio of times taken = 1 : 2.

$\therefore$ A's 1 day's work $= \frac{1}{6}$; B's 1 day's work $= \frac{1}{12}$.

(A + B)'s 1 day's work $= \left(\frac{1}{6}+\frac{1}{12}\right) = \frac{3}{12} = \frac{1}{4}$.

So, A and B together can finish the work in 4 days.

Sol.156 (A's 1 day's work) : (B's 1 day's work) = 2 : 1.

(A + B)'s 1 day's work = $\frac{1}{14}$.

Divide $\frac{1}{14}$ in the ratio 2 : 1.

$\therefore$ A's 1 day's work = $\left(\frac{1}{14}\times\frac{2}{3}\right) = \frac{1}{21}$.

Hence, A alone can finish the work in 21 days.

Sol.157 Ratio of times taken by A and B = 1 : 3.

If difference of time is 2 days, B takes 3 days.

If difference of time is 60 days, B takes $\left(\frac{3}{2}\times 60\right)$

= 90 days.

So, A takes 30 days to do the work.

A's 1 day's work = $\frac{1}{30}$, B's 1 day's work = $\frac{1}{90}$.

(A + B)'s 1 day's work = $\left(\frac{1}{30}+\frac{1}{90}\right) = \frac{4}{90} = \frac{2}{45}$.

$\therefore$ A and B together can do the work in $\frac{45}{2}$

= $22\frac{1}{2}$ days.

Sol.158 (A's 1 day's work) : (B's 1 day's work) = $\frac{7}{4}$: 1

= 7 : 4.

Let A's and B's 1 day's work be 7x and 4x respectively.

Then, 7x + 4x = $\frac{1}{7} \Rightarrow 11x = \frac{1}{7} \Rightarrow x = \frac{1}{11}$.

$\therefore$ A's 1 day's work = $\left(\frac{1}{77}\times 7\right) = \frac{1}{11}$.

Sol.159 Ratio of times taken by Sakshi and Tanya

= 125 : 100 = 5 : 4.

Suppose Tanya takes x days to do the work.

5 : 4 : : 20 : x $\Rightarrow$ x = $\left(\frac{4\times 20}{5}\right) \Rightarrow$ x = 16 days.

Hence, Tanya takes 16 days to complete the work.

Sol.160 Ratio of times takesn by A and B 100 : 130 = 10 : 13.

Suppose B takes x days to do the work.

Then, 10 : 13 : : 23 : x $\Rightarrow$ x = $\left(\frac{23\times 13}{10}\right)$

$\Rightarrow$ x = $\frac{299}{10}$.

A's 1 day's work = $\frac{1}{23}$; B's 1 days work = $\frac{10}{299}$.

(A + B)'s 1 day's work = $\left(\frac{1}{23}+\frac{10}{299}\right) = \frac{23}{299} = \frac{1}{13}$.

$\therefore$ A and B together can complete the job in 13 days.

Sol.167 A : B : C
= (20000 × 24) : (15000 × 24) : (20000 × 18) = 4 : 3 : 3.

∴ B's share = Rs. $\left(25000\times\frac{3}{10}\right)$ = Rs. 7500.

Sol.168 Aman : Rakhi : Sagar
= (70000 × 36) : (105000 × 30) : (140000 × 24)
= 12 : 15 : 16.

Sol.169 Arun : Kamal : Vinay
= (8000 × 6) : (4000 × 8) : (8000 × 8)
= 48 : 32 : 64 = 3 : 2 : 4.

∴ Kamal's share = Rs. $\left(4005\times\frac{2}{9}\right)$ = Rs. 890.

Sol.170 A : B : C = (40000 × 36) : (80000 × 12 + 40000 × 24) : (120000 × 24 + 40000 × 12)
= 144 : 192 : 336 = 3 : 4 : 7.

Sol.171 A : B : C = (25 lakhs × 1) + (35 lakhs × 2)
: (35 lakhs × 2 + 25 lakhs × 1) : (30 lakhs × 3)
= 95 lakhs : 95 lakhs : 90 lakhs = 19 : 19 : 18.

Sol.172 Shekar : Rajeev : Jatin
= (25000 × 12 + 35000 × 12 + 45000 × 12)
: (35000 × 24) : (35000 × 12)
= 1260000 : 840000 : 420000 = 3 : 2 : 1.

∴ Rajeev's share = Rs. $\left(150000\times\frac{2}{6}\right)$ = Rs. 50000.

Sol.173 A : B : C = (16000 × 3 + 11000 × 9)
: (12000 × 3 + 17000 × 9) : (21000 × 6)
= 147 : 189 : 126 = 7 : 9 : 6.
∴ Difference of B and C's shares

= Rs. $\left(26400\times\frac{9}{22}-26400\times\frac{6}{22}\right)$ = Rs. 3600.

Sol.174 A : B : C = (5000 × 4 + 2500 × 8)
: (4500 × 6 + 3000 × 6) : (7000 × 6)
= 40000 : 45000 : 42000 = 40 : 45 : 42.

∴ A's share = Rs. $\left(5080\times\frac{40}{127}\right)$ = Rs. 1600;

B's share = Rs. $\left(5080\times\frac{45}{127}\right)$ = Rs. 1800;

C's share = Rs. $\left(5080\times\frac{42}{127}\right)$ = Rs. 1680.

Sol.175 Let C = x. Then, B = x + 5000 and A = x + 5000 + 4000 = x + 9000.

So, x + x + 5000 + x + 9000 = 50000 $\Leftrightarrow$ 3x = 36000

$\Leftrightarrow$ x = 12000.

A : B : C = 21000 : 17000 : 12000 = 21 : 17 : 12.

$\therefore$ A's share = Rs. $\left(35000\times\frac{21}{50}\right)$ = Rs. 14,700.