9. COMMERCIAL MATHEMATICS

EXERCISE 9.1

1) Find 77% of $580 + 34\%$ of 390.

Sol: 77% of $580 + 34\%$ of 390

$= 446.6 + 132.6$

$= 579.2$

2) 240 candidates appeared for an examination, of which 204 passed. What is the pass percentage ?

Sol: Total candidates $= 240$

No. of passed candidates $= 204$

$\therefore$ Passed percentage $= \frac{204}{240} \times 100$

$= 85\%$

3) What percent of 8.4 kg is 168 grams?

Sol: 8.4 kg $= 8.4 \times 1000$ ..(1Kg $= 1000$ grams)

$= 8400$ grams.

$\therefore$ Percentage of 168 gram of 8.4 kg

$= \frac{168}{8400} \times 100$

$= 2\%$

4) If the length of a rectangle is decreased by 20%, what should be the increase in the breadth of the rectangle so that the area remains the same ?

Sol: Let the length and breadth of rectangle be $'x'$ and $'y'$ respectively.
New length $= x - 20\%$ of x

$= x - \frac{20x}{100}$

$= x - \frac{x}{5}$

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

Let the breadth increased by 2%

New breadth $= y + z\%$ of y

$= y + \frac{z}{100} \times y$

$= y + \frac{zy}{100}$

$\because$ Area of Rectangle $= xy$

and Area remains the same for new dimensions of rectangle

$\therefore$ New length $\times$ New breadth $=$ Area of rectangle

$\therefore \left(\frac{4x}{5}\right)\left(y + \frac{zy}{100}\right) = xy$

$\therefore \frac{4xy}{5}\left(1 + \frac{z}{100}\right) = xy$

$\therefore \frac{4}{5}\left(\frac{100+z}{100}\right) = \frac{xy}{xy}$

$\therefore \frac{4}{500}(100 + z) = 1$

$\therefore 100 + z = \frac{500}{4}$

$\therefore 100 + z = 125$

$\therefore z = 125 - 100$

$\therefore \boldsymbol{z = 25\%}$

5) The price of rice increased by 20%, as a result a person can have 5 kg rice for Rs. 600.

What was the initial price of rice per kg ?

Sol: Let the initial price of rice be Rs. x

$\because$ Price is increased by 20%

$\therefore$ New price of rice $= x + 20\% \times x$

$= x + \frac{20x}{100}$

$= x + \frac{x}{5}$

$= \text{Rs.}\frac{6x}{5}$

Price of 5 kg rice $= \text{Rs. } 600$

$\therefore$ Quantity of rice $= \frac{600}{6x/5}$

$\therefore \quad 5 = \frac{600}{6x/5}$

$\therefore \quad 5 \times \frac{6x}{5} = 600$

$\therefore \quad 6x = 600$

$\therefore \quad x = \frac{600}{6}$

$\therefore \quad x = \text{Rs.}100$

6) What percent is 3% of 5% ?

Sol: 3% of $5\% = \frac{3}{100} \times \frac{5}{100} = \frac{15}{100 \times 100}$

$= \frac{0.15}{100}$

$= \mathbf{0.15\%}$

7) After availing two successive discounts of 20% each, Madhavi paid Rs. 64 for a book. If she would have got only one discount of 20%, how much additional amount would she have paid ?

Sol: Let the original price of a book be $\text{Rs. } x$
Price after 1^{st} Discount $= x - 20\%$ of x

$= x - 20\% \times x$

$= x - \frac{20x}{100}$

$= x - \frac{x}{5}$

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

Price after 2^{nd} discount $= \frac{4x}{5} - 20\% \times \frac{4x}{5}$

Price paid for a book $^{v} = \text{Rs. } 64$

$\frac{16x}{25} = 64$

$x = \frac{64 \times 25}{16}$

$x = \text{Rs } 100$

∴ Original price $= \text{Rs. } 100$

∴Price after 1^{st} Discount $= \frac{4x}{5}$

$= \frac{4 \times 100}{5}$

$= \text{Rs. } 80$

∴ Additional amount she would have paid

$= 80 - 64 = \mathbf{Rs.\ 16}$

8) Price of table is 40% more than price of a chair; By what percent price of chair is less than price of a table ?

Sol: Let the price of a chair be $\text{Rs. } x$

∴ Price of table $= x + 40\% \times x$

$= x + \frac{40x}{100}$

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

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

Difference in value of chair with respect to $\frac{7x}{5} - x = \frac{2x}{5}$

∴ Percentage price of chair less with respect to table

$$= \frac{\frac{2x}{5}}{\frac{7x}{5}} - \times 100$$

$$= \frac{2}{7} \times 100$$

$$= \mathbf{28.57\%}$$

9) A batsman scored 92 runs which includes 4 boundaries 5 sixes. He scored other runs buy running between the wickets. What percent of his total score did he make by running between the wickets ?

Sol: ∵ Total runs $= 92$ and

No. of four's $= 4$

∴ No. of six's $= 5$

∴ Runs scored by four $= 4 \times 4 = 16$

∴ Runs scored by sixes $= 6\,x\,5 = 30$

∴ Total runs by Boundaries $= 16 + 30 = 46$

∴ Runs scored between running the wickets $= 92 - 46 = 46$

∴ Percentage of runs scored by running $= \frac{46}{92} \times 100$

$$= \mathbf{50\%}$$

EXERCISE 9.2

1) Mr. Sarad purchased a laptop for Rs.24,000 and sold it for Rs. 30,000. What was the profit percentage ?

Sol: C.P. of laptop $=$ Rs. 24000
SF. of laptop $=$ Rs. 30000

Profit $=$ S.P. C.P.

$= 30000 - 24000$

$= \text{Rs. } 6000$

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

$= \frac{6000}{24000} \times 100$

$= \mathbf{25\%}$

2) Shraddha purchase mobile phone and refrigerator for $\mathbf{Rs.\,18000}$ and $\mathbf{15,000}$ respectively. She sold the refrigerator at a loss of $\mathbf{20\%}$ and mobile at a profit of $\mathbf{20\%}$ gWhat is her overall profit or loss ?

Sol: C.P. of mobile phone $= \text{Rs. } 18000$ and

Rate of profit $= 20\%$

S. P. of mobile phone $=$ C. P. $+$ Profit

$= 18000 + 20\% \times 18000$

$= 18000 + \frac{20}{100} \times 18000$

$= 18000 + 3600$

$= \text{Rs. } 21{,}600$

$\therefore$ C.P. of Refrigerator $= \text{Rs. } 1500$

$\therefore$ Rate of loss $= 20\%$

$\therefore$ S.P. of Refrigerator $=$ C. P. Loss

$= 15000 - 20\% \times 15000$

$= 15000 - 3000$

$= \text{Rs. } 12{,}000$

Total C P. of two products $= 18000 + 15000$

$= \text{Rs. } 33{,}000$

Total SF. of two products $= 21600 + 12000$

$= \text{Rs. } 33{,}600$

$\therefore$ Net Profit $=$ Total S.P. $-$ Total C.P.

$= 33600 - 33000$

$= \mathbf{Rs.\,600}$

3) A vendor bought toffees at 6 for $\text{Rs. } 10$, How many for $\text{Rs. } 10$ must he sell to gain 20% ?

Sol: GP. of 6 toffees $= \text{Rs. } 10$

$\therefore$ C.P. of 1 toffee $= \frac{10}{6} = 1.666 = \text{Rs. } 1.67$

$\therefore$ Rate of Profit $= 20\%$

$\therefore$ S.P. $=$ C.P. $+$ P

$= 1.67 + 20\% \times 1.67$

$= 1.67 + 0.334$

$= \text{Rs. } 2.004$

$= \text{Rs. } 2\,.$

$\therefore$ Toffees he must sell for $\text{Rs. } 10 = \frac{10}{2} = 5$ toffees.

4) The percentage profit earned by selling an article for $\text{Rs. } 2880$ is equal to the percentage loss incurred by selling the same article for $\text{Rs. } 1920$. At what price the article should be sold to earn 25% profit ?

Sol: Let the QR of an article be $\text{Rs. } x$

Case 1:

$\because$ S.P. $= \text{Rs. } 2880$ and

S.P. $=$ C.P. $+$ P

$\therefore 2880 = x + P$

$\therefore P = 2880 - x$

Case 2:

$\because$ S.P. $= Rs.1920$ and

L $=$ L. P. $-$ S.P.

$\therefore L = x - 1920$

$\therefore$ Percentage Loss in Profit in Case 1 $=$ Percentage Loss in Profit in Case 2

$\therefore$ Amount of Profit in Case 1 $=$ Amount of Loss in Case 2

$\therefore 2880 - x = x - 1920$

$\therefore 2880 + 1920 = x + x$

$\therefore 2x = 4800$

$\therefore x = \frac{4800}{2}$

$\therefore x = Rs.2,400$

Case 3:

$\therefore$ Rate of Profit $= 25\%$

$\therefore$ S.P. $=$ C.P. $+$ P

$= 2400 + 25\% \times 2400$

$= 2400 + \frac{25}{100} \times 2400$

$= 2400 + 600$

$= \mathbf{Rs.3,000}$

5) A cloth merchant advertises for selling cloth at 4% loss. By using faulty meter scale, he is earning profit of 20%. What is the actual length of the scale ?

Sol: Let the length of sale be $'s'$ cm
Let the C.P. per cm be $\text{Rs. } 100$

$\because$ Trucker selling at 4% loss

$\therefore$ S.P. $=$ C.P. -2

$= 100 - 4\% \times 100$

$= 100 - 4$

$= \text{Rs. } 96/\text{cm}$

But he is gaining 20% profit

$\because$ cost of 1 cm $= \text{Rs. } 100$
$\therefore$ cost of x cm length $= \text{Rs. } 100x$

$\therefore$ S.P. $=$ C.P. $+$ profit

$\therefore \quad 96 = 100x + 20\% \times 100x$

$\therefore \quad 96 = 100x + \frac{25 \times 100x}{100}$

$\therefore \quad 96 = 100x + 20x$

$\therefore \quad 96 = 120x$

$\therefore \quad \frac{96}{120} = x$

$= \quad x = 0.8$ cm

6) Sunil sells his bike worth $\text{Rs. } 25000$ to Rohit at a profit of 20%. After 6 months Rohit sells the bike back to Sunil at a loss of 20%. Find the total profit percent of Sunil considering both the transactions. Sol: Transaction from Sunil to Rohit

$\because$ C.P. of Bike $= \text{Rs. } 25{,}000$ and
Rate of Profit $= 20\%$

SP. $=$ C.P. $+$ P

$= 25{,}000 + 2000 \times 25{,}000$

$= 25{,}000 + 5{,}000$

$= \text{Rs. } 30{,}000$

Transaction from Rohit to Sunil

$\because$ C.P. of Bike $= \text{Rs. } 30{,}000$

$\therefore$ Rate of loss $= 20\%$

$\therefore$ S.P. $=$ C.P. $-$ L

$= 30{,}000 - 20\% \times 3{,}000$

$= 30{,}000 - 6{,}000$

$\therefore$ S.P. $= \text{Rs. } 24{,}000$

Overall profit of Sunil in Both transaction $= 30{,}000 + 24{,}000$

$\therefore \quad = \text{Rs. } 6{,}000$

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

$= \frac{6000}{25{,}000} \times 100$

$\therefore$ Percentage profit $= 24\%$

7) By selling a book at $\text{Rs. } 405$ bookseller incurs a loss of 25%. Find the cost price of the book.

Sol: S.P. of book $= \text{Rs. } 400$

Rate of loss $= 25\%$

L $=$ C.P. $-$ S.P.

$\therefore \quad 25\% \times \text{CP} = \text{CP} - 405$

$\therefore \quad \frac{25\ \text{CP}}{100} = \text{CP} - 405$

$\therefore \quad 405 = CP - \frac{25\,CP}{100}$

$\therefore \quad 405 = CP - \frac{CP}{4}$

$\therefore \quad 405 = \frac{4CP - CP}{4}$

$\therefore \quad 405 \times 4 = 3\,CP$

$\therefore \frac{405 \times 4}{3} = CP$

$\therefore$ **CP= Rs. 540**

8) A cloth costs Rs. 675. If it is sold at a loss of 20%, what is its cost price as a percentage of its selling price ?

Sol: C.P. of an article = Rs. 400
Rate of loss = 20%
L = C.P. SP.

$\therefore 20\% \times 675 = 675 - S.P.$

$\therefore 135 = 675 - S.P.$

$\therefore SP = 67\,5 - 135$

$\therefore SP = Rs.540$

$\therefore$ Cost Price as a percentage of its selling price

$= \frac{C.P.}{S.P.} \times 100$

$= \frac{775}{540} \times 100$

$= \mathbf{125\%}$
100

9) Ashwin buys an article for Rs. 500. He marks it for sale at 75% more than

the cost price. He offers 25% **discount on market price to his customer. Calculate the actual percentage of profit made by Ashwin.**

Sol: C.P. of an article $= {}^{Rs}.500$

Rate of profit $= 75\%$

S.P. $=$ C.P. $+$ P

$= 500 + 75\% \times 500$

$= 500 + 375$

$= \mathbf{Rs.875}$

Rate of Discount $= 25\%$

$\therefore$ S.P. $= 875 -$ Discount

$= 875 - 25\% \times 875$

$= 875 - 218.75$

$=$ Rs. 656.25

$\therefore$ Actual profit $= 656.25 - 500$

$=$ Rs. 156.25

$\therefore$ Actual profit percentage

$= \frac{\text{Actual profit}}{\text{C.P.}} \times 100$

$= \frac{156.25}{500} \times 100$

$= \mathbf{31.25\%}$

10) The combined cost price of a refrigerator and a mixer is $\mathbf{Rs.12400}$. If the refrigerator costs $\mathbf{600\%}$ more than the mixer, find the cost price of the mixer.

Sol: Let C.P. of mixer be $\mathbf{Rs.}\ x$

Refrigerator cost 600% more than mixer

∴ C.P. 0f refrigerator $= x + 600\% \times x$

$= x + \frac{600\,x}{100}$

$= x + 6x$

$= \text{Rs.}\,7x$

∴ C.P. 0f mixer $+$ C.P. of refrigerator

$=$ combined cost price

∴ $x + 7x = \text{Rs.}\,12400$

∴ $8x = 12400$

∴ $x = \frac{12400}{80}$

$x = \text{Rs.}\,1550$

11) Find the single discount equivalent to the discount series of $5\%, 7\%$ and 9%.

Sol: Let the initial price be $\text{Rs.}\,100$

Rate of 1^{st} discount $= 5\%$

∴ Price after 1^{st} discount $= 100 - 5\% \times 100$

$= 100 - 5$

$= \text{Rs.}\,95$

Rate of 2^{nd} discount $= 7\%$

∴ Price after 2^{nd} discount $= 95 - 7\% \times 95$

$= 95 - 6.65$

$= \text{Rs.}\,88.35$

Rate of 3^{rd} discount $= 9\%$

∴ Price after 3^{rd} discount $= 88.35 - 9\% \times 89.35$

$= 88.35\ 7.95$

$= \text{Rs. } 80.4$

∴ Single discount equivalent to the discount

series of $5\%, 7\%$ and 9%

$= 100 - 80.4$

$= \mathbf{19.6\%}$

12) The printed price of a shirt is $\mathbf{Rs. 390}$. Lokesh pays $\mathbf{Rs. 175.50}$ for it after getting two successive discounts. If the first discount is $\mathbf{10\%}$, find the second discount.

Sol: Printed price of shirt $= \text{Rs. } 390$

Rate of at 1^{st} discount $= 10\%.$

Price after availing

1^{st} discount $=$ Printed price $-$ discount

$= 390 - 10\% \times 390$

$= 390 - 39$

$= \text{Rs. } 351$

Let the rate of 2^{nd} discount be $x\ \%$
Price after availing

2^{nd} Discount $= 351 - x\ \% \times 351$

$= 351 - \frac{351x}{100}$

Lokesh pays Rs. find price for is $\text{Rs. } 175.50$

∴ Price after 1^{st} Discount $-$ Price after 2^{nd} discount $= 175.50$

$\therefore 351 - \frac{351x}{100} = 175.50$

$\therefore 351 - 175.50 = \frac{351x}{100}$

$\therefore 175.50 = \frac{351x}{100}$

$\therefore 175.50 \times 100 = 351x$

$\therefore \frac{17550}{351} = x$

$\therefore x = \text{Rs. } 50\%$

13) Amar a manufacturer, gives a discount of $^{\text{Rs}}$. $^{25\%}$ on the list price to his distributor Akbar, Akbar sales at $^{10\%}$ discount on the list price to his customer Anthony. Anthony paid $^{\text{Rs. } 540}$ for the article. What is profit percentage of Akbar on his cost price $^{?}$

Sol: Let the list price of the article be $^{\text{Rs. } x}$
Rate of discount given to Akbar $^{25\%}$

$\therefore$ Price paid by Akbar $^{=}$ List Price $^{-}$ Discount

$= x - 25\% \times x$

$= x - \frac{25x}{100}$

$= x - \frac{x}{4}$

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

Rate of discount given to Anthony $^{= 10\%}$

$\therefore$ Pride paid by Anthony $^{=}$ L.P.$^{-}$ Discount

$= x - 10\% \times x$

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

$= x - \frac{x}{10}$

$= \text{Rs. } \frac{9x}{10}$

$\therefore$ Anthony paid $\text{Rs. } 540$ for the article

$\therefore \frac{9x}{10} = 540$

$\therefore x = \frac{540 \times 10}{9}$

$\therefore x = \text{Rs. } 600$

$\therefore$ C.P. for Akbar $= \frac{3x}{4} = \frac{3 \times 600}{4} = \text{Rs. } 400$

$\therefore$ Profit $= 540 - 450 = \text{Rs. } 90$

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

$= \frac{90}{450} \times 100$

$= 20\%$

14) A man sells an article at a profit of 25%. If he had bought it at 10% less and sold it for Q. 7 less, he would have gained 35%. Find cost price of the article.

Sol: Let C.P. of an article be $\text{Rs. } x$

Rate of profit $= 25\%$

S.P. $=$ C.P. $+$ P

$= x + 25\% \times x$

$= x + \frac{25x}{100}$

$= x + \frac{x}{4}$

S.P. $= \text{Rs. } \frac{5x}{4}$

$\therefore$ New C.P. $=$ Old C.P. $-$ Less 10%

$= x - 10\% \times x$

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

$= x - \frac{x}{10}$

$= \text{Rs.}\frac{9x}{10}$

$\therefore$ New S.P. $=$ Old S.P. -7

$= \frac{5x}{4} - 7$

Profit $=$ New S.P. $-$ New C.P.

$= \frac{5x}{4} - 7 - \frac{9x}{10}$

$= \frac{5x-28}{4} - \frac{9x}{10}$

$= \frac{50x-280-36x}{40}$

$= \frac{14x-280}{40}$

$= \frac{14(x-20)}{40}$

$= \frac{7(x-20)}{20}$

Profit $= \text{Rs.}\frac{7x-140}{20}$

Rate of profit $= 35\%$

Percentage profit $= \frac{\text{Profit}}{\text{New CP}} \times 100$

$\therefore \quad 35 = \frac{\frac{7x-140}{20}}{\frac{9x}{10}} \times 100$

$\therefore \quad 35 = \frac{7x-140}{20} \times \frac{10}{9x} \times 100$

$\therefore \quad 35 = \frac{(7x-140)\times 50}{9x}$

$\therefore \quad \frac{35\times 9x}{50} = 7x - 140$

$\therefore \quad \frac{7\times 9x}{10} = 7x - 140$

$\therefore \quad \frac{63x}{10} = 7x - 140$

$\therefore \quad 63x = 70x - 140$

$\therefore \quad 1400 = 70x - 63x$

$\therefore \quad 1400 = 7x$

$\therefore \quad \frac{1400}{7} = x$

$\therefore \quad \boldsymbol{x = \text{Rs.}\,200}$

15) Mr. Mehta sold his two luxury cars at $\text{Rs.}\,39,10,000$ each. On one he gains 15% but on the other he loses 15%. How much does he gain or lose in the whole transaction?

Sol: Let C.P. of 1^{st} car be $\text{Rs.}\,x$
S.P. of 1^{st} car $= \text{Rs.}\,39,10,000$
Rate of profit $= 15\%$
S.P $=$ C.P. $+$ P

$\therefore 39,10,000 = x + 15\% \times x$

$\therefore 39,10,000 = x + \frac{15x}{100}$

$\therefore 39,10,000 = x + \frac{3x}{20}$

$\therefore 39,10,000 = \frac{20x+3x}{20}$

$\therefore 39,10,000 = \frac{23x}{20}$
$\therefore \frac{20\times 39,10,000}{23} = x$

$\therefore x = \text{Rs.}\,34,00,000$

$\therefore$ S.P. of 2^{nd} car $= \text{Rs.}\,39,10,000$

Rate of loss $= 15\%$

L $=$ C.P. $-$ S.P.

$\therefore 15\% \times \text{C.P.} = \text{C.P.} - 39{,}10{,}000$

$\therefore \frac{15CP}{100} = \text{C.P.} - 39{,}10{,}000$

$\therefore \frac{3CP}{20} = \text{C.P.} - 39{,}10{,}000$

$\therefore 3\ \text{C.P.} = 20\ \text{C.P.} - 7{,}82{,}00{,}000$

$\therefore 7{,}82{,}00{,}000 = 20\ \text{C.P.} - 3\ \text{C.P}$

$\therefore 17\ \text{C.P.} = 7{,}82{,}00{,}000$

$\therefore \text{C.P.} = \frac{7{,}82{,}00{,}00}{17}$

$\therefore \text{C.P.} = \text{Rs. } 4600000$

$\therefore$ Total C. P. of 2 cars $= 39{,}10{,}000 \times 2$

$= 78{,}20{,}000$

Total C. P. of 2 cars $= 3400000 + 4600000$

$= \text{Rs. } 80{,}00{,}000$

Net Loss $= 80{,}00{,}000 - 78{,}20{,}000$

$= \text{Rs. } 1{,}80{,}000$

$\therefore$ Percentage loss $= \frac{\text{Net Loss}}{\text{Total CP}} \times 100$

$= \frac{1{,}80{,}000}{8{,}00{,}0000} \times 100$

$= \mathbf{2.25\%}$

EXERCISE 9.3

1) What would be the simple interest on an amount of $\text{Rs. } 9,600$ at the rate of 6% per annum after 3 years ?

Sol: P = Rs. 9,600

R = 6%

N = 3 years

$\therefore I = \frac{P \times N \times R}{100}$

$= \frac{9600 \times 3 \times 6}{100}$

$\therefore \mathbf{I = Rs.\ 1,728}$

2) What would be the simple interest at the rate of $9\frac{1}{2}\%$ per annum on Rs. 6000 for 2 years?

*(*Answer differ from textbook)*

Sol: P = Rs. 6000

R = 9.5% p.a.

N = 2.5 years

$I = \frac{P \times N \times R}{100}$

$\therefore I = \frac{6000 \times 2.5 \times 9.5}{100}$

$\therefore \mathbf{I = Rs.\ 1,425}$

3) What would be the simple interest on Rs. 8400 in 9 months at the rate of 8.25 percent per annum?

Sol: P = 8,400

R = 8.25% p.a.

N = 9 months

$\therefore I = \frac{P \times N \times R}{100}$

$= \frac{8400 \times \frac{9}{12} \times 8.25}{100}$

$= \frac{8400 \times 9 \times 825}{100 \times 100 \times 12}$

$= \frac{84 \times 9 \times 825}{100 \times 12}$

$\therefore \mathbf{I = Rs.\ 519.75}$

4) What would be the compound interest on the $\mathbf{Rs.\ 4,200}$ for 18 months at $\mathbf{10\%}$ per annum compounded half yearly?

P $=$ Rs. 4,200

$n = 18$ months

Interest is compounded half yearly

$\therefore n = \frac{18}{6} = 3$

$r = 10\%$ p.a.

$\therefore r = \frac{10}{2} 5\%$ half yearly

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

$= 4{,}200 \left(1 + \frac{5}{100}\right)^3$

$= 4{,}200(1 + 0.05)^3$

$= 4{,}200 \times (1.05)^3$

$= 4{,}200 \times 1.157625$

$\therefore$ A $=$ Rs. 4,862.025

$\therefore$ Compound Interest $=$ A $-$ P

$= 4{,}862.025 - 4{,}200$

$= \mathbf{Rs.\ 662.025}$

5) Find compound interest on $\mathbf{Rs.}$ 10,000 for $\mathbf{2}$ years at $\mathbf{8\%}$ per annum compounded half yearly.

Sol: P = Rs. 10,000

$r = 8\%$ p.a.

Interest is compounded half yearly

$\therefore r = \frac{8}{2} = 4\%$ half yearly

$n = 2$ years

$\therefore n = 2 \times 2 = 4$

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

$= 10000\left(1 + \frac{4}{100}\right)^4$

$= 10000\ (1.04)^4$

$= 10000 \times 1.16985856$

$\therefore A = Rs.\ 11698.5856$

$\therefore$ Compound Interest $=$ A $-$ P

$= 11698.5856 - 10000$

$= \mathbf{Rs.\ 1,698.5856}$

6) In how many years Rs. 1, 00, 000 will become Rs. 1, 33,100 at compound interest rate of 10% per annum?

Sol: P = Rs. 1,00,000

A = Rs. 1, 33,100

$r = 10\%$ p.a.

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

$\therefore$ 1, 33,100 $= 1{,}00{,}000\left(1 + \frac{10}{100}\right)^n$

$\therefore \frac{1,33,100}{100000} = (1+0.1)^n$

$\therefore \frac{1331}{1000} = (1.1)^n$

$\therefore 1.331 = (1.1)^n$

$\therefore (1.1)^3 = (1.1)^n$

$\therefore \boldsymbol{n = 3}$ **Years**

7) A certain sum of money becomes three times of itself in 20 years at simple Interest. In how many years does it become double of itself at the same rate of simple interest?

Sol: Case 1:

$A = 3P$, $N = 20$ Years

$I = \frac{P \times N \times R}{100}$

$\therefore I = \frac{P \times 20 \times R}{100}$

$\therefore I = \frac{PR}{5}$

$A = I + P$

$\therefore 3P = \frac{PR}{5} + P$

$\therefore 3P - P = \frac{PR}{5}$

$\therefore 2P = \frac{PR}{5}$

$\therefore 2 = \frac{R}{5}$

$\therefore R\ 10\%$ p.a.

Case 2:

$A = 2P$

$I = \frac{P \times N \times R}{100}$

$\therefore I = \frac{P \times N \times 10}{100}$

$\therefore I = \frac{PN}{10}$

$A = I + P$

$\therefore 2P = P + \frac{PN}{10}$

$\therefore 2P - P = \frac{PN}{10}$

$\therefore P = \frac{PN}{10}$

$\therefore \mathbf{N = 10}$ **Years**

8) A person borrows $10,000$ for 2 years at 4% p.a. simple interest he immediately lends it to another person at 6.5% p.a. for 2 years. Find his total gain in the transaction.

Sol: $P = Rs.10{,}000$

$N = 2$ years

$R = 4\%$ p.a.

$I = \frac{P \times N \times R}{100}$

$\therefore I = \frac{10000 \times 2 \times 4}{100}$

$\therefore \mathbf{I = Rs.\ 800}$

$A = P + I$

$A = 10000 + 800$

$\therefore A = \text{Rs. } 10{,}800$

Now, he leads $\text{Rs. } 10000$ to another person at 6.5% p. a for 2 years.

$$\text{Interest} = \frac{P \times N \times R}{100}$$

$$\text{Interest} = \frac{10000 \times 2 \times 6.5}{100}$$

$\therefore \text{Interest} = \text{Rs. } 1,300$

$\therefore$Amount received $= P + I$

$$= 10,000 + 1,300$$

$$= \text{Rs. } 11,300$$

Net profit $= 11,300 - 10,800$

$$= \textbf{Rs. } \mathbf{500}$$

9) A man deposits $\text{Rs. } 200$ at the end of each year in recurring accotlnt at 5% compound interest. How much will it become at the end of 3 years?

Sol: $C = \text{Rs. } 200$

$n = 3$ years

$r = 5\%$ p.a.

$$i = \frac{5}{100} = 0.05$$

$$A = \frac{C}{i}[(1+i)^n - 1]$$

$$\therefore A = \frac{200}{0.05}[(1+0.05)^3 - 1]$$

$$= \frac{200 \times 100}{5}[(1+0.05)^3 - 1]$$

$$= 4000[1.157625 - 1]$$

$$= 4000 \times 0.157625$$

$\therefore A = \text{Rs. } 630.5$

10) A man gets a simple interest of $\mathbf{Rs.\,2,\,000}$ on a certain principal at the rate of $\mathbf{5\%}$ p.a. in $\mathbf{4}$ years. What compound interest will the man get on twice the principal in 2 years at the same rate? Case 1:

Sol: Case^{1}:

$I = \text{Rs. } 2000$

$R = 5\%$ p.a.

$N = 4$ years

$I = \frac{P \times N \times R}{100}$

$\therefore 2000 = \frac{P \times 4 \times 5}{100}$

$\therefore 2000 = \frac{P \times 4}{20}$

$\therefore \frac{2000 \times 20}{4} = \mathbf{P}$

$\therefore \mathbf{P = Rs.\ 10000}$

Case ^{2}:

$P = 2 \times 10000 = \text{Rs. } 20000$

$n = 2$ years

$r = 5\%$ p.a

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

$= 20000\left(1 + \frac{5}{100}\right)^{2}$

$= 20000\,(1 + 0.05)^{2}$

$= 20000 \times 1.1025$

$\therefore A = \text{Rs. } 22{,}050$

$\therefore$ Compound Interest $= A - P$

$= 22{,}050 - 20000$

$= \mathbf{Rs.\,2,050}$

11) The difference between simple interest and compound interest on a certain sum of money is Rs. 32 at 8% per annum for 2 years. Find the amount.

Sol: N $= 2$ years

R $= 8\%$ p.a.

$I = \frac{P \times N \times R}{100}$

$I = \frac{16P}{100} = Rs.\ 0.16P$

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

$= A = P\left(1 + \frac{8}{100}\right)^2$

$= P\,(1 + 0.008)^2$

$= P(1.08)^2$

$= P \times 1.1664$

$\therefore A = Rs.\ 1.1664P$

$\therefore$ Compound Interest $=$ A $-$ P

$= 1.1664\ P - P$

$\therefore$ Compound Interest $= Rs.\ 0.1664P$

Compound Interest $-$ Simple Interest $= Rs.\ 32$

$\therefore\ 0.1664\ P - 0.16\ P = 32$

$\therefore\ 0.1664\ P = 32$

$\therefore\ P = \frac{32}{0.0064}$

$\therefore\ \mathbf{P = Rs.\ 5000}$

EXERCISE 9.4

1) Kanchan purchased a Maruti car for $\text{Rs. } 2,45,000$/- and the rate of depreciation is $14\frac{1}{2}\%$ per annum. Find the value of the car after two years?

Sol: $V = \text{Rs. } 2,45,000$

$r = 14\frac{1}{2}\% = \frac{100}{7}\%$

$n = 2$ Years

$\therefore$ Present value of Assets $= V\left(1 - \frac{r}{100}\right)^n$

$= 2,45,000\left(1 - \frac{100/7}{100}\right)^2$

$= 2,45,000\left(1 - \frac{100}{700}\right)^2$

$= 2,45,000\left(1 - \frac{1}{7}\right)^2$

$= 2,45,000\left(\frac{6}{7}\right)^2$

$= 2,45,000 \times \frac{6}{7} \times \frac{6}{7}$

$\therefore$ **Present value of Assets $= \text{Rs. } 80,000$**

2) The value of a machine depreciates from $\text{Rs. } 32768$ to $\text{Rs. } 21,952$/- in three years. What is the rate of depreciation ?

Sol: $P = \text{Rs. } 21952$

$V = \text{Rs. } 32768$

$n = 3$ years

$P = V\left(1 - \frac{r}{100}\right)^n$

$\therefore 21952 = 32768\left(1 - \frac{r}{100}\right)^3$

$\therefore \frac{21952}{32768} = \left(\frac{100-r}{100}\right)^3$

$\therefore \left(\frac{14}{16}\right)^3 = \left(\frac{100-r}{100}\right)^3$

$\therefore \frac{100-r}{100} = \frac{14}{16}$

$\therefore \frac{100-r}{100} = \frac{7}{8}$

$\therefore 800 - 8r = 700$

$\therefore 800 - 700 = 8r$

$\therefore \frac{100}{8} = r$

$\therefore \boldsymbol{r = 12.5\%}$ **p.a.**

3) The value of machine depreciates at the rate of 10% every year. It was purchased 3 years ago. Its present value is $\text{Rs. } 2,18,700$/-.What was the purchase price of the machine ?

Sol: $r = 10\%$ p.a.

$P = 2{,}18{,}700$

$n = 3$ years.

$P = V\left(1 - \frac{r}{100}\right)^n$

$\therefore 218700 = V\left(1 - \frac{10}{100}\right)^3$

$\therefore 218700 = V(1 - 0.1)^3$

$\therefore 218700 = V(0.9)^3$

$\therefore 218700 = V \times 0.729$

$\frac{218700}{0.729} = V$

$\boldsymbol{V = \text{Rs. } 3,00,000.}$

4) Mr. Manish purchased a motorcycle at $\text{Rs. } 70,000$/-. After some years he sold

his motorcycle at exact depreciated value of it that is $\mathbf{Rs.\,51,030}$/-. Rate of depreciation was taken as $\mathbf{10\%}$. Find after how many years he sold his motorcycle.

Sol: $V = Rs.\,70{,}000$

$P = Rs.\,51{,}030$

$r = 10\%$ p.a.

$P = V\left(1 - \frac{r}{100}\right)^n$

$\therefore 51030 = 70000 \left(1 - \frac{10}{100}\right)^n$

$\therefore \frac{51030}{70000} = (1 - 0.1)^n$

$\therefore 0.729 = (0.9)^n$

$\therefore (0.9)^3 = (0.9)^n$

$\therefore \boldsymbol{n = 3}$ Years

5) Mr. Chetan purchased furniture for her home at $\mathbf{Rs.\,5,12,000}$/-. Considering rate of depreciation as $\mathbf{12.5\%}$, what will be value of furniture after $\mathbf{3}$ years.

Sol: $V = 5{,}12{,}000$

$r = 12.5\%$ p.a.

$n = 3$ years

$P = V\left(1 - \frac{r}{100}\right)^n$

$\therefore P = 512000\left(1 - \frac{12.5}{100}\right)^3$

$= 512000\,(1 - 0.125)^3$

$= 512000\,(0.875)^3$

$\therefore \mathbf{P = Rs.\,3,43,000}$

6) Grace Fashion Boutique purchased as sewing machine at $\mathbf{Rs.\,25,000}$/-. After 3 years machine was sold at depreciated value $\mathbf{Rs.\,18,225}$/Find rate of depreciation.

Sol: $V = Rs.\,25{,}000$

$P = Rs.\,18{,}225$

$n = 3$ years

$P = V\left(1 - \frac{r}{100}\right)^n$

$\therefore 18225 = 25000\ \left(1 - \frac{100-r}{100}\right)^3$

$\therefore \frac{18225}{25000} = \left(\frac{100-r}{100}\right)^3$

$\therefore \frac{729}{1000} = \left(\frac{100-r}{100}\right)^3$

$\therefore \left(\frac{9}{10}\right)^3 = \left(\frac{100-r}{100}\right)^3$

$\therefore \frac{9}{10} = \frac{100-r}{100}$

$\therefore 900 - 1000 = 10r$

$\therefore 10r = 1000 - 900$

$\therefore r = \frac{100}{10}$

$\therefore \boldsymbol{r = 10\%}$ **p.a.**

7) Mr. Pritesh reduced value of his assets by $\mathbf{5\%}$ each year, which were purchased for $\mathbf{Rs.\,50,00,000}$/-. Find the value of assets after $\mathbf{2}$ years.

Sol: $V = \mathbf{50,00,000}$

$r = 5\%$ p.a.

$n = 2$ years

$P = V\left(1 - \frac{r}{100}\right)^n$

$\therefore P = 5000000\left(1-\frac{5}{100}\right)^2$

$= 5000000\ (1-0.05)^2$

$= 5000000\ (0.95)^2$

$\therefore \mathbf{P = Rs.\ 45,12,500}$

8) A manufacturing company is allowed to charge 10% depreciation on its stock. Initial value of the stock was $\mathbf{Rs.\ 60,000}$/- After how many years, value of the stock will be $\mathbf{Rs.\ 39,366}$?

Sol: $V = Rs.\ 60{,}000$

$P = Rs.\ 39{,}366$

$r = 10\%$ p.a.

$P = V\left(1-\frac{r}{100}\right)^n$

$\therefore 39366 = 60000\ \left(1-\frac{10}{100}\right)^n$

$\therefore \frac{39366}{60000} = (1-0.1)^n$

$\therefore 0.6561 = (0.9)^n$

$\therefore (0.9)^4 = (0.9)^n$

$\therefore n = 4$ Years

EXERCISE 9.5

Three partners shared the profit in a business in the ratio $5:6:7$. They had partnered for 12 months, 10 months and 8 months respectively. What was the ratio of their investments?

Sol:

Partner	Capital	Period of Investment
A	x	12 m
B	y	10 m

C	z	8 m

Profit will be according to ratio of product of their capital and period of investment

$\therefore$ Profit ratio $= 12x : 10y : 8z$

$= 6x : 5y : 4z$

$\therefore$ Given profit ratio $= 5 : 6 : 7$

$\therefore 5 : 6 : 7 = 6x : 5y : 4z$

$\therefore \frac{5}{6} = \frac{6x}{5y}$

$\therefore \frac{25}{36} = \frac{x}{y}$

$\therefore \frac{2\times25}{2\times36} = \frac{x}{y}$

$\therefore \frac{x}{y} = \frac{50}{72}$ ....(1)

$\therefore \frac{6}{7} = \frac{5y}{4z}$

$\therefore \frac{24}{35} = \frac{y}{z}$

$\therefore \frac{3\times25}{3\times36} = \frac{y}{z}$

$\therefore \frac{y}{z} = \frac{72}{105}$ ....(2)

$\therefore x : y : z = 50 : 72 : 105$ ...from (1) and (2)

2) Kamala, Vimala and Pramila enter into a partnership. They invest Rs. 40,000 , Rs. 80,000 and Rs. 1, 20,000 respectively. At the end of the first year, Vimala withdraws Rs. 40,000, while at the end of the second year. Pramila withdraws Rs. 80,000. In what ratio will the profit be shared at the end of 3 years ?

Sol: For 1st Year,

Partner	Capital	Period of Investment

Kamala	40000	12 m
Vimala	80000	12 m
Pramila	120000	12 m

Vimala withdraws $^{\text{Rs. } 40000}$ after 1 year

Sol: For ^{2nd} Year,

Partner	Capital	Period of Investment
Kamala	40000	12 m
Vimala	40000	12 m
Pramila	120000	12 m

Pramila withdraws $^{\text{Rs. } 80000}$ after 2 year

Sol: For ^{3rd} Year,

Partner	Capital	Period of Investment
Kamala	40000	12 m
Vimala	40000	12 m
Pramila	40000	12 m

Overall it can be observed that

Partner	Capital	Period of Investment
Kamala	40000	12 + 1 + 12 = 36 m
Vimala	80000 40000	12 m 12 + 12 = 24 m
Pramila	120000 40000	12 + 12 = 24 m 12 m

Profit will be shared according to ratio of product of their capital and period of investment

∴ Profit ratio

$= 40000 \times 36 : (80000 \times 12) + ((40000 \times 24) :$

$(120000 \times 24) + (40000 \times 12)$

$= 1440000 : 960000 + 960000 : 2880000 + 480000$

$= 1440000 : 1920000 : 3360000$

$.= 144 : 192 : 336$

$= 12 : 16 : 28$

$= \mathbf{3 : 4 : 7}$

3) Sanjeev 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, Sanjeev invested another additional amount of $Rs. 10,000$ and Pawan 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 ?

Sol: In 1999,

Sanjeev started a business with $Rs. 25{,}000$In 2000, he invested $Rs. 10{,}000$ additionally and Rajeev joined business With capital of $Rs. 35{,}000$. In 2001 , Sanjeev invested $Rs. 10{,}000$ additionally and Pawan joined business with capital of $Rs. 35{,}000$.

Partner	Capital	Period of Investment
Kamala	25000 35000 45000	12 m 12 m 12 m
Vimala	35000	24 m
Pramila	35000	12 m

Profit will be shared according to ratio of product of their capital and period of investment

∴ Profit ratio

$= (25{,}000 \times 12) + (35{,}000 \times 12) + (45{,}000 \times 12)$

$: (35{,}000 \times 24 : (35{,}000 \times 12)$

$= 3{,}00{,}000 + 4{,}20{,}000 + 5{,}40{,}000 : 8{,}40{,}000 : 4{,}20{,}000$

$= 12,60,000 : 8,40,000 : 4,20,000$

$= 63 : 42 : 21$

$= 3 : 2 : 1$

Total profit $= \text{Rs. } 1,50,000$

$\therefore$ Rajeev's share $= \frac{2}{6} \times 1,50,000$

$= \mathbf{Rs. 50,000}$

4) Teena, Leena and Meena invest in a partnership in the ratio: $7/2, 4/3, 6/5$. After 4 months, Teena increases her share 50%. If the total profit at the end of one year is $Rs. 21,600$, then what is Leena's share in the profit ?

Sol: Let the common multiple be $'x'$

$\therefore$ Teena's capital $= \text{Rs. } \frac{7x}{2}$

$\therefore$ Leena's capital $= \text{Rs. } \frac{4x}{3}$

$\therefore$ Meena's capital $= \text{Rs. } \frac{6x}{5}$

After 4 months, Teena invested additionally 50% of her share

$\therefore$ Teena's capital $= \frac{7x}{2} + \frac{7x}{2} \times 50\%$

$= \frac{7x}{2} + \frac{7x}{2} \times \frac{50}{100}$

$= \frac{7x}{2} + \frac{7x}{4}$

$= \frac{14x+7x}{4}$

$= \frac{21x}{4}$

Partner	Capital	Period of Investment

Teena	$\frac{7x}{2}$ $\frac{21x}{4}$	4 m 8 m
Leena	$\frac{4x}{3}$	12 m
Meena	$\frac{6x}{5}$	12 m

Profit will be shared according to ratio of product of their capital and period of investment

∴ Profit ratio

$$= \frac{7x}{2} \times 4 + \frac{21x}{4} \times 8 : \frac{4x}{3} \times 12 : \frac{6x}{5} \times 12$$

$$= 14x + 42x : 16x : 14.4x$$

$$= 56x : 16x : 14.4x$$

$$= 560 : 160 : 144$$

$$= 35 : 10 : 9$$

Total profit $= \text{Rs. } 21{,}600$

Leena's share $= \frac{10}{54} \times 21{,}600$

$= \mathbf{Rs.\,4,000}$

5) Dilip and Pradeep invested amounts in the ratio $2:1$, whereas the ratio between amounts invested by Dilip and Sudip was $3:2$. If $\text{Rs. } 1,49,500$ was their profit, how much amount did Sudip receive ?

Sol: $\frac{\text{Dilip's capital}}{\text{Pradeep's capital}} = \frac{2}{1}$

$\frac{2\times3}{1\times3} = \frac{6}{3}$ .... (1)

$\frac{\text{Dilip's capital}}{\text{Sudip's capital}} = \frac{3}{2}$

$\frac{3\times2}{2\times2} = \frac{6}{4}$ .... (2)

$\therefore$ Ratio of capital $= 6 : 3 : 4$ ...from $(^{1})$ and $^{(2)}$

Total profit $=$ Rs. 1,49,500

Sudip's share $= \frac{4}{13} \times 1,49,500$

$= \mathbf{Rs.\,46,000}$

6) The ratio of investments of two partners Jatin and Lalit is $11:12$ and the ratio of their profits is $2:3$. If Jatin invested the money for 8 months, find for how much time Lalit invested his money.

Sol: Let the common multiple be $'x'$
Let the period of investment for Lalit be $'y'$ months

Partner	Capital	Period of Investment
Jatin	$11x$	8 m
Lalit	$12x$	y m

Profit will be share according to ratio of their period of investment
Profit ratio

$= 11x \times 8 : 12x \times y$
$= 88x : 12xy$

Given profit ratio $= 2:3$

$\therefore 2:3 = 88x : 12xy$

$\therefore \frac{2}{3} = \frac{88}{12y}$

$\therefore y = \frac{88 \times 3}{12 \times 2}$

$\therefore y = \frac{44 \times 3}{4 \times 2}$

$\therefore \mathbf{y = 11}$ **months**

7) Three friends had dinner at a restaurant. $\frac{2}{3}$ when the bill was received, Alpana paid as much as Beena paid and Beena paid $\frac{1}{2}$ as much as Catherine paid. What fraction of the bill did Beena pay ?

Sol: Let Beena's share be $Rs.\,x$

$\therefore$ Alpana's share $= \text{Rs.}\frac{2x}{3}$

$\therefore$ Catherine's share $= \text{Rs. } 2x$

$\therefore x + \frac{2x}{3} + 2x = 1$

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

$\therefore \frac{11x}{3} = 1$

$\therefore \boldsymbol{x = \frac{3}{11}}$

8) Roy start a business with Rs.10,000 Shikha joins him after 2 months with 20% more investment than Roy, after 2 months Tariq joins him with 40% less than Shikha. If the profit earned by them at the end of the year is equal to the twice of the difference between investment of Roy and ten times the investment of Tariq. Find the profit of Roy?

Sol: Roy capital = Rs.10,000
Shikha joins after 2 months Shikha invested 20% more than Roy's capital
Shikha's capital $= 10{,}000 + 20\% \times 10{,}000$
$= 10{,}000 + \frac{20}{100} \times 10{,}000$
$= 10{,}000 + 2{,}000$

$=$ Rs.12,000

Tariq joins after 4 months
Tariq invested 40% less than Shikha's capital

Tariq's capital $= 12{,}000 - 40\% \times 12{,}000$

$= 12{,}000 - \frac{40}{100} \times 12{,}000$

$= 12{,}000 - 24800$

$=$ Rs.7,200

Let the total profit be Rs.x

$\therefore x = 2(10 \times 72000 - 10000)$

$= 2(72000 - 10000)$

$= 2 \times 62000 =$

Rs.1,24,000

Partner	Capital	Period of Investment
Roy	10,000	12m
Shikha	12,000	10 m
Tariq	7,200	8 m

Profit will be shared according to ratio of product of their capital and period of investment

$\therefore$ Profit ratio $= 10{,}000 \times 12 : 12{,}000 \times 10 : 7{,}200 \times 8$

$= 1, 20{,}000: 1, 20{,}000: 57{,}600$

$= 50 : 50 : 24$

$= 25 : 25 : 12$

$\therefore$ Profit of Roy $= \frac{25}{62} \times 1, 24{,}000 =$ Rs.50,000

9) If 4 (P's Capital) = 6 (Q's Capital) = 10 (R's Capital), then out of the total profit of ?5580, what is R's share ?

Sol: Let $4P = 6Q = 10R = k$

$\therefore P = \frac{k}{4}, Q = \frac{k}{6}, R = \frac{k}{10}$

$\therefore P : Q : R = \frac{k}{4} : \frac{k}{6} : \frac{k}{10} = 15 : 10 : 6$

Total profit = Rs. 5,580

$\therefore$ R's share $= 5580 \times \frac{6}{31}$

Rs. 1, 080

10) A and B start a business with A investing the total capital of Rs.50,000, on the condition that B pays A interest at the rate of 10% per annum on his half of the capital. A is a working partner and receives Rs. 1500 per month from the total profit and any profit remaining is equally shared by both of them. At the end of the year, it was found that the income of A is twice that of B. Find the total profit for the year ?

Sol: A's capital = Rs. 50000

B's capital = Rs. 50000

A receives interest @10% on half of his capital

Interest for A $= 10\% \times \frac{50000}{2}$

$= \frac{10}{100} \times 25000$

= Rs.2,500

∴ A receives 1,500 for 12 months

Amount received by A = 1,500 × 12 = Rs.18,000

Let the total profit be Rs. x

∴ Remaining profit $= x - 18000$

A and B receiving profit equally

i.e. Rs. $\frac{x-18000}{2}$

∴ Income of A is twice of Income of B

$\therefore \frac{x-18000}{2} + 18{,}000 + 2{,}500 = 2\left(\frac{x-18000}{2}\right)$

$\therefore x - 18000 + 36000 + 5000 = 2x - 36000$

$\therefore \quad x + 23000 = 2x - 36000$

$\therefore \quad 36000 + 23000 = 2x - x$

$\therefore \quad \boldsymbol{x = \text{Rs. } 59000}$

EXERCISE 9.6

(1) M/s Janaseva sweet mart sold sweets of Rs.3,86,000. What CGST and SGST he will pay if the rate of GST is 5% ?

Sol: Bill amount $= \text{Rs.}\ 386000$

Rate of GST $= 5\%$.

Rate of CGST $= 2.5\%$

Rate of SGST$= 2.5\%$

CGST and SGST$= 3,86,000 \times \frac{2.5}{100}$

$= \mathbf{Rs.\ 9,650}$

2) Janhavi Gas Agency purchased some gas cylinders for $\mathbf{Rs.\ 5,00,000}$ and sold them to the customers for $\mathbf{Rs.\ 5,90,000}$. Find amount of GST payable and amount of ITC $\mathbf{5\%}$ GST is applicable.

Sol: Purchased Price $= \text{Rs.}\ 5,00,000$
Rate of GST $= 5\%$

$\therefore$ Input tax $= 500000 \times 5\%$

$= 500000 \times \frac{5}{100}$

$= \text{Rs.}\ 25,000$

Selling price $= 5\% \times 5,90,000$

$\therefore$Output tax $= 5\% \times 5,90,000$

$= \frac{5}{100} \times 500000$

$= \text{Rs.}\ 29,500$

$\therefore$ GST payable $=$ Output tax $-$ Input tax

$= 29500 - 25000$

$= \mathbf{Rs.\ 4,500}$

3) A company dealing in mobile phones purchased mobile phones worth $\mathbf{Rs.\ 5,00,000}$ and sold the same to customers at $\mathbf{Rs.\ 6,00,000}$. Find amount of ITC and amount of GST if rate of GST is $\mathbf{12\%}$.

Sol: Purchase price $= \text{Rs. } 5{,}00{,}000$
Rate of GST $= 12\%$

$\therefore$ Input tax $= 12\% \times 500000$

$$= \frac{12}{100} \times 500000$$

$$= \mathbf{Rs.\ 60{,}000}$$

Selling price $= \text{Rs. } 6{,}00{,}000$

$\therefore$ Output tax $= 12\% \times 6{,}00{,}000$

$$= \frac{12}{100} \times 600000$$

$$= \text{Rs. } 72{,}000$$

$\therefore$ GST payable $= 72{,}000 - 60{,}000$

$$= \mathbf{Rs.\ 12{,}000}$$

4) Prepare Business to Customers $(\mathbf{B2C})$ tax invoice using given information. Write the mime of supplier, address, state, Date, Invoice Number, GSTIN etc. as per your choice.

Supplier: M/s.....

Address: .....

State: ..... Date: ..... Invoice No: ..... GSTIN: .....

Particular: Rate of Sarees $-\mathbf{Rs.\ 2750}$ Rate of GST 5% HSN $\mathbf{5407 - 2}$ pcs

Rate of Kurta $\mathbf{Rs.\ 750}$ Rate of GST 12%

HSN $\mathbf{5408}$

Sol: Tax Invoice

Supplier: ABC Shopping centre,
48, Raj Business Park, Mumbai,
400084, Maharashtra.

Email: ABC@gmail.com

Invoice

no: GST/125 **Invoice**

date: 3/3/19

GSTIN:

7PQRST2646K129

Sr. no	HSN code	Name of product	Rate	Quantity	Taxable Amount	CGST		SGST		Total (Rs)
						Rate	Tax (Rs)	Rate	Tax (Rs)	
1	5407	Saree	2,750	2	5,500	2.5%	137.5	2.5%	137.5	5,775
2	5408	Kurta	750	1	750	6%	45	6%	45	840
Total							**182.5**		**182.5**	**6,615**

5) Heena Enterprise sold cosmetics worth $\text{Rs. } 25,000$ to Leena traders, a retailer. Leena Traders sold it further to Meena Beauty products for $\text{Rs. } 30,000$. Meena beauty product sold it further to the customers for $\text{Rs. } 40,000$. Rate of GST is 18%. Find (I) GST payable by each party (II) CGST and SGST

Sol: (I) Purchased price for Leena traders $= \text{Rs. } 25,000$

Rate of GST $= 18\%$

∴ GST payable by Heena Enterprise

$$= 25000 \times 8\%$$

$$= 25000 \times \frac{18}{100}$$

$$= \text{Rs. } 4,500$$

Leena traders sold it to Meena Beauty Products for $\text{Rs. } 30,000$

∴ Output tax $= 30,000 \times 18\%$ '

$$= 30000 \times \frac{18}{100}$$

$$= \text{Rs. } 5,400$$

GST payable By Leena traders

$$= 5400 - 4500 .$$

$= \mathbf{Rs.900}$

Meena Beauty Products sold it to customer for $\text{Rs. } 40{,}000$

$\therefore$ Output tax $= 40{,}000 \times 18\%$

$= 40000 \times \frac{18}{100}$

$= \mathbf{Rs.7,200}$

$\therefore$ GST payable by 'Meena Beauty Products

$= 7200 - 5400$

$= \mathbf{Rs.1,800}$

(II) Total GST payable $= 4500 + 900 + 1800$

$= \text{Rs. } 7200$

$\therefore$ CSGT and SGST $= \frac{7200}{2}$

$= \text{Rs. } 3{,}600$

6) 'Chitra furnishings' purchased tapestry (curtain cloth) for $\mathbf{Rs.28,00,000}$ and sold for $\mathbf{Rs.44,80,000}$ Rate of GST is 5%. Find,

(I) Input tax

(II) Output tax

(III) ITC

(IV) CGSTand SGST

Sol: Purchase price $= \text{Rs. } 2{,}80{,}00{,}00$
Rate of GST $= 5\%$

(I)Input tax $= 2{,}80{,}0000 \times 5\%$

$= \mathbf{Rs.1,40,000}$

(II)Selling price $= \text{Rs. } 44{,}80{,}000$

Output tax $= 44{,}800{,}00 \times 5\%$

$= \mathbf{Rs.\,2,24,000}$

(III) Input tax credit = Input tax $= \text{Rs. } 1{,}40{,}000$

GST payable $= 2{,}24{,}000 - 1{,}40{,}000$

$= \mathbf{Rs.\,84,000}$

$\therefore$ SGST and CGST $= \frac{84{,}000}{2} + \frac{1{,}40{,}000}{2}$

$= 42{,}000 + 70{,}000$

$= \mathbf{Rs.\,1,12,000}$

7) Two friends 'Aditi' and 'Vaishali' went to a restaurant. They ordered 2 Masala Dosa costing Q 90 each ^{2} coffee costing $^{\mathbf{Rs.\,60}}$ each and l sandwich costing $^{\mathbf{Rs.\,80}}$. If GST is charged at $^{5\%}$ find total amount of bill including GST.

Sol:

Product	Quantity	GST Rate	Price	Total price	GST @5%
Masala Dosa	2	5%	90	180	$180 \times 5\%$ $Rs.9$
Coffee	2	5%	60	120	$120 \times 5\%$ $Rs.6$
Sandwich	1	5%	80	80	$80 \times 5\%$ $Rs.4$

$\therefore$ Total amount of bill $= 380 + 19$

$= \mathbf{Rs.\,399}$

EXERCISE 9.7

1) Shantanu has a choice to invest in Rs. 10 shares of two firms at Rs. 13 or at Rs. 16. If the first firm pays 5% dividend and the second firm pays 6% dividend per annum, find:

(I) which firm is paying better ?

(II) If Shantanu invests equally in both the firms and the difference between the return from them is Rs. 30. Find how much, in all, does he invest.

Sol: Firm I:

FV = Rs. 10

MV = Rs. 13

∴ Profit from 1 share 5% × 10: Rs. 0.5

Rate of return $= \frac{0.5}{13} \times 100$

$= 13.85\ \%$

Firm II:

FV = Rs. 10

MV = Rs. 16

∴ Profit from 1 share $= 6\% \times 10 = 6\%$

∴ Rate of return $= \frac{0.6}{16} \times 100$

$= 3.75\%$

∴ **Firm I is paying better**

(II) Let the amount invested in each firm be Rs. x

Firm I:

No of shares $= \frac{x}{13}$

Dividend $= 5\% \times 10 \times \frac{x}{13}$

$= \frac{0.5x}{13}$

Firm II:

No of shares $= \frac{x}{16}$

Dividend $= 6\% \times 10 \times \frac{x}{16}$

$= \frac{0.6x}{16}$

Difference in return from to firm Rs. 30

$\therefore \frac{0.5x}{13} - \frac{0.6x}{16} = 30$

$\therefore \frac{8x-7.8x}{208} = 30$

$\therefore 0.2x = 6{,}240$

$\therefore x = \frac{6{,}240}{0.2}$

$\therefore$ Total investment $= 31{,}200 + 31{,}200$

$= \mathbf{Rs.\,62{,}400}$

2) A dividend of 9% was declared on Rs. 100 shares selling at a certain price in the stock market.

If the rate of return is 7.5%, calculate (I) The market price of each share, and

(II) The amount to be invested to obtain an annual dividend of Rs. 630.

Sol: (I) Let the MP of each share be Rs. x

FV $=$ Rs. 100

Rate of dividend $=$ 900 Dividend $= 900 \times 100 =$ Rs. 9

Profit earned $= 7.5 \times x$

$\therefore = \frac{75x}{1000}$

$\therefore \frac{75x}{1000} = 9$

$\therefore x = \frac{9 \times 1000}{75}$

$=$ Rs. 120

(II) Let the amount invested be Rs. x

$\therefore$ No of shares $= \frac{x}{16}$

Dividend $=$ Rs. 630

$\therefore 9\% \times 100 \times \frac{x}{120} = 630$

$\therefore \frac{9\%}{120} \times 100 \times x = 630 \times 120$

$\therefore x = \frac{630 \times 120}{9}$

$\therefore \boldsymbol{x = Rs.\ 8400}$

3) Nilesh has the option of investing his money in 8% Rs. 10 shares at a premium of Rs.3.50 or 7% Rs. 100 shares at a premium of 20%. Which of the two investments will be more profitable for him ? Sol: Firm I:

FV = Rs. 10

Rate of premium = 3.50

∴ MV = 10 + 3.50 = Rs. 13.50

Rate of dividend = 8%

∴Dividend = 8% × 10 = Rs.0.8

∴ Rate of return = $\frac{0.8}{13.50} \times 100$

Firm II:

FV = Rs. 100

Rate of premium = 20%

MV = 100+ 2000 × 100

= 100 + 20

= Rs. 120

Rate of dividend = 7%

∴Dividend = 7% × 100 = Rs.7

Dividend = $\frac{07}{120} \times 100$

= 5.83%

∴ Firm I is paying better.

4) Sudhakar invests Rs. 1,344 in buying shares of face value Rs.24 selling at 12% premium. The dividend on the shares is 15% per annum. Calculate

(I) The number of shares Aditya buys,
and

(II) The dividend he receives annually.

Sol:
(I) Amount Invested = Rs. 1,344
FV = Rs.24
Rate of premium = 15%

∴ MV= $24 + 1500 \times 24$

$= 24 + 2.88$

= Rs.26.88

∴ No of Shares $= \frac{1,344}{26.88} = 50$

(II) Rate of dividend =15%

∴ Dividend = $15\% \times 24 \times 50$
= Rs.180

5) Sameer invests Rs. 5,625 in a company paying 7% per annum when share of Rs. 10 stands for I 12.50. Find Sameer's income from this investment. If he sells 60% of these shares for Rs.10 each, find his gain or loss in this transaction.

Sol: Amount Invested = Rs. 5,344

FV = Rs.24

MV=Rs.12.5
∴ No of Shares $= \frac{5,625}{12.5} = 450$

Rate of dividend =7%

∴ Dividend =$7\% \times 10 \times 450$

= **Rs.**315

∴ Shares sold = $(60\% \times 450) \times 10$

= Rs.2,700

$\therefore$ As per MV $= (60\%^{\times\ 450}) \times 10 = 2{,}700$

$\therefore$ Net Loss $= 3{,}375^{-2{,}700}$

= Rs. 675

6) Geeta buys Rs.100 shares of a company which pays 15% dividend. She buys the shares at a price from the-market that gives her 10% return on her investment. At what price did she buy each share ?

Sol: FV = Rs. 100
Rate of dividend _= 15%

$\therefore$Dividend $= 1500 \times 100 =$ Rs. 15

Rate of return = 10%

$\therefore$ Rate of return $=^{\frac{15}{MV}} \times 100$

$\therefore \quad 10 = \frac{15}{MV} \times 100$

$\therefore \quad MV = \frac{15}{10} \times 100$

$\therefore$ **MV = Rs.150**

7) Tejas invests in 9% Rs.100 shares at f 145 but Sahil invests in 7% RS.100 shares at Rs.116. Whose investment is better?

Sol: For Tejas,

FV = Rs.100

MV = Rs.145

Rate of profit = 9%

Profit $= 9\% \times 100 =$ Rs.9
$\therefore$ Rate of Return $=^{\frac{9}{145}} \times 100 = 6.21\%$
For Sahil,

FV = Rs. 100

MV = Rs. 116

Rate of profit = 7% Profit=7% × 100 = Rs.7

∴ Rate of Return $=\frac{7}{116} \times 100 = 6.03\%$

∴ Tejas's Investment is better.

(8) A 6% share yields 8%. Find the market value of a Rs.100 share.

Sol: FV = Rs.100
Rate of profit = 6%
Profit=6% × 100 = Rs.6
Rate of return = 8%

∴ Rate of return $=\frac{6}{MV} \times 100$

∴ $8 = \frac{6}{MV} \times 100$

∴ $MV = \frac{6}{8} \times 100$

∴ **MV = Rs.75**

9) Ashwini bought Rs.40 shares at a premium of 40%. Find the income, if Ashwini invests Rs.14000 in these shares and receives .a dividend at the rate of 8% on the nominal value of the shares.

Sol: Amount Invested = Rs.14000

FV = RS.40

Rate of premium = 40%

MV = 40 + 40% × 40

= 40 + 16

= Rs.56

∴ No of Shares $= \frac{14000}{56} = 250$

Rate of dividend =8%

∴ Dividend $= 8\% \times 40 \times 250$

$= \text{Rs.}800$

10) Mr. Rutvik Invests Rs.30,000 in buying shares of a company which pays a 12% dividend annually on Q 100 shares selling at a premium of Rs.50. Find

(I) The number of shares bought by Mr. Rutvik, and

(II) His annual income from the shares.

Sol:

(I) FV = Rs.100

∴ MV= 100 + 50 = Rs.150
∴ Amount Invested = Rs.30000
No. of shares $= \frac{30000}{150} = 200$

(II) Rate of dividend = 12%

∴ Dividend = 12% × 100 × 200

= Rs.2400

11) Rasika bought Rs.40 shares at a discount of 40%. Find the income, if she invests Rs. 12000 in these shares and receives a dividend at the rate of 11% on the nominal value of the shares.

Sol: Amount Invested = Rs.12000

FV = Rs.40

Rate of premium = 40%

MV = 40 − 40% × 40

= 40 − 16

= Rs.24

∴ No of Shares $= \frac{12000}{24} = 500$

Total Rate of dividend =11%

∴ Total Income=11%$\times 40 \times 500$

$= \textbf{Rs.}2{,}200$

12) Nisha invests Rs.15,840 in buying shares of nominal value Rs.24 selling at a premium of 10%. The company pays a15% dividend annually. Find

(I) The dividend she receives annually, and

(II) The rate of return from her investment.

*(*Answer differ from textbook)*

Sol: Amount Invested = Rs.15840

FV = Rs.24

∴ Rate of premium = 10

∴ MV = 24 + 10% × 24

= 24 + 2.4

= Rs.26.4

No of shares = $\frac{15840}{26.4}$ = 600

(I) Rate of dividend=15%

∴ Dividend 15% × 24 × 600 = Rs.2,160

(II) Profit = 15% × 24 = Rs.3.6

∴ Rate of Return = $\frac{3.6}{26.4} \times 100$

= 13.64%

13) Ashutosh buys 400, Rs. 100 shares at a discount of 20% and receives a return of 12% on his money. Calculate:

(I) The amount invested by Ashutosh. (II) The rate of dividend paid by the company.

*(*Answer differ from textbook)*

Sol: No of shares = 400

FV = Rs.100

Rate of discount = 20%

∴ MV = 100 − 20% × 100

= 100 − 20

= Rs.80

(I) Amount Invested = 400 × 80

= Rs.32000

(II) Let the rate of dividend be x

∴ Rate of Return = 12%

Rate of Return = $\frac{\text{Dividend}}{\text{MV}} \times 100$

$12 = \frac{x}{80} \times 100$

∴ $x = \frac{12 \times 80}{100}$

∴ $\boldsymbol{x = 9.6\%}$

14) Vaishnavi bought 1000, Rs.100 shares from the stock market carrying 8% dividend quoted at Rs.130. A few days later the market value of' the shares went up by 10%. Vaishnavi sold all her shares. What was her total income from this transaction?

Sol: No of shares = 1000

FV = Rs.100

MV = Rs.130

Rate of dividend = 8%

∴ Dividend = 8% × 100 = Rs.8,000

Rate of premium = 10%

$\therefore$ New MV $= 130 + 10\% \times 130$

$= 130 + 13$

$=$ Rs.143

Selling price $= 143 \times 1000 =$ Rs.1,43,000

$\therefore$ Total Income $=$ 1,43,000 + 8,000 1,30,000

= Rs.21,000

15) Mr. Dinesh invests Rs.20,800 in 6% Rs. 100 shares at Rs.104, and Rs.14,300 in 10.5% Rs.100 shares at Rs.143. What will be his annual income from the shares?

Sol: Case 1:

FV $=$ Rs.100

MV $=$ Rs.104

Amount Invested $=$ Rs.20,800

$\therefore$ No of shares $= \frac{20800}{104}$

$= 200$

Rate of dividend $= 6\%$

$\therefore$ Dividend $= 6\% \times 100 \times 200$
$=$ Rs.1,200

Case 2:

FV $=$ Rs.100

MV $=$ Rs.143

Amount Invested $=$ Rs.14,300

$\therefore$ No of shares $= \frac{14300}{143}$

$=100$

Rate of dividend = 10.5%

∴ Dividend = 10.5% × 100 × 100
= Rs.1,050

∴ Total Income = 1,200 + 1,050

= Rs.2,250

16) A company declares a semi-annual dividend of 5%. Daniel has 400 shares of company. If Daniel's annual income from the shares is Rs.1000, find the face value of each share.

Sol: Annual Income = Rs.1000

∴ Semi Annual Income = $\frac{1000}{2}$
= Rs.500

∴ Rate of dividend = 500

∴ Semi Annual dividend = 5% × 400 × FV

∴ 500 = $\frac{5}{100} \times 400 \times FV$

∴ 500 = 20 × FV

∴ FV = $\frac{500}{20}$

∴ FV = Rs.25

7) Bhargav buys 400, twenty-dollar shares at a premium of Rs.4 each and receives a dividend of 12% find:

(I) The amount invested by Bhargav

(ii) His total income from the shares.

(III) Percentage return on his money.

Sol: No of shares = 400

FV = Rs.20

MV=20 + 4 = Rs.24

(I) Amount Invested = 24 × 400 **= Rs.9,600**

(II) Rate of dividend = 12%

∴ Dividend = 12% × 20 × 400 = **Rs. 960**

(II) Dividend per share = 12% × 20 = Rs.2.4 .4

Rate of Return = $\frac{2.4}{24} \times 100$

= 10%

18) Anil buys 350 Rs.100 shares of a company at a premium of 20% from the market.
The company pays 12% dividend annually Find

(i) The investment made by the Anil.

(ii) His annual income from the shares,

and

(iii) The rate of return from the shares.

Sol: No of shares = 350

FV= Rs.100
Rate of premium = 20%

∴ MV= 100 + 20% × 100 = 100 + 20 = Rs.120

(I) Amount Invested = 350 × 120 **= Rs.42,000**

(II) Rate of dividend = 12%

∴ Dividend = 12% x 100 x 350 = Rs.4,200

(III) Dividend per share = 12% × 100 = Rs.12

Rate of Return = $\frac{12}{120} \times 100$

= 10%