

Aptitude Practice

Ratio & Proportion

(:: or =)

<u>Ratio</u>	<u>Proportion</u>
$a:b \text{ or } \frac{a}{b}$	$a:b :: c:d$ or $a:b = c:d$

when we see :: or = in que
that is proportion Que.

Types of Ratio

① Duplicate Ratio

$$(3:7) \\ \times 2 \quad \downarrow \times 2 \\ (9:49)$$

② Triplicate Ratio

$$(3:7) \\ \times 3 \quad \downarrow \times 3 \\ (27:343)$$

③ Sub-Duplicate Ratio

$$(9:25)$$

$$\sqrt[2]{9} : \sqrt[2]{25} \Rightarrow 3:5$$

④ Sub Triplicate ratio

$$(125:343)$$

$$\sqrt[3]{125} : \sqrt[3]{343} \Rightarrow 5:7$$

⑤ Inverse ratio

$$5:7$$

$$\Rightarrow 7:5$$

⑥ Compound ratio

$$1:3 \quad 2:9 \quad 4:7 \\ a:b \quad c:d \quad e:f$$

$$\frac{1 \times 2 \times 4}{3 \times 9 \times 7} = \frac{8}{189}$$

Note Ratio shouldn't be in fraction if given then convert to ratio.

$$a:b = \frac{2}{9} : \frac{1}{3} \\ = 2 : \underline{\frac{3}{9}}$$

$$\boxed{a:b = 2:3}$$

Finding Ratio

Note: $a:b = 2:3$

$$\begin{cases} a=2 \\ b=3 \end{cases}$$

In que if they ask ans in ratio

$$\begin{cases} a=2x \\ b=3x \end{cases}$$

In que if they ask ans in number

Q If $A:B:C = 2:3:4$, then what is the value of $\frac{A}{B} : \frac{B}{C} : \frac{C}{A}$?

$\rightarrow \frac{A}{B} : \frac{B}{C} : \frac{C}{A} = \frac{2}{3} : \frac{3}{4} : \frac{4}{2}$ but ratio value should not be in fraction.

$$= \frac{8:9:24}{12}$$

Ans 8:9:24

Q If $A:B = 2:3$ and $B:C = 4:5$, then $A:B:C$ is ?

$$\begin{array}{c} A:B:C \\ 2:3 \overset{\text{?}}{:} 3 \\ \hline 4:4:5 \end{array}$$

Ans 8:12:15

Q If $A:B = \frac{1}{2} : \frac{1}{3}$ and $B:C = \frac{1}{2} : \frac{1}{3}$ then $A:B:C = ?$

$$\begin{array}{l} \rightarrow A:B = \frac{1}{2} : \frac{1}{3} \quad B:C = \frac{1}{2} : \frac{1}{3} \\ \qquad\qquad\qquad = \frac{3:2}{6} \qquad\qquad\qquad = \frac{3:2}{6} \end{array}$$

$$\begin{array}{c} A:B:C \\ 3:2 \overset{\text{?}}{:} 2 \\ \hline 3:3:2 \end{array}$$

Ans 9:6:4

Q If $a:b = 5:7$ and $c:d = 2a:3b$, then $ac:bd$ is ?

$$\rightarrow \frac{a}{b} = \frac{5}{7} \quad \frac{c}{d} = \frac{2a}{3b}$$

$$\frac{a c}{b d} = \frac{5 \times 2a}{7 \times 3b}$$

$$= \frac{5}{7} \times \frac{2}{3} \times \frac{5}{7} = \frac{50}{147} \quad \text{Ans: } 50:147$$

Q If $3A = 5B$ and $4B = 6C$, then $A:C$ equal to,

$$\rightarrow \frac{A}{B} = \frac{5}{3} \quad \frac{B}{C} = \frac{6}{4} \quad \therefore A:B = 5:3, B:C = 6:4$$

$$A:B:C$$

$$S:3:\boxed{3}$$

$$\frac{\boxed{6}:6:4}{30:x:12}$$

$$5:x:2$$

$$\text{Ans: } A:C = 5:2$$

Q If $a:5 = b:7 = c:8$ then $\frac{a+b+c}{a}$ is equal to,

$$\rightarrow \frac{a}{5} = \frac{b}{7} = \frac{c}{8} \quad \frac{a+b+c}{a}$$

$$\frac{5x+7x+8x}{5x}$$

$$\frac{20x}{5x} = \text{Ans } 4$$

Q. If $\frac{x}{y} = \frac{6}{5}$, find the value of $\frac{x^2+y^2}{x^2-y^2}$

$$\rightarrow \frac{x}{y} = \frac{6}{5}, \quad \frac{x^2+y^2}{x^2-y^2}$$

$$\frac{(6x)^2 + (5x)^2}{(6x)^2 - (5x)^2} \Rightarrow \frac{36x^2 + 25x^2}{36x^2 - 25x^2} \Rightarrow \text{Ans} = \frac{61x^2}{11x^2} = \frac{61}{11}$$

Q. If $x:y = 8:9$, then $5x-4y : 3x+2y$ is equal to,

$$\rightarrow \overbrace{x:y = 8:9} \quad 5x-4x : 3x+2y$$

$$5(8x) - 4(9x) : 3(8x) + 2(9x)$$

$$40x - 36x : 24x + 18x$$

$$\frac{4x}{2} : \frac{42x}{21} \quad \text{Ans } 2:21$$

Q. If $\frac{x}{2y} = \frac{6}{7}$, the value of $\frac{(x-y)}{(x+y)} + \frac{14}{19}$

$$\rightarrow \frac{x}{y} = \frac{12}{7} \Rightarrow \frac{12x - 7x}{12x + 7x} + \frac{14}{19}$$

$$\frac{5x}{19x} + \frac{14}{19}$$

$$\frac{5}{19} + \frac{14}{19} \Rightarrow \frac{19}{19} \Rightarrow \text{Ans } ①$$

Q If $a:b = 2:3$ and $b:c = 4:5$ is then $a^2:b^2:bc$ is,

$$\rightarrow a:b:c$$

$$2:3:\boxed{3}$$

$$\frac{\boxed{4}:4:5}{8:12:15}$$

$$a^2:b^2:bc$$

$$(8)^2:(12)^2:12 \times 15$$

$$64:144:12 \times 15$$

Ans $16:36:45$

Q If $A:B = 2:3$, $B:C = 4:5$ and $C:D = 6:7$, what is the value of $A:B:C:D$?

$$\rightarrow A:B:C:D$$

$$2:3:\boxed{3}:\boxed{3}$$

$$\frac{\boxed{4}:4:5}{\boxed{6}:6:7}$$

$$\frac{\boxed{6}:6:7}{16:24:30:35}$$

$$(2 \times 4 \times 9):(2 \times 4 \times 6):(2 \times 5 \times 6):(2 \times 5 \times 7)$$

Ans $16:24:30:35$

Q If $a:b = \frac{2}{9}:\frac{1}{3}$, $b:c = \frac{2}{7}:\frac{5}{14}$, $d:c = \frac{7}{10}:\frac{3}{5}$, then find $a:b:c:d$?

$$\rightarrow a:b = \frac{2}{9}:\frac{1}{3} = \frac{2}{9}:3 = 2:3$$

$$a:b:c:d$$

$$2:3:\boxed{3}:\boxed{3}$$

$$b:c = \frac{2}{7}:\frac{5}{14} = \frac{4}{14}:5 = 4:5$$

$$\frac{\boxed{4}:4:5}{\boxed{6}:6:7}$$

$$\boxed{6}:6:7$$

$$c:d = \frac{3}{5}:\frac{7}{10} = \frac{6}{10}:7 = 6:7$$

Ans $16:24:30:35$

Divided into Parts

① If Rs 1000 is divided between A and B in the ratio 3:2 then A will receive.

$$\rightarrow A : B = \frac{A}{B} = \frac{3}{2} \times \frac{1000}{1000} = 600$$

② If 78 is divided into three parts which are in the ratio $1:\frac{1}{3}:\frac{1}{6}$ the middle part is? find middle part

$$\rightarrow 1 : \frac{1}{3} : \frac{1}{6} \Rightarrow \frac{6:2:1}{6} \Rightarrow [6:2:1]$$

$$\frac{2}{9} \times 78^{\frac{26}{3}} \Rightarrow \frac{52}{3}$$

③ Rs 33,630 are divided among A, B, C in such manner that the ratio of the amt of A to that of B is 3:7 and the ratio of the amt of B to that of C is 6:5. The amt of money received by B is,

$$\rightarrow 33,630 \quad A:B = 3:7 \quad B:C = 6:5$$

$$\begin{array}{r} A:B:C \\ 3:7: \boxed{2} \\ \hline \boxed{18}:42:35 \end{array}$$

$$\textcircled{B} \quad \frac{42}{95} \times \frac{35}{35} \Rightarrow \text{Ans } 19,868$$

④ Rs 3400 is divided among A, B, C, D in such a way that the share of A and B, B and C, C and D may be as 2:3, 4:3, 2:3 resp. The sum of shares of B and D is,

$$\rightarrow A:B = 2:3, B:C = 4:3, C:D = 2:3$$

$$\begin{array}{c} A:B:C:D \\ 2:3 \quad \boxed{1} \quad \boxed{3} \\ \boxed{4} \quad \boxed{3} \quad \boxed{3} \\ \hline \boxed{2} \quad \boxed{2} \quad 2:3 \\ \hline 1: \boxed{2} : 18 : \boxed{2} \\ \text{B} \qquad \qquad \text{D} \end{array}$$

$$\begin{array}{c} B+D \\ \hline \frac{51}{85} \times 3400 \Rightarrow \underline{\text{Arg}} \quad 2640 \end{array}$$

⑤ By mistake instead of dividing Rs 117 among A, B, C the ratio $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$ it was divided in the ratio of 2:3:4. Who gains the most and by how much?

$$\begin{array}{c} \rightarrow 117 \\ \frac{1}{2} : \frac{1}{3} : \frac{1}{4} \quad \boxed{2:3:4} \\ 6:4:3 \quad 8x=117 \\ \hline 12 \quad \boxed{x=13} \\ \boxed{6:4:3} \quad 2 \times 13 : 3 \times 13 : 4 \times 13 \\ +3 \quad +4 \quad +13 \\ \hline 13 \quad 18x=117 \\ \boxed{x=9} \quad 26:39:52 \\ 6 \times 9:4 \times 9:3 \times 9 \\ 54:36:27 \\ \textcircled{a} \quad \textcircled{b} \quad \textcircled{c} \\ \oplus \quad \oplus \quad \oplus 25 \\ \text{Arg} \quad \text{C gains most } (+25) \end{array}$$

⑥ If a sum of money is to be divided among A, B, C such that A's share is equal to twice B's share and B's share is 4 times C's share, then their shares are in the ratio.

$$\rightarrow A : B = 2 : 1$$

$$B : C = 4 : 1$$

$$A : B : C$$

$$2 : 1 : \boxed{1}$$

$$\underline{\boxed{4} : \boxed{4} : 1}$$

$$\text{Ans} \quad \underline{8 : 4 : 1}$$

⑦ Divide Rs 1250 among A, B, C so that A gets $\frac{2}{9}$ of B's share and C gets $\frac{3}{9}$ of A's share. Find the shares of A, B and C.

$$\rightarrow$$

$$A = \frac{2}{9} B$$

$$C = \frac{3}{9} A$$

$$\frac{A}{B} = \frac{2}{9}$$

$$C = \frac{3}{9} \times \frac{2}{9} B$$

$$\boxed{A : B = 2 : 9}$$

$$= \frac{1}{6} B$$

$$\frac{C}{B} = \frac{1}{6}$$

$$\boxed{B : C = 6 : 1}$$

$$A : B : C$$

$$2 : 9 : \boxed{9}$$

$$\underline{6 : 54 : 1}$$

$$12 : 54 : 9$$

$$4 : 18 : 3$$

$$25x = 1250$$

$$x = 50$$

$$\begin{array}{c} \textcircled{A} \\ \textcircled{B} \\ \textcircled{C} \end{array} \begin{array}{l} 50 \times 4 \\ 50 \times 18 \\ 50 \times 3 \end{array} \begin{array}{l} 200 \\ 900 \\ 150 \end{array}$$

⑧ Rs 2010 are to be divided among A, B, C in such a way that if A gets Rs 5, then B must get Rs 12 and if B must get Rs 12 and if B gets Rs 4, then C must get Rs 5.50. The share of C will exceed that of B by,

$$\rightarrow \boxed{A : B = 5 : 12}$$

$$A : B : C$$

$$5 : 12 : 12$$

$$B : C = 4 : 5.50$$

$$= 4 : \frac{55}{11} \cancel{\times 2}$$

$$\boxed{B : C = 8 : 11}$$

$$8 : 12 : 12$$

$$8 : 8 : 11$$

$$(8 \times 2) : (12 \times 2) : (12 \times 11)$$

$$\boxed{16 : 24 : 33}$$

$$\textcircled{A} \quad \textcircled{B} \quad \textcircled{C}$$

$$B - C = 33 - 24$$

$$= 9$$

$$\frac{9}{67} \times 2010$$

$$\boxed{\text{Ans} 270}$$

Based on Numbers

① The ratio of two numbers is 3:8 and their difference is 115. The larger number is,

$$\rightarrow \boxed{3 : 8}$$

\downarrow \downarrow

$$\boxed{3x} \quad \boxed{8x}$$

$$3x \sim 8x = 115$$

$$5x = 115$$

$$\boxed{x = 23}$$

$$\begin{aligned}\text{Smallest} &= 3x \\ &= 3 \times 23 \\ &= 69\end{aligned}$$

$$\begin{aligned}\text{Largest} &= 8x \\ &= 8 \times 23\end{aligned}$$

$$\underline{\text{Ans}} = 184$$

② The ratio of two numbers is 10:7 and their difference is 105. The sum of the numbers are

$$\rightarrow \boxed{10 : 7}$$

\downarrow \downarrow

$$10x \sim 7x$$

\curvearrowright

$$17x = 17 \times 35$$

$\boxed{x = 35}$

$$10x \sim 7x = 105$$

$$3x = 105$$

$$\boxed{x = 35}$$

$$\underline{\text{Ans}}$$

③ The sum of two numbers is 40 and difference b/w them is 4. Find the numbers.

\rightarrow First = x , Second = y put $x = 22$ in Eq ①

$$x + y = 40 \quad \text{---} ①$$

$$x - y = 4 \quad \text{---} ②$$

$$\begin{array}{r} x + y = 40 \\ x - y = 4 \\ \hline 2x = 44 \\ \boxed{x = 22} \end{array}$$

$$22 + y = 40$$

$$\boxed{y = 18}$$

$$\begin{array}{r} 11 \\ 22 : 18 \\ 9 \end{array}$$

$$\underline{\text{Ans}} = \boxed{\underline{11 : 9}}$$

④ Three numbers are in the ratio 3:2:5 and the sum of their squares is 1862. What are the three numbers?

$$\rightarrow \boxed{3 : 2 : 5}$$

\downarrow \downarrow \downarrow
 $3x$ $2x$ $5x$

$$9x^2 + 4x^2 + 25x^2 = 1862$$

$$38x^2 = 1862$$

$$x^2 = \frac{1862}{38} = 49$$

$$x^2 = 49$$

$$x = \sqrt{49}$$

$$\boxed{x = 7}$$

$$3x = 3 \times 7 = 21$$

$$2x = 2 \times 7 = 14$$

$$5x = 5 \times 7 = 35$$

Ans 21:14:35

⑤ Of the three numbers, the ratio of the first and the second is 8:9 and that of the second and third is 3:4. If the product of the first and third number is 2400, then the 2nd number is,

$$\rightarrow 1^{\text{st}} : 2^{\text{nd}} = 8 : 9, \quad 2^{\text{nd}} : 3^{\text{rd}} = 3 : 4$$

$$1^{\text{st}} : 2^{\text{nd}} : 3^{\text{rd}}$$

$$8 : 9 : \boxed{9}$$

$$\underline{\boxed{3} : 3 : 4}$$

$$\underline{24 : 27 : 36}$$

$$\underline{8 : 9 : 12}$$

$$8x \times 12x = 2400$$

$$96x^2 = 2400$$

$$x^2 = \frac{2400}{96}$$

$$x^2 = 25$$

$$\boxed{x = 5}$$

$$\text{second no. } 9x = 9 \times 5 = \boxed{45}$$

⑥ Three numbers are in the ratio $\frac{1}{2} : \frac{2}{3} : \frac{3}{4}$. The difference b/w the greatest and the smallest number is 36. The numbers are?

$$\rightarrow \frac{1}{2} : \frac{2}{3} : \frac{3}{4} \quad 9x \times 6x = 36$$

$$\underline{6 : 8 : 9}$$

$$\boxed{12}$$

$$\boxed{3x = 36}$$

$$\boxed{1x = 12}$$

$$\boxed{6x \rightarrow 6 \times 12 = 72}$$

$$\boxed{8x \rightarrow 8 \times 12 = 96}$$

$$\boxed{9x \rightarrow 9 \times 12 = 108}$$

Ans 72:96:108

⑦ There is a ratio of 5:4 betn two numbers. If 40% of the first number is 12 then what would be the 50% of the second number?

$$\rightarrow \begin{array}{l} 5 : 4 \\ \downarrow \quad \downarrow \\ 5x \quad 4x \end{array}$$

$$\begin{array}{l} 40\% \text{ of } 5x = 12 \\ \frac{40}{100} \times 5x = 12 \\ 5x = 12 \end{array}$$

$$\begin{array}{l} 50\% \text{ of } 4x \\ \frac{50}{100} \times 4x = 12 \\ 4x = 24 \end{array}$$

$$x = 6$$

$$\boxed{\text{Ans: 12}}$$

Boys and Girls

① The ratio of the number of boys to girls of a school with 504 students is 13:11. What will be the new ratio if 12 more girls are admitted?

$$\rightarrow \begin{array}{ll} \text{Boys} & \text{Girls} \\ 13 & 11 \end{array}$$

$$\frac{13}{24} \times 504 = 21 \times 13$$

$$\text{Total Boys} = 273$$

$$\text{Total Girls} = 231 + 12 = 243$$

$$\begin{array}{l} \text{Boys} \quad \text{Girls} \\ 273 : 243 \\ \boxed{91 : 81} \end{array}$$

② In classroom, Boys and Girls are in the ratio of 5:7. If 9 left from each of them, their ratio became 7:1. The difference of Boys and Girls is,

$$\rightarrow \begin{array}{ll} \text{Boys} & \text{Girls} \\ 5 & 7 \end{array} \rightarrow \begin{array}{ll} \text{Boys} & \text{Girls} \\ 7 & 11 \end{array}$$

$$\begin{array}{l} -9 \\ -9 \end{array}$$

$$\frac{5x - 9}{7x - 9} = \frac{7}{11}$$

$$\begin{array}{l} 55x - 99 = 49x - 63 \\ 55x - 49x = -63 + 99 \\ 6x = 36 \\ x = 6 \end{array}$$

$$\begin{array}{l} \text{Boys} = 5x - 9 = (5 \times 6) - 9 = 30 \\ \text{Girls} = 7x - 9 = (7 \times 6) - 9 = 42 \\ \text{Difference} = 42 - 30 = 12 \end{array}$$

③ The students in three classes are in the ratio 2:3:5. If 40 students are increased in each class the ratio changes to 4:5:7 originally the total no. of students was,

$$\rightarrow \begin{array}{c} \text{Class} \\ 2 : 3 : 5 \\ +40 \quad | \quad +40 \\ 4 : 5 : 7 \end{array} \rightarrow 10x \quad (2x+40) : (3x+40) : (5x+40)$$

take any two,

$$\frac{2x+40}{3x+40} = \frac{4}{5}$$

$$10x + 200 = 12x + 160$$

$$2x = 40$$

$$x = 20$$

$10x \rightarrow 10x \cdot 20 = \boxed{\text{Ans 200}}$

Shortcut

$2 : 3 : 5$ the the +40 $\frac{2 \text{ parts}}{1 \text{ part}} = 40$	$4 : 5 : 7$ the +40 $\frac{1 \text{ part}}{2 \text{ parts added in 3 ratios}} = 20$	apply this trick when equal parts are added i.e. here
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$$2 \times 20 : 3 \times 20 : 5 \times 20$$

$$40 + 60 + 100 = \boxed{\text{Ans 200}}$$

④ The ratio of boys and girls in a college is 5:3. If 50 boys leave the college and 50 girls join the college, the ratio becomes 9:7. The no. of boys in the college is,

$$\rightarrow \begin{array}{cc} \text{Boys} & \text{GIRLS} \\ 5 : 3 & \\ 5x : 3x & \end{array}$$

$$\frac{5x - 50}{3x + 50} = \frac{9}{7}$$

$$35x - 350 = 27x + 450$$

$$8x = 450 + 350$$

$$8x = 800$$

$$x = 100$$

$$\text{Boys} \rightarrow 5x \rightarrow 5 \times 100 = \boxed{500}$$

⑤ The ratio of the number of boys to that of girls in a group becomes $2:1$. When 15 girls leave, But afterwards when 45 boys also leave, the ratio becomes $1:5$. Originally the number of girls in the group was,

$$\rightarrow \text{Boys} = x, \text{Girls} = y$$

$$① \frac{x}{y-15} = \frac{2}{1}$$

$$\boxed{x = 2y - 30}$$

$$② \frac{x-45}{y-15} = \frac{1}{5}$$

$$5x - 225 = y - 15$$

$$5x = y - 15 + 225$$

$$5(2y - 30) = y - 15 + 225$$

$$10y - 150 = y - 15 + 225$$

$$9y = 210 + 150$$

$$9y = 360 \quad \begin{matrix} \text{Girls} \\ \boxed{y = 40} \end{matrix}$$

⑥ The total no. of students in a school was 660. The ratio betn boys and girls was $13:9$. After some days, 30 girls joined the school and some boys left the school and new ratio betn boys and girls became $6:5$. The no. of Boys who left the school is,

$$\rightarrow \text{Boys : Girls} = 13 : 9$$

$$\frac{13}{22} \times 660 = \boxed{390 \text{ Boys}}$$

$$\underline{\text{total}} \quad \underline{\text{Boys}} = \boxed{270} + 30 \quad \underline{\text{Girls}} = 300$$

$$\frac{390-x}{300-60} = \frac{6}{5}$$

$$390 - x = 360$$

$$\boxed{x = 30}$$

⑦ In a college union, there are 48 students. The ratio of the number of boys to the number of girls is 5:3. The number of girls to be added in the union, so that the number of boys to girls is 6:5 is,

$$\rightarrow 5 : 3$$

$$\frac{5}{8} \times 48 = 30$$

$$\frac{48 - 30}{\text{total Boys}} = \frac{18}{\text{Girls}}$$

$$\frac{30}{18+x} = \frac{6}{5}$$

$$150 = 108 + 6x$$

$$42 = 6x$$

$$x = 7$$

Income & Expenditure

$$\boxed{\text{Income} = \text{Expenditure} + \text{Savings}}$$

① The ratio of income of P & Q is 3:4 and the ratio of their expenditure is 2:3. If both of them save Rs 6000 each, the income of P is,

$$\rightarrow \text{Income} \Rightarrow P:Q = 3:4, \quad \text{Exp} = 2:3$$

$$\begin{matrix} \downarrow & \downarrow \\ 3x & 4x \end{matrix}$$

$$\boxed{\text{Income} - \text{Save} = \text{Exp.}}$$

$$\frac{3x - 6000}{4x - 6000} = \frac{2}{3}$$

$$9x - 18000 = 8x - 12000$$

$$\boxed{x = 6000}$$

$$\begin{aligned} P &= 3x \\ &= 3 \times 6000 \end{aligned}$$

$$\boxed{P = 18000}$$

② A and B have monthly incomes in the ratio 5:6 and monthly expenditures in the ratio 3:4. If they save ₹ 1800 and ₹ 1600 resp - find the monthly income of B.

$$\rightarrow \textcircled{A} 5 : 6 \textcircled{B}$$

$$\begin{matrix} \downarrow & \downarrow \\ 5x & 6x \end{matrix}$$

$$6x \rightarrow 6x \times 1200$$

$$\boxed{\text{Ans } 7200}$$

$$\frac{5x - 1800}{5x - 1600} = \frac{3}{4}$$

$$20x - 7200 = 18x - 4800$$

$$2x = 2400$$

$$\boxed{x = 1200}$$

③ A man spends a part of his monthly income and saves a part of it. The ratio of his expenditure to his saving is 26:3. If his monthly income is ₹ 7250, what is the amount of his monthly savings?

$$\rightarrow \text{Income} = \text{Exp.} + \text{Saving}$$

$$7250 = 26x + 3x$$

$$29x = 7250$$

$$\boxed{x = 250}$$

$$\begin{matrix} 26 : 3 \\ \downarrow & \downarrow \\ 26x & 3x \end{matrix}$$

$$3x \rightarrow 3 \times 250$$

$$\boxed{= 750}$$

④ The monthly salary of A, B, C in the proportion of 2:3:5
 If C's monthly salary is Rs 12000 more than that of A,
 then B's annual salary is,

$$\rightarrow \begin{array}{ccc} A & B & C \\ 2 & 3 & 5 \\ \downarrow & & \downarrow \\ 2x & & 5x \end{array} \quad 5x - 2x = 12000 \\ 3x = 12000 \\ \boxed{2x = 4000}$$

Note:

month = ans \div 12

year = ans \times 12

$$3x \rightarrow 3 \times 4000 = \boxed{12000}$$

\rightarrow this is monthly salary
 convert it to annual

$$12000 \times 12 = \boxed{1,44,000}$$

⑤ The incomes of A and B are in the ratio 5:3. The expenses of A, B and C are in the ratio 8:5:2. If C spends Rs 2000 and B saves Rs 700, then A saves

$$\rightarrow \boxed{\text{Income} - \text{Exp} = \text{Save}}$$

$$A : B : C$$

$$8 : 5 : 2$$



2000 \leftarrow Expenditure

$$2y = 2000$$

$$\boxed{y = 1000}$$

$$\therefore A : B : C$$

$$8 : 5 : 2$$

$$\begin{matrix} \text{Exp} & 8000 : 5000 : 2000 \\ & \uparrow \quad \uparrow \\ & 8 \times 1000 \quad 5 \times 1000 \end{matrix}$$

$$\boxed{\text{Savings (B) } 700}$$

$$A : B$$

$$5 : 3$$

$$\downarrow \quad \downarrow$$

$$5x \quad 3x$$

$$\boxed{\text{Inc} - \text{Exp} = \text{Save}}$$

$$3x - 5000 = 700$$

$$3x = 5700$$

$$\boxed{7x = 1900}$$

$$5x \rightarrow 5 \times 1900 = 9500$$

$$\boxed{I - E = S}$$

$$9500 - 8000 = \boxed{1500}$$

Based on coins Note Rs. 2 value of coins

1 Rupee coins \Rightarrow 2

50 paise \Rightarrow 4

25 paise \Rightarrow 8 \rightarrow No. of coins

20 paise \Rightarrow 10

① In a bag there are three types of coins

1 rupee, 50 paise and 25 paise in the ratio

3:8:20. Their total value is Rs 372. Find the total number of coins?

$$\rightarrow 3:8:20$$

$$3x + 8x \times \frac{1}{2} + 20x \times \frac{1}{4} = 372$$

\swarrow

\downarrow bcz 50 paise

$$3x + 4x + 5x = 372$$

$$12x = 372$$

$$x = \frac{372}{12}$$

\cancel{x}

$$x = 31$$

$$3x \rightarrow 3 \times 31 = 93$$

$$8x \rightarrow 8 \times 31 = 248$$

$$20x \rightarrow 20 \times 31 = 620$$

Ans 961

② In a bag, there are 3 types of coins 1 rupee, 50 paise, 25 paise in the ratio 2:3:4. Their total value is Rs 180. Find the total number of 50 paise coins?

$$\rightarrow 2:3:4$$

$$2x + 3x \times \frac{1}{2} + 4x \times \frac{1}{4} = 180$$

$$3x \rightarrow 3 \times 40 = 120$$

Ans 120

$$2x + \frac{3x}{2} + x = 180$$

$$4x + \frac{3x}{2} + 2x = 180$$

$$\frac{9x}{2} = 180 \times 2$$

$$9x = 360$$

$$x = 40$$

③ In a bag there are three types of coins Rupee, 50 paise, 25 paise in the ratio 8:5:3. Their total value is Rs 225. Find the total number of 1 rupee coins?

$$\Rightarrow 8:5:3$$

$$8x + 5x \times \frac{1}{2} + 3x \times \frac{1}{4} = 225$$

$$8x + \frac{5x}{2} + \frac{3x}{4} = 225$$

$$8x \rightarrow 8 \times 25 = 160$$

$$\frac{32x + 10x + 3x}{4} = 225$$

$$45x = 225 \times 4$$

$$x = 20$$

Ans

④ A box contains 420 coins of 1 rupee, 50 paise and 25 paise coins. The ratio of their values is 13:11:7. The number of 50 paise coins is?

$$\rightarrow 13:11:7 \leftarrow \text{Rupee values}$$

1Rs 50p 25p

$$13:22:35 \leftarrow \text{No. of coins}$$

$$13x + 22x + 35x = 420 \text{ coins}$$

Note $\underline{\underline{\text{1 Rupee + 50 paise + 25 paise = coins}}}$

$$\underline{\underline{R\$ + R\$ + R\$ = R\$}}$$

$$70x = 420$$

$$x = 6$$

$$22x \rightarrow 22 \times 6$$

$$\underline{\underline{\text{Ans = 132}}}$$

⑤ A box containing 280 coins of 1 rupee, 50 paise and 25 paise coins. The ratio of their values is 8:4:3. The number of 50 paise coins is?

\rightarrow

$$8:4:3$$

$$\frac{1}{1Rs} \frac{1}{50p} \frac{1}{25p}$$

$$\underline{\underline{\text{coins}} \rightarrow 8:8:2x}}$$

$$2:2:3$$

$$2x + 2x + 3x = 280$$

$$7x = 280$$

$$x = 40$$

$$2x \rightarrow 2 \times 40$$

$$\underline{\underline{\text{Ans = 80}}}$$

Based on Ages

① The ratio of the ages of two student in 3:2 one is elder than the other by 5 years what is the age of younger student?

$$\rightarrow 3 : 2 \quad 3x - 2x = 5 \\ \downarrow \quad \downarrow \\ 3x - 2x = 5 \\ \hookrightarrow 3x - 2x = 10 \\ \hookrightarrow 3x = 15$$

② The ratio of age of two boys is 5:6 . After two years , the ratio will be 7:8 . what will be the ratio of their age after 12 years?

$$\rightarrow \begin{matrix} \text{Present} & \xrightarrow{+12 \text{ years}} \\ 5:6 & \xrightarrow{+2 \text{ years}} 7:8 \end{matrix} ?$$

$$5x \quad 6x \quad \frac{5x+2}{6x+2} = \frac{7}{8}$$

$$40x + 16 = 42x + 14$$

$$2x = 2$$

$$(x = 1)$$

$$B_1 = 5x + 12$$

$$B_2 = 6x + 12$$

$$(B_1 : B_2) \boxed{17 : 18}$$

③ Harsha is 40 years old and Ritu is 60 years old . How many years ago was the ratio of their ages 3:5 ?

$$\rightarrow 3:5 \quad H = 40 \text{ yr}, R = 60 \text{ yr}$$

$$\xrightarrow{\text{many years ago}} (x)$$

$$\frac{40-x}{60-x} = \frac{3}{5}$$

$$200 - 5x = 180 - 3x$$

$$2x = 20$$

$$(x = 10)$$

④ The ratio of the present ages of two brothers is 1:2 and 5 years back the ratio was 1:3. What will be the ratio of their ages after 5 years.

→

-5 years back present +5 years forward
 1:3 1:2 ?
 Page
 $1x \quad 2x$
 $1x \times 10 = 10$
 $2x \times 10 = 20$
 $\frac{x-5}{2x+5} = \frac{1}{3}$
 $3x - 15 = 2x + 5$
 $x = 10$
 after 5 years after 5 years
 $10+5 \quad 20+5$
 $15 : 25$
 $3:5$

mixture

① A mixture containing alcohol and water in ratio 4:3. If 5 litres of water is added to the mixture, the ratio becomes 4:5. Find the quantity of alcohol in the given mixture.

$$\rightarrow AL: \omega \Rightarrow 4:3$$

$$AL = 4x \quad , \quad w = 3x$$

$$\frac{4x}{3x+5} = \frac{4}{5}$$

$$20x = 12x + 20$$

$$8x = 20$$

$$x = \frac{20}{8} = \frac{5}{2}$$

$$AC = 4x = \frac{4 \times 5}{2} = 10$$

$$\overline{AL} = 10$$

② In two alloys A and B, the ratio of zinc to tin is 5:2 and 3:4. Seven kg of the alloy A and 21 kg of the alloy B are mixed together to form a new alloy. What will be the ratio of zinc and tin in the new alloy?

→ Metal A

$$z:t = 5:2$$

$$\frac{5}{x} \times x : \frac{2}{x} \times x$$

$$z = 5 \text{ kg} \quad t = 2 \text{ kg}$$

$$7 \text{ kg}$$

Metal B

$$z:t = 3:4$$

$$\frac{3}{x} \times 21 : \frac{4}{x} \times 21 \rightarrow$$

$$z = 9 \text{ kg}$$

$$t = 12 \text{ kg}$$

$$21 \text{ kg}$$

$$\text{zinc} = 9 + 5 = 14$$

$$\text{tin} = 2 + 12 = 14$$

$$(1:1)$$

③ Zinc and copper are in the ratio 5:3 in 400 gm of an alloy. How much of copper (in grams) should be added to make the ratio 5:4?

$$z:c \Rightarrow 5:3$$

$$\text{Alloy} = 400 \text{ gm}$$

$$+ ? \\ \Rightarrow 5:4$$

$$\frac{5}{8} \times \frac{50}{400} : \frac{3}{8} \times \frac{50}{400}$$

$$250 \text{ gm}$$

$$150 \text{ gm}$$

$$\frac{250}{150+x} = \frac{5}{4}$$

$$1000 = 750 + 5x$$

$$250 = 5x$$

$$x = 50 \text{ gm}$$

Copper

④ In a mix of 3 varieties of tea, the ratio of their weights is 4:5:8. If 5 kg tea of the first variety, 10 kg tea of the second variety and some quantity of tea of the third variety are added to the mix, the ratio of the weights of those varieties of tea becomes as 5:7:9. In the final mixture the quantity (in kg) of the third variety of tea used,

$$\rightarrow 4:5:8$$

$$(4x+5):(5x+10):(8x+y) = 5:7:9$$

$$\boxed{\frac{4x+5}{5x+10} = \frac{5}{7}}$$

$$28x + 35 = 25x + 50$$

$$3x = 15$$

$$\boxed{x=5}$$

3rd variety quantity

$$8x+y$$

$$8 \times 5 + 5$$

$$\underline{\underline{\text{ans}}} \quad \boxed{45}$$

$$\boxed{\text{put } x=5}$$

$$\frac{5x+10}{8x+y} = \frac{7}{9}$$

$$\frac{25+10}{40+y} = \frac{7}{9}$$

$$\frac{35}{40+y} = \frac{7}{9}$$

$$\begin{aligned} 45 &= 40+y \\ \boxed{y=5} \end{aligned}$$

Partnership

① Ajay started a business investing Rs 12000. After 5 months, Bala joined him with a capital of Rs 9000. At the end of the year, the total profit was Rs 4416. What is the share of profit of Ajay?

$$\rightarrow \text{Ajay} \quad \text{Bala} \quad (1 \text{ year} = 12 \text{ month})$$

$$12000 \times 12 \text{ month} : 9000 \times 7 \text{ month} \quad (12 \text{ m} - 5 \text{ m} = 7 \text{ month})$$

$$\frac{12 \times 12}{4} : 9 \times 7$$

$$\boxed{16 : 7}$$

$$\frac{16}{23} \times \frac{192}{4416} = \frac{192 \times (10+6)}{4416} = \frac{1920}{4416} + \frac{1152}{4416}$$

$$\boxed{3072}$$

② Ann started a business investing Rs 45000 after 8 months. Vani joined him with a capital of Rs 52000 at the end of two years, the total profit was Rs 56165. What is the share of the profit of Vani?

$$\rightarrow \text{Ann} \quad \text{Vani} \quad 2 \text{ years} = 24 \text{ months}$$

$$45000 \times 24 : 52000 \times 16$$

$$\frac{3}{3}$$

$$\boxed{135 : 104}$$

$$\frac{604}{239} \times \frac{235}{56165} = \frac{235 \times (100+4)}{56165}$$

$$= \frac{23500}{56165} + \frac{940}{56165}$$

$$\boxed{24440}$$

③ Nikita and Nishita enters into a partnership by investing Rs 50000 and Rs 40000 resp. They agreed to share the profit in the ratio of their capitals. Find out the share of Nikita when profit of the business is Rs 22500 after year.

$$\rightarrow \begin{array}{l} \text{Nikita} \\ \text{50000 : } 40000 \\ \times 12 \text{ months} \end{array} \quad \begin{array}{l} \text{Nishita} \\ \text{X months} \end{array}$$

$$\boxed{5 : 4} \rightarrow \frac{5}{9} \times 22500 = 2500 \times 5 = 12500$$

④ A started a business with Rs 45000 and was joined afterwards by B with Rs 54000. After how many months did B join if the profit at the end of the year were divided in the ratio 2:1?

$$\rightarrow \begin{array}{l} \text{A} \\ 45000 \times 12 \text{ months} : 54000 \times x \end{array} \quad \begin{array}{l} \text{B} \\ 54000 \times n \end{array}$$

$$\frac{5 \times 45 \times 12}{54 \times n} = \frac{x}{1}$$

$$\frac{5}{2} = \frac{1}{1}$$

$$2n = 5 \text{ months}$$

Ans
7 months + 5 months
12 months

⑤ Ram started a business with Rs 10000 and Banu joined him later with a capital of Rs 40000. If at the end of the year, they both get an equal share of the profit, how many months after the business started did Banu join it?

$$\rightarrow \text{Ram} \quad \text{Banu}$$

$$10000 \times 12 \text{ months} : 40000 \times x \rightarrow 3$$

$$\frac{120000}{120000} : \frac{120000}{120000}$$

12 months
3 months

⑥ Ajay, Adhi and Arun invested Rs 45000, Rs 70000 and Rs 90000 resp. to start a business. At the end of two years, they earned a profit of Rs 1,64,000. What will be Adhi's share in profit?

$$\rightarrow \text{Ajay} \quad \text{Adhi} \quad \text{Arun}$$

$$45000 : 70000 : 90000 \times 24 \text{ m}$$

$$45 : 70 : 90$$

$$(9 : 14 : 18)$$

$$\frac{14}{41} \times 164000$$

$$= 4000 \times 14$$

$$= 56000$$

⑦ Anil, Mukesh and Ritesh started a business by investing Rs 125000, Rs 150000, and 175000 resp. Out of an annual profit 93600 what will be 50% of Mukesh share in the profit.

$$\rightarrow \begin{array}{ccc} \text{Anil} & \text{Mukesh} & \text{Ritesh} \\ 125000 & 150000 & 175000 \\ \times 12m & \times 12m & \times 12m \end{array}$$

$$\frac{125}{5} : \frac{150}{6} : \frac{175}{7} \quad \boxed{5:6:7}$$

$$\begin{aligned} &\hookrightarrow \frac{6}{18} \times 93600 = 31200 \\ &= 50\% \text{ of } 31200 \\ &= 15600 \end{aligned}$$

⑧ A, B, C enters into partnership with investments of Rs 75000, Rs 60000 and Rs 40000 resp. After 3 years of operation, the partnership earned a net profit of Rs 26250 what was the share of C in the profit.

$$\rightarrow \begin{array}{ccc} \text{A} & \text{B} & \text{C} \\ 75000 & 60000 & 40000 \\ \times 36m & \times 36m & \times 36m \end{array} \quad (3 \text{ years} \rightarrow 36 \text{ months})$$

$$\begin{aligned} &\frac{75}{35} : \frac{60}{35} : \frac{40}{35} \\ &\boxed{15:12:8} \quad \begin{array}{c} 750 \\ \hline 35 \end{array} \times 26250 \\ &\frac{8}{35} \times 26250 \\ &750 \times 8 \\ &= 6000 \end{aligned}$$

⑨ Ajay, Vicky and Bala entered into a partnership business. Ajay invested Rs 16000 for 9 months. Vicky invested Rs 12000 for 6 months and Bala invested Rs 8000 for 12 months. At the end of a year, the total profit of Rs 26000. Find out the share of Vicky in the profit.

→ Ajay Vicky Bala

$$16000 \times 9 : 12000 \times 6 : 8000 \times 12$$

$$\frac{16 \times 9}{4} : \frac{12 \times 6}{3} : \frac{8 \times 12}{4}$$

$$\boxed{6 : 3 : 4} \rightarrow \frac{3}{13} \times 26000 = 6000$$

⑩ A started a business investing Rs 45000 after 3 months, B joined him with a capital of Rs 60000 after another 6 months, C joined them with a capital of Rs 90000 at the end of the year. They made a profit of 16500. Find the share of each.

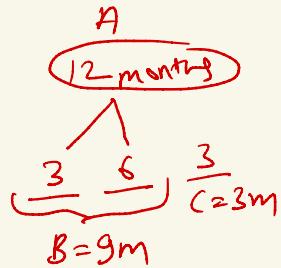
→ A B C

$$\frac{45000 \times 4}{15} : 60000 \times 9m : 90000 \times 3m$$

$$60 : 60 : 30$$

$$\boxed{2 : 2 : 1}$$

$$\hookrightarrow B = \frac{33}{2} \\ 2 = 3300$$



$$2 \times 33 \rightarrow 6600 \text{ (A)}$$

$$2 \times 33 \rightarrow 6600 \text{ (B)}$$

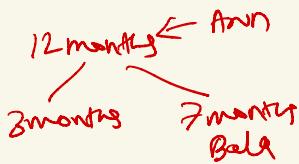
$$1 \times 33 \rightarrow 3300 \text{ (C)}$$

⑪ Ann started a business investing Rs 32000 after 5 months
 Bala joined him with a capital of Rs 22000 at the end
 of the year the total profit was Rs 16409. What is the diff.
 betⁿ shares of Ann and Bala.

$$\rightarrow \begin{array}{l} \text{Ann} : \text{Bala} \\ 32000 \times 7 : 22000 \times 7 \\ \cancel{12} \cancel{12} \end{array}$$

$$32 \times 6 : 77$$

$$\boxed{192 : 77} \rightarrow \frac{192 - 77}{192 + 77} = \frac{115}{269} \times \frac{61}{16409} \\ = 115 \times 61 \\ = 115 \times (60 + 1) \\ = 7015 \text{ Rs}$$



⑫ Adhi and Bala started a business investing Rs 42000 and
 Rs 57000 resp. but Bala left the business after 8 months
 find the diff. betⁿ the shares of profits of Adhi and Bala
 if the total profit at the end of the year was Rs 26000?

$$\rightarrow \begin{array}{l} \text{Adhi} : \text{Bala} \\ 42000 \times 12 \text{ months} : 57000 \times 8 \text{ months} \end{array}$$

$$\frac{42000 \times 12}{57000 \times 8} = \frac{3}{2}$$

$$\boxed{21 : 19} \underbrace{\qquad}_{60}$$

$$21 - 19 = \frac{2}{4} \times \frac{1300}{26000} \\ = \frac{1}{2} \times \frac{1300}{26000}$$

$$\boxed{= 1300}$$

(13) A, B, C enter into a partnership they invest in Rs 60000, Rs 80000 and Rs 120000 respectively. At the end of 1st year B withdraws Rs 40000 while at the end of 2nd year C withdraws Rs 80000. In what ratio will the profit be shared at the end of 3 years.

$$\rightarrow \begin{array}{ccc} A & B & C \\ \frac{60000}{x 36 \text{ months}} : & \frac{80000}{x 12 \text{ months}} : & \frac{120000}{x 24 \text{ months}} \\ + & + & + \\ (\frac{60000}{x 36} \times 24m) & (\frac{80000}{x 12} \times 12m) & \end{array}$$

$$\frac{(4 \times 36)}{3} : \frac{(8 \times 12)}{1} + \frac{(4 \times 24)}{2} : \frac{(12 \times 24)}{2} + (4 \times 12)$$

$$12 : 16 : 28 \Rightarrow \boxed{3 : 4 : 7}$$

(14) A and B enter into a partnership for a year. A contributes Rs 1500 and B contributes Rs 2000. After 4 months they admit C who contributes Rs 2250. If B withdraws his contribution after 9 months, how would they share a profit of Rs 900 at the end of the year?

$$\rightarrow \begin{array}{ccc} A & : & B & : & C \\ 1500 & : & 2000 & : & 2250 \\ x 12m & & x 9m & & x 8m \end{array}$$

12m
4m
8m

$$150 \times 12 : 200 \times 9 : 225 \times 8$$

$$1800 : 1800 : 1800$$

$$\boxed{1 : 1 : 1}$$

300, 300, 300

900

(15) A started a business by investing Rs 25000 6 months later B joined him by investing Rs 15000 after another 6 months B invests an additional amount of Rs 15000 at the end of 3 years they earn a profit of Rs 247000 what is the B's share in the profit?

$$\rightarrow \begin{array}{ccc} & A & B \\ 25000 & \times 36 & : (15000 \times 6m) \\ & & + \\ & & (30000 \times 24m) \end{array}$$

36 months

~~6 months~~

~~6 months~~ ~~30000 × 24~~

~~B~~ ~~B~~

$$\begin{array}{c} 25 \times 36 : (15 \times 6) + (30 \times 24) \\ 5 \times 2 \times 3 \times 1 : 1 \times 1 \times 2 \times 4 \\ \boxed{10 : 9} \rightarrow \frac{9}{10} \times 247000 = \boxed{217000} \end{array}$$

(16) A, B, C started a business investing Rs 42000, Rs 30000, and 28000 resp. After 4 months, A withdraws Rs 12000, B withdraws Rs 6000 and C withdraws Rs 8000. If after 10 months a total profit of Rs 46420 is earned. what is share of C?

$$\rightarrow \begin{array}{ccc} & A & B & C \\ 42000 & : & 30000 & : & 28000 \\ & \times 4m & & \times 4m & \times 4m \\ & + & + & + \\ 30000 \times 6m & (24000 \times 6) & (20000 \times 6) \end{array}$$

$$(168 + 180) : (120 + 144) : (112 + 120)$$

$$168 : 264 : 232$$

$$174 : 132 : 116$$

$$87 : 66 : 58$$

$$\begin{aligned} & \frac{58}{224} \times \frac{220}{464+20} \\ & = 220 \times 58 \\ & = 58 \times (20+2) \\ & = 1276 \text{ as } 12760 \end{aligned}$$

Miscellaneous

① A, B, C divide an amount of Rs 4200 amongst themselves in the ratio of 7:8:6 resp. If an amount of Rs 200 is added to each of their shares, what will be the new respective ratio of their shares of amount?

$$\rightarrow \begin{array}{ccc} A & B & C \\ 7x : 8x : 6x & & \end{array}$$
$$21x = 4200 \quad \leftarrow 7x \rightarrow 7x + 200 = 140 \frac{0}{+200} = 1600$$
$$x = 4200/21 \quad \leftarrow 8x \rightarrow 8x + 200 = 160 \frac{0}{+200} = 1800$$
$$(x = 200) \quad \leftarrow 6x \rightarrow 6x + 200 = 120 \frac{0}{+200} = 1400$$
$$1600 : 1800 : 1400$$
$$16 : 18 : 14$$
$$8 : 9 : 7$$

② P, Q, R start a business jointly. Twice the capital of P is equal to thrice the capital of Q and the capital of Q is four times the capital of R. find the share of Q in an annual profit of

Rs 148500

$$\rightarrow P : Q : R$$
$$6x : 4x : 1x$$

$$6 : 4 : 1$$

$$\frac{4}{4} \times 13500$$

$$= 13500 \times 4$$

$$= 54000$$

$$2P = 3Q$$
$$2P = 3(4x)$$

$$P = 600$$

③ P, Q, R start a business. P invests 3 times as much as Q invests and Q invests $\frac{2}{3}$ as much as R invests. Find the ratio of capitals of P, Q, R.

$$\rightarrow P : Q : R$$

$$2x : \frac{2}{3}x : x$$

$$6 : 2 : 3$$

$$P = 3Q$$

$$= 3\left(\frac{2}{3}x\right)$$

$$P = 2x$$

④ A, B, C enter into partnership. A invests some amount at the beginning, B invests double the amount of A after 6 months and C invests thrice the amount of A after 8 months. If the annual profit be Rs 54000, find the C's share?

$$\rightarrow A : B : C$$

$$x : 12 : 2x \times 6 : 3x \times 4 \Rightarrow 12 : 12 : 12$$

$$(1 : 1 : 1)$$

$$\frac{1}{3} \times 54000 = 18000$$

$$C = 18000$$

⑤ A and B together start a business by investing in the ratio of 4:3. If 9% of the total profit goes to charity and A's share is Rs 1196 find the total profit.

$$\rightarrow A : B$$

$$4 : 3$$

$$(1196) : (897)$$

$$4x = 3 \times 1196$$

$$x = 3 \times 1196 / 4$$

$$x = 897$$

$$1196 / 897 = 100 / x$$

$$x = 2300$$

$$9\% = 2093$$

$$2093 \times 100 / 91$$

⑥ A, B, C do certain investments for time periods in the ratio of 2:1:8. At the end of business term, they received the profits in the ratio of 3:4:2. find the ratio of investments of A, B and C.

→ Ratio of Inv. = Ratio of Profit

$$x \times 2 : y \times 1 : z \times 8 = 3 : 4 : 2$$

$$2x : y : 8z = 3 : 4 : 2$$

$$x : y : z = \frac{3}{2} : 4 : \frac{2}{8}$$

$$= \frac{3}{2} : 4 : \frac{1}{4}$$

$$= \underline{\underline{6 : 16 : 1}}$$

Ans 6:16:1

⑦ A and B are partners in a business. A contributes $\frac{1}{9}$ of the capital for 15 months and B received $\frac{2}{3}$ of the profit. How long B's money was used?

→

$$\frac{x}{4} \times 15 \text{ months} : \frac{3x}{4} \times y = \frac{1}{3} : \frac{2}{3}$$

$$\frac{15}{4} = \frac{1}{\frac{3}{2}}$$

$$\frac{15}{4y} = \frac{1}{\frac{2}{3}}$$

$$x - \frac{x}{4} = \frac{3x}{9}$$

$$10 = y$$

Ans [y = 10 months]

8) Ram, Manoj and Ann started a business in partnership investing in the ratio of 3:2:5 resp. At the end of the year, they earned a profit of Rs 45000 which is 15% of their total investment. How much did Manoj invest?

$$\rightarrow \text{Ram} : \text{Manoj} : \text{Ann}$$

$$3 : 2 : 5$$

$$15\% = 45000$$

$$100\% = x$$

$$15x = 45000 \times \frac{3}{100}$$

$$x = 300,000$$

$$\frac{2}{15} \times 300,000$$

$$= 60000$$

9) Amit and Brijesh started a business with initial investments 12:11 and their annual profit were in the ratio of 4:1. If Amit invested the money for 11 months, then for what time Brijesh invested the money?

$$\rightarrow \text{Amit} : \text{Brijesh}$$

$$(12x \times 11) : (11x \times y) = 4:1$$

$$\frac{(12x \times 11)}{11x \times y} = \frac{4}{1}$$

$$\frac{12}{y} = \frac{4}{1}$$

$$y = 3 \text{ months}$$

⑩ A and B started a business with Rs 20000 and Rs 35000 resp. They agreed to share the profit in the ratio of their capital. C joining the partnership with the condition that A, B, C will share profit equally and pays Rs 22000 as premium for this to be shared b/w ① and ②. This is to be divided b/w ① and ② in the ratio

$$\rightarrow \begin{array}{rcc} & \text{A} & \text{B} \\ & 20000 \times 12 & : 35000 \times 12 \\ & 2,40,000 & : 4,20,000 \\ & + 2\text{lac} & + 2\text{lac} \\ \hline & 4,40,000 & \Leftrightarrow 4,40,000 \\ & 20\text{lac} : 24\text{lac} & \\ & 20 : 24 & \\ & & \boxed{10:1} \end{array}$$

$$\begin{array}{c} \textcircled{C} \\ \downarrow \\ 2,20,000 \\ \downarrow \\ 2\text{lac} + 20\text{k} \end{array}$$

⑪ A, B, C became partners in a business by investing money in the ratio of 5:7:6 next year they increased their investment by 26%, 20% and 15% resp. in what ratio should profit earned during 2nd year be distributed

$$\rightarrow \begin{array}{ccc} \textcircled{A} & \textcircled{B} & \textcircled{C} \\ 5x & : 7x & : 6x \\ 126\% \times 5x & : 120\% \times 7x & : 115\% \times 6x \\ 126 \times \frac{5}{100} & : 120 \times \frac{7}{100} & : 115 \times \frac{6}{100} \\ 24 & & 23 \end{array}$$

$$\cancel{26} : 24 \times 7 : 23 \times 6 \\ 21 \quad 4$$

$$\boxed{\cancel{21} : 28 : 23}$$

12) A, B, C started a business with their investments in the ratio 1:3:5. After 4 months, A invested the same amount as before and B as well as C with double half of their investments. The ratio of their profits at the end of the year is,

→ (A) (B) (C)

$$x \times 4m : 3x \times 4m : 5x \times 4m$$

$$(x + x) + (2x \times 8m) : (3x + \frac{4}{2}x) : (\frac{5x}{2} \times 8)$$

$$(2x \times 4 + 2x \times 8) : (12x + 12x) : (20x + 20x)$$

$$20x : 24x : 40x$$

$$\boxed{5 : 6 : 10}$$

13) The sum of Rs 427 is to be divided among A, B & C in such a way that 3 times A's share, 4 times B's share and 7 times C's share are all equal. The share of C is,

$$\rightarrow 3A = 4B = 7C$$

$$\boxed{3A = 7C}$$

$$A = \frac{7}{3}C$$

$$\boxed{4B = 7C}$$

$$B = \frac{7}{4}C$$

$$427 = \frac{7}{3}C + \frac{7}{4}C + C$$

$$427 = 28C + 21C + 12C$$

$$C = \frac{427 \times 12}{61}$$

$$\boxed{C = 84}$$

⑭ A, B, C enter into a partnership and their shares are in the ratio $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$. After 2 months, A withdraws half of his capital and after 1 year, a profit of Rs 378 is divided among them. What is B's share?

$$\rightarrow A : B : C \\ \frac{1}{2} : \frac{1}{3} : \frac{1}{4} \leftarrow \text{lcm } 12$$

$$\frac{6:4:3}{12} \quad 6x : 4x : 3x$$

$$(6x \times 2) + (3x \times 10) : 4x \times 12 : 3x \times 12$$

$$42x : 48x : 36x$$

$$\boxed{7 : 8 : 6} \rightarrow \frac{8}{21} \times \frac{18}{378} = \boxed{\text{Rs } 144}$$

⑮ A and B start a business jointly. A invest Rs 16000 for 8 months and B remains in the business for 4 months out of total profit B claims $\frac{2}{7}$ of the profit. How much money was contributed by B.

$$\rightarrow \begin{array}{c} \textcircled{A} \\ 16,000 \times 8 \end{array} : \begin{array}{c} \textcircled{B} \\ y \times 4 \end{array} = \begin{array}{c} \textcircled{A} \\ \frac{5}{7} \end{array} : \begin{array}{c} \textcircled{B} \\ \frac{2}{7} \end{array}$$

$$\frac{16,000 \times 8}{y \times 4} = \frac{\frac{5}{7}}{\frac{2}{7}}$$

$$\frac{3200}{\frac{16000 \times 8}{y \times 4}} = \frac{\frac{5}{7}}{\frac{2}{7}}$$

$$y = 3200 \times 4$$

$$\boxed{y = 12800}$$

$$1 - \frac{2}{7} = \frac{5}{7}$$

(14) A and B entered into a partnership investing Rs 16000 and Rs 12000 resp. After 3 months, A withdraw Rs 5000 while B invested Rs 5000 more, After 3 more months, C joins the business with a capital of Rs 21000, The share of B exceeds that of C, out of a total profit of Rs 26,400 after one year by,

→ (A) (B) (C)

$$(16 \times 8 \times 3m : 12 \times 8 \times 3m : 21 \times 9 \times 6m \\ + + \\ 11 \times 8 \times 9m) \quad 17 \times 8 \times 9m)$$

$$16 \times 8 + 11 \times 8 : 12 \times 8 + 17 \times 8 : 21 \times 6 \\ 16 + 33 : 12 + 51 : 42$$

$$\frac{49}{7} : \frac{63}{9} : \frac{42}{6}$$

$$7 : 9 : 6 \\ 3$$

$$\frac{3}{22} \times 26400$$

$$\text{Ans} = 3600$$

