

Chapter 9 Ratio and Proportion

VII

9. Ratio and Proportion

Exercise-9.1

Solution-01

we have,

$$x:y = 3:5$$

$$\frac{x}{y} = \frac{3}{5}$$

$$5x = 3y \Rightarrow x = \frac{3y}{5}$$

$$\begin{aligned}\therefore 3x+4y : 8x+5y &= 3 \times \frac{3y}{5} + 4y : 8 \times \frac{3y}{5} + 5y \\ &= \frac{9y+20y}{5} : \frac{24y+25y}{5} \\ &= \frac{29y}{5} : \frac{49y}{5} \\ &= 29y : 49y \\ &= 29 : 49\end{aligned}$$

Solution-02:-

we have,

$$x:y = 8:9$$

$$\Rightarrow \frac{x}{y} = \frac{8}{9}$$

$$\Rightarrow 9x = 8y$$

$$\begin{aligned}\therefore (7x-4y) : 3x+2y &= 7 \times \frac{8y}{9} - 4y : 3 \times \frac{8y}{9} + 2y \\ &= \frac{56y-36y}{9} : \frac{42y}{9} \\ &= 20 : 42 = 10 : 21\end{aligned}$$

Solution - 03

Let the required numbers be $6x$ and $13x$

Then Their L.C.M is $78x$

$$78x = 312$$

$$\Rightarrow x = \frac{312}{78}$$

$$\Rightarrow x = 4$$

Thus,

$$\text{The numbers are } 6x = 6 \times 4 = 24$$

$$13x = 13 \times 4 = 52.$$

Solution - 04:-

Let the required numbers be $3x$ and $5x$.

If 8 is added to each number

$$\therefore 3x + 8 : 5x + 8 = 2 : 3$$

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

$$\Rightarrow 3(3x + 8) = 2(5x + 8)$$

$$\Rightarrow 9x + 24 = 10x + 16$$

$$\Rightarrow 10x - 9x = 24 - 16$$

$$\Rightarrow x = 8.$$

Thus,

$$\text{The numbers are } 3x = 3(8) = 24.$$

$$5x = 5(8) = 40.$$

Solution-05.

Let the number to be added be x .

$$\text{Then } \frac{7+x}{13+x} = \frac{2}{3}$$

$$\Rightarrow (7+x)3 = 2(13+x)$$

$$\Rightarrow 3x - 2x = 26 - 21$$

$$\Rightarrow x = 5$$

Hence, the required number = 5

Solution-06:-

Given that,

Three numbers are in the ratio 2:3:5

Sum of these numbers = 800

Sum of the terms of the ratio = 2+3+5
= 10.

$$\therefore \text{First number} = \frac{2}{10} \times 800$$

$$= 160$$

$$\text{Second number} = \frac{3}{10} \times 800$$

$$= 240$$

$$\text{Third number} = \frac{5}{10} \times 800$$

$$= \text{RS } 400.$$

Solution-07:

Let the required ages be $5x$ and $7x$.

\therefore 18 years ago their ^{ages} ratio.

$$\Rightarrow \frac{5x-18}{7x-18} = \frac{8}{13}$$

$$\Rightarrow 65x - 13 \times 18 = 8 \times 7x - 8 \times 18$$

$$\Rightarrow 65x - 234 = 56x - 144$$

$$\Rightarrow 65x - 56x = 234 - 144$$

$$\Rightarrow 9x = 90$$

$$\Rightarrow x = 10.$$

Thus,

The Ages are $5x = 50$ yrs

$7x = 70$ yrs

Solutions-08:

Let the required numbers be $7x$ and $11x$.

if 7 is added to each of the numbers
it becomes

$$\Rightarrow \frac{7x+7}{11x+7} = \frac{2}{3}$$

$$\Rightarrow 21x + 21 = 22x + 14$$

$$\Rightarrow x = 21 - 14 = 7.$$

Thus,

The numbers are $7x = 7 \times 7 = 49$

$11x = 11 \times 7 = 77.$

Solution-09:-

Two numbers are in the ratio = 2:7.

if sum of the numbers = 810.

we have,

sum of the terms of the ratio = $2+7=9$.

$$\text{first number} = \frac{2}{9} \times 810$$

$$= 2 \times 90 = 180$$

$$\text{second number} = \frac{7}{9} \times 810 = 7 \times 90 = 630.$$

Solution-10:

we have,

sum of the terms of the ratio = $2+3=5$.

$$\text{Ravish money} = \frac{2}{5} \times 1350$$

$$= 2 \times 270$$

$$= \text{RS. } 540.$$

$$\text{Shikha's money} = \frac{3}{5} \times 1350$$

$$= 3 \times 270$$

$$= \text{RS. } 810.$$

Solution-11:-

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we have,

Sum of the terms in the ratio = $2+3+5=10$.

$$P\text{-share} = \frac{2}{10} \times \text{Total money}$$

$$= \frac{2}{10} \times 2000$$

$$= 2 \times 200$$

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

$$Q\text{-share} = \frac{3}{10} \times 2000$$

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

$$R\text{-share} = \frac{5}{10} \times 2000$$

$$= \text{Rs. } 1000.$$

Solution-12:-

we have,

The boys and girls in the ratio $7:4$.

Sum of the terms in the ratio = $7+4=11$.

$$\text{Boys strength} = \frac{7}{11} \times 550 \quad [\text{Total strength} = 550]$$

$$= 7 \times 50 = 350.$$

$$\text{Boys} = 350$$

$$\text{Girls} = \frac{4}{11} \times 550 = 4 \times 50$$

$$= 200 \text{ girls.}$$

Solution-13.

It is given that.

The ratio of income and savings is 7:2.

$$\text{Savings} \Rightarrow 2x = 500$$

$$\Rightarrow x = 250.$$

$$\therefore \text{Income} = 7x = 7 \times 250 = 1750.$$

$$\text{Expenditure} = \text{Income} - \text{Savings}$$

$$= 1750 - 500$$

$$= \text{Rs. } 1250.$$

Solution-14:-

The sides of a triangle are in the ratio

$$1:2:3$$

$$\text{Sum of the terms in the ratio} = 1+2+3 = 6.$$

$$\text{Perimeter} = 36\text{cm}$$

$$\text{first side} = \frac{1}{6} \times 36\text{cm}$$

$$= 6\text{cm}$$

$$\text{second side} = \frac{2}{6} \times 36$$

$$= 12\text{cm}$$

$$\text{third side} = \frac{3}{6} \times 36$$

$$= 18\text{cm}.$$

Solution -15:-

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we have,

The sum of the terms in the ratio = $2+3=5$.

$$\text{Raman share} = \frac{2}{5} \times 5500$$

$$= 2 \times 1100$$

$$= \text{Rs } 2200$$

$$\text{Aman share} = \frac{3}{5} \times 5500$$

$$= \frac{3}{5} \times 1100$$

$$= \text{Rs } 3300.$$

Solution -16:-

we have,

The ratio of zinc and copper in the alloy = $7:9$

weight of copper in the alloy = 11.7 kg .

$$9x = 11.7 \text{ kg}$$

$$\Rightarrow x = \frac{11.7 \text{ kg}}{9}$$

$$\text{weight of zinc in the alloy} = \frac{1.3}{0.9} \times 7$$

$$= 9.10 \text{ kg}$$

$$\therefore \text{weight of zinc} = 9.10 \text{ kg}.$$

Solution - 17:

Given Ratio = 7:8.

Consequent $\Rightarrow 8x = 40$ [\because second half]
in the proposition

$$\Rightarrow x = \frac{40}{8}$$

$$\Rightarrow x = 5.$$

$$\text{antecedent} = 7x = 7 \times 5 \\ = 35.$$

Solution - 18:-

ratio - 2:7.

The sum of the terms in the ratio =
 $2+7=9.$

$$1^{\text{st}} \text{ ratio} = \frac{2}{9} \times 351$$

$$= 2 \times 39$$

$$= \text{RS } 78$$

$$2^{\text{nd}} \text{ Ratio} = \frac{7}{9} \times 351$$

$$= 7 \times 39$$

$$= \text{RS } 273.$$

Solution-19:

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one score = 20.

Rs 16 per score.

$$\text{pencil cost} = \frac{16}{20}$$

$$= \text{Rs } 0.80$$

Ball pencils dozen cost = Rs 8.40.

$$\text{Ball pen cost} = \frac{8.40}{12}$$

$$= \text{Rs } 0.70$$

Ratio of price of pencil to that of Ball

$$\text{Pen} = \frac{0.80}{0.70}$$

$$= \frac{8}{7}$$

Solution-20:-

Given.

one out of six students fails.

x out of 42 students

$$\frac{1}{6} = \frac{x}{42} \Rightarrow x = \frac{42}{6} = 7.$$

Students fails = 7 students

Pass students = Total-fail = $42 - 7 = 35$.

Exercise-9.2.

Solution-01.

(i) $3:4$ (or) $9:16$.

Now, L.C.M of 4 and 16 is 16.

we have.

$$\frac{3}{4} = \frac{3 \times 4}{4 \times 4} = \frac{12}{16} \text{ and } \frac{9}{16} = \frac{9}{16}.$$

clearly $12 > 9$.

$$\therefore \frac{3}{4} > \frac{9}{16}$$

(ii) $15:16$ or $24:25$

Now, LCM of 16 & 25 is = 400.

we have.

$$15:16 = \frac{15 \times 25}{16 \times 25} = \frac{375}{400}$$

$$24:25 = \frac{24 \times 16}{25 \times 16} = \frac{384}{400}$$

$$\therefore \frac{384}{\boxed{400}} > 375.$$

$$\therefore \frac{384}{400} > \frac{375}{400} \text{ i.e. } \frac{15}{16} > \frac{24}{25}.$$

(iii) $4:7$ (or) $5:8$.

L.C.M of 7 and 8 is 56.

$$4:7 = \frac{4 \times 8}{7 \times 8} = \frac{32}{56} \quad \& \quad \frac{5}{8} = \frac{5 \times 7}{8 \times 7} = \frac{35}{56}$$

$$35 > 32$$

$$\therefore \frac{35}{56} > \frac{32}{56} \quad \text{i.e. } 5:8 > 4:7.$$

(iv) $9:20$ (or) $8:13$.

L.C.M of 20 and 13 is 260.

$$9:20 = \frac{9 \times 13}{20 \times 13} \quad \& \quad \frac{8 \times 20}{13 \times 20} = \frac{160}{260}$$

$$\therefore \frac{160}{260} > \frac{117}{260}.$$

$$\therefore \frac{8}{13} > \frac{9}{20}$$

(v) $1:2$ (or) $13:27$

L.C.M of 2 and 27 is 54.

$$1:2 = \frac{1 \times 27}{2 \times 27} \quad \& \quad \frac{13 \times 2}{27 \times 2} = \frac{26}{54}$$

$$\therefore \text{Clearly } 27 > 26$$

$$\therefore \frac{1}{2} > \frac{13}{27}$$

So Exercise-9.8.

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Solution-01:-

(i) we have,

$$33:44 = \frac{3}{4} \text{ and } \frac{66}{88} = \frac{3}{4}$$

$$\therefore 33:44 = 66:88$$

Hence, 33, 44, 66, 88 are in proportion.

(ii) we have,

$$46:69 = \frac{2}{3} \text{ and } \frac{69}{46} = \frac{3}{2}$$

$$\therefore 46:69 \neq 69:46$$

Hence, 46, 69, 69, 46 are not in proportion.

(iii) we have,

$$72, 84, 186, 217$$

$$72:84 = \frac{6}{7} \text{ and } \frac{186}{217} = \frac{6}{7}$$

Hence, 72, 84, 186, 217 are in proportion.

Solution - 02:-

$$(i) 16 : 18 = x : 96$$

$$\Rightarrow \frac{16}{18} = \frac{x}{96}$$

$$\Rightarrow x = \frac{256}{3}$$

$$(ii) x : 92 = 87 : 116$$

$$\frac{x}{92} = \frac{87}{116}$$

$$x = \frac{87 \times 92}{116}$$

$$x = 69.$$

Solution - 03:-

The ratio of income and expenditure
= 7:6.

$$7x = 1400$$

$$\Rightarrow x = 200$$

$$\begin{aligned} \text{expenditure} &= 6x = 6 \times 200 \\ &= \text{RS } 1200 \end{aligned}$$

$$\begin{aligned} \text{Savings} &= \text{Income} - \text{expenditure} \\ &= 1400 - 1200 \\ &= \text{RS } 200 \end{aligned}$$