

### EXERCISE 9.1

1.  $\therefore$  In 2 hours, car covers a distance = 72 km

$$\begin{aligned} \therefore \text{In 1 hour, car will cover a distance} &= \frac{72}{2} \text{ km} \\ &= 36 \text{ km} \end{aligned}$$

Therefore, speed of car = 36 km/hour

$\therefore$  In 3 hours, train covers a distance = 120 km

$$\begin{aligned} \therefore \text{In 1 hour, train will cover a distance} &= \frac{120}{3} \text{ km} \\ &= 40 \text{ km} \end{aligned}$$

Therefore, speed of train = 40 km/hour

Now, ratio of their speeds = speed of car : speed of train = 36 : 40

$$\begin{aligned} &= \frac{36}{40} = \frac{36 \div 4}{40 \div 4} = \frac{9}{10} \\ &\quad (\because \text{H.C.F. of 36 and 40 is 4}) \end{aligned}$$

Hence, ratio of their speeds = 9 : 10.

2. (i)  $4 : 7 = \frac{4}{7}$  and  $5 : 8 = \frac{5}{8}$   
(L.C.M. of 7 and 8 is 56)

$$\therefore \frac{4}{7} = \frac{4 \times 8}{7 \times 8} = \frac{32}{56}$$

and  $\frac{5}{8} = \frac{5 \times 7}{8 \times 7} = \frac{35}{56}$

Now,  $\frac{35}{56} > \frac{32}{56}$  ( $\because 35 > 32$ )

$$\Rightarrow \frac{5}{8} > \frac{4}{7}$$

Hence, 5 : 8 is greater.

(ii)  $2 : 3 = \frac{2}{3}$  and  $3 : 4 = \frac{3}{4}$   
(L.C.M. of 3 and 4 is 12)

$$\therefore \frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

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

Now,  $\frac{8}{12} < \frac{9}{12}$  ( $\because 8 < 9$ )

$$\Rightarrow \frac{2}{3} < \frac{3}{4}$$

Hence, 3 : 4 is greater.

(iii)  $2 : 5 = \frac{2}{5}$  and  $5 : 6 = \frac{5}{6}$   
(L.C.M. of 5 and 6 is 30)

$$\therefore \frac{2}{5} = \frac{2 \times 6}{5 \times 6} = \frac{12}{30}$$

and  $\frac{5}{6} = \frac{5 \times 5}{6 \times 5} = \frac{25}{30}$

Now,  $\frac{25}{30} > \frac{12}{30}$  ( $\because 25 > 12$ )

Hence, 5 : 6 is greater.

3. (i)  $\frac{6}{15} = \frac{2}{\square} = \frac{\square}{45}$

Now,  $\frac{6}{15} = \frac{2}{\square}$

Let the missing number be  $x$ .

$$\therefore \frac{6}{15} = \frac{2}{x}$$

$$\Rightarrow 6 \times x = 2 \times 15 \text{ (By cross-multiplication)}$$

$$\Rightarrow 6x = 30$$

$$\Rightarrow x = \frac{30}{6} = 5$$

Again,  $\frac{6}{15} = \frac{\square}{45}$

Let the missing number be  $y$ .

$$\therefore \frac{6}{15} = \frac{y}{45}$$

$$\Rightarrow 6 \times 45 = 15 \times y \text{ (By cross-multiplication)}$$

$$\Rightarrow y = \frac{6 \times 45}{15} = 18$$

Hence,  $\frac{6}{15} = \frac{2}{5} = \frac{18}{45}$

(ii)  $\frac{6}{18} = \frac{\square}{3} = \frac{18}{\square}$

Now,  $\frac{6}{18} = \frac{\square}{3}$

Let the missing number be  $x$ .

$$\begin{aligned} \therefore \frac{6}{18} &= \frac{x}{3} \\ \Rightarrow 6 \times 3 &= 18 \times x \\ \Rightarrow x &= \frac{6 \times 3}{18} = 1 \end{aligned}$$

Again,  $\frac{6}{18} = \frac{18}{\square}$

Let the missing number be  $y$ .

$$\begin{aligned} \text{Then, } \frac{6}{18} &= \frac{18}{y} \\ \Rightarrow 6 \times y &= 18 \times 18 \\ \Rightarrow y &= \frac{18 \times 18}{6} \\ \Rightarrow y &= 54 \end{aligned}$$

Hence,  $\frac{6}{18} = \frac{\boxed{1}}{3} = \frac{18}{\boxed{54}}$

4. The given ratios are 5 : 4, 7 : 6, 3 : 2, 5 : 8

or  $\frac{5}{4}, \frac{7}{6}, \frac{3}{2}, \frac{5}{8}$

L.C.M. of 4, 6, 2 and 8 is 24.

$$\begin{aligned} \therefore \frac{5}{4} &= \frac{5 \times 6}{4 \times 6} = \frac{30}{24} \\ \frac{7}{6} &= \frac{7 \times 4}{6 \times 4} = \frac{28}{24} \\ \frac{3}{2} &= \frac{3 \times 12}{2 \times 12} = \frac{36}{24} \\ \frac{5}{8} &= \frac{5 \times 3}{8 \times 3} = \frac{15}{24} \end{aligned}$$

$\therefore$  The denominators are same.

$\therefore$  The given ratios in ascending order are

$$\frac{15}{24}, \frac{28}{24}, \frac{30}{24}, \frac{36}{24}$$

$$\Rightarrow \frac{5}{8}, \frac{7}{6}, \frac{3}{2}, \frac{5}{4}$$

Hence, 5 : 8, 7 : 6, 3 : 2, 5 : 4 are in ascending order.

5.  $6 : 7 = \frac{6}{7}$  and  $3 : 4 = \frac{3}{4}$

L.C.M. of 7 and 4 is 28.

$$\begin{aligned} \therefore \frac{6}{7} &= \frac{6 \times 4}{7 \times 4} = \frac{24}{28} \\ \text{and } \frac{3}{4} &= \frac{3 \times 7}{4 \times 7} = \frac{21}{28} \end{aligned}$$

Now,  $\frac{24}{28} > \frac{21}{28}$  ( $\because 24 > 21$ )

$$\Rightarrow \frac{6}{7} > \frac{3}{4}$$

Hence,  $6 : 7 > 3 : 4$ .

6.  $\therefore 12 : 15 = \frac{12}{15} = \frac{12 \div 3}{15 \div 3} = \frac{4}{5}$

and  $\frac{4}{5} = \frac{4 \times 4}{5 \times 4} = \frac{16}{20}$

$$\frac{16}{20} = \frac{16 \times 2}{20 \times 2} = \frac{32}{40}$$

$$\frac{4}{5} = \frac{4 \times 5}{5 \times 5} = \frac{20}{25}$$

Hence,  $\frac{12}{15} = \frac{4}{5} = \frac{16}{20} = \frac{20}{25} = \frac{32}{40}$

Hence, four equivalent ratios of 12 : 15, 4 : 5, 16 : 20, 20 : 25 and 32 : 40.

7. Total number of students = 48

Number of passed students = 16

$$\therefore \text{Number of failed students} = 48 - 16 = 32$$

(i) Ratio between passed students to the total

$$\text{number of students} = \frac{16}{48} = \frac{16 \div 16}{48 \div 16} = \frac{1}{3} = 1 : 3$$

(ii) Ratio between failed students to the number of

$$\text{passed students} = \frac{32}{16} = \frac{32 \div 16}{16 \div 16} = \frac{2}{1} = 2 : 1$$

8. If  $A : B = 2 : 3$ ,  $B : C = 5 : 6$

$$\therefore A : C = A : B \times B : C$$

$$= \frac{2}{3} \times \frac{5}{6} = \frac{5}{9}$$

Hence,  $A : C = 5 : 9$

9. Given that :  $3A = 4B = 5C$

We divide by L.C.M. of 3, 4 and 5 is 60.

$$\frac{3A}{60} = \frac{4B}{60} = \frac{5C}{60}$$

$$\frac{A}{20} = \frac{B}{15} = \frac{C}{12}$$

Hence,  $A : B : C = 20 : 15 : 12$

10. We have,  $A : B = 3 : 4$ ,  $B : C = 5 : 7$

Now,  $A : B = 3 : 4$

$$B : C = 5 : 7 = 1 : \frac{7}{5} = 4 : \frac{28}{5}$$

Now,  $A : B : C = 3 : 4 : \frac{28}{5}$

$$= 3 \times 5 : 4 \times 5 : \frac{28}{5} \times 5$$

Hence,  $A : B : C = 15 : 20 : 28$

### EXERCISE 9.2

1. Let the antecedent be  $x$ .

The consequent = 91

Then  $8 : 13 = x : 91$

$$\Rightarrow \frac{8}{13} = \frac{x}{91}$$

$$\Rightarrow 8 \times 91 = x \times 13 \text{ (By cross multiplication)}$$

$$\Rightarrow x = \frac{8 \times 91}{13}$$

$$\Rightarrow x = 56$$

Hence, antecedent = 56.

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

$$\begin{aligned} \text{Now, Rishi's share} &= \frac{3}{5} \times ₹3500 \\ &= ₹(700 \times 3) \\ &= ₹2100 \end{aligned}$$

$$\begin{aligned} \text{And Saurav's share} &= \frac{2}{5} \times ₹3500 \\ &= ₹1400 \end{aligned}$$

Hence, Rishi will get ₹2100 and Saurav will get ₹1400.

3. Sum of the terms of ratio =  $4 + 5 = 9$ .

Sum of the two numbers = 459

$$\begin{aligned} \text{Now, first number} &= \frac{4}{9} \times 459 \\ &= 4 \times 51 \\ &= 204 \end{aligned}$$

$$\begin{aligned} \text{Second number} &= \frac{5}{9} \times 459 \\ &= 5 \times 51 \\ &= 255 \end{aligned}$$

Hence, the required two numbers are 204 and 255.

4. Total money = ₹3600.

Sum of the terms of ratio =  $2 + 3 + 4 = 9$

$$\begin{aligned} A's \text{ share} &= \frac{2}{9} \times ₹3600 \\ &= ₹(2 \times 400) \\ &= ₹800 \end{aligned}$$

$$\begin{aligned} B's \text{ share} &= \frac{3}{9} \times ₹3600 \\ &= ₹(3 \times 400) \\ &= ₹1200 \end{aligned}$$

$$\begin{aligned} C's \text{ share} &= \frac{4}{9} \times ₹3600 \\ &= ₹(4 \times 400) \\ &= ₹1600 \end{aligned}$$

5. Let the required number to be added to each term of the ratio be  $x$ .

Therefore,

$$\frac{9+x}{16+x} = \frac{2}{3}$$

$$\Rightarrow 3(9+x) = 2(16+x) \quad \text{(By cross multiplication)}$$

$$27 + 3x = 32 + 2x$$

$$\Rightarrow 3x - 2x = 32 - 27 \quad \text{(By transposing)}$$

$$x = 5$$

Hence, the number 5 must be added.

6. Let the required number to be added to each term of ratio be  $x$ .

Now,  $(8+x) : (11+x) = 4 : 5$

$$\Rightarrow \frac{8+x}{11+x} = \frac{4}{5}$$

$$\Rightarrow 5(8+x) = 4(11+x) \quad \text{(By cross multiplication)}$$

$$\Rightarrow 40 + 5x = 44 + 4x$$

$$\Rightarrow 5x - 4x = 44 - 40$$

(Transposing  $4x$  to L.H.S. and 40 to R.H.S.)

$$\Rightarrow x = 4$$

Hence, the number 4 must be added to each term of given ratio.

7. Let the required number to be subtracted be  $x$ .

Therefore,

$$(15-x) : (33-x) = 2 : 5$$

$$\Rightarrow \frac{15-x}{33-x} = \frac{2}{5}$$

$$\Rightarrow 5(15-x) = 2(33-x) \quad \text{(By cross multiplication)}$$

$$\Rightarrow 75 - 5x = 66 - 2x$$

$$\Rightarrow -5x + 2x = 66 - 75 \quad \text{(By transposing)}$$

$$\Rightarrow -3x = -9$$

$$\Rightarrow x = 3$$

Hence, number 3 must be subtracted from each term of the ratio.

8. Let the number be to subtracted from each term of given ratio be  $x$ .

Therefore,

$$(19-x) : (21-x) = 7 : 8$$

$$\Rightarrow \frac{19-x}{21-x} = \frac{7}{8}$$

$$\Rightarrow 8(19-x) = 7(21-x) \quad \text{(By cross multiplication)}$$

$$\Rightarrow 152 - 8x = 147 - 7x$$

$$\Rightarrow -8x + 7x = 147 - 152 \quad \text{(By transposing)}$$

$$\Rightarrow -x = -5$$

$$\Rightarrow x = 5$$

Hence, number 5 must be subtracted from each term of given ratio.

9. Sum of the terms of ratio =  $3 + 5 + 7 = 15$

Total money = ₹4500

$$A's \text{ share} = \frac{3}{15} \times ₹4500$$

$$= ₹\left(\frac{3}{15} \times 4500\right)$$

$$= ₹(3 \times 300)$$

$$= ₹900$$

$$B's \text{ share} = ₹\left(\frac{5}{15} \times 4500\right)$$

$$= ₹(5 \times 300)$$

$$= ₹1500$$

$$C's \text{ share} = ₹\left(\frac{7}{15} \times 4500\right)$$

$$= ₹(7 \times 300) = ₹2100$$

10. Given :  $x : y = 4 : 7$

Let  $x = 4k$  and  $y = 7k$ , where  $k$  is the constant of proportionality.

$$\therefore (4x + 5y) : (5x + 3y) = \frac{4x + 5y}{5x + 3y}$$

$$= \frac{4(4k) + 5(7k)}{5(4k) + 3(7k)}$$

$$= \frac{16k + 35k}{20k + 21k}$$

$$= \frac{51k}{41k} = \frac{51}{41}$$

Hence,  $4x + 5y : 5x + 3y = 51 : 41$ .

11. Given :  $x : y = 5 : 8$

Let  $x = 5k$  and  $y = 8k$ , where  $k$  is the constant of proportionality.

$$\therefore (4x - 2y) : (7x - 3y) = \frac{4x - 2y}{7x - 3y}$$

$$= \frac{4(5k) - 2(8k)}{7(5k) - 3(8k)}$$

$$= \frac{20k - 16k}{35k - 24k}$$

$$= \frac{4k}{11k} = \frac{4}{11}$$

Hence,  $(4x - 2y) : (7x - 3y) = 4 : 11$ .

12. The ratio of the marks in each subjects =  $1 : 2 : 2 : 3$

Sum of the terms of ratio =  $1 + 2 + 2 + 3 = 8$

Total marks obtained = 320

$$\text{Marks in Maths} = \frac{1}{8} \times 320 = 1 \times 40 = 40$$

$$\text{Marks in English} = \frac{2}{8} \times 320 = 2 \times 40 = 80$$

$$\text{Marks in Hindi} = \frac{2}{8} \times 320 = 2 \times 40 = 80$$

$$\text{Marks in Science} = \frac{3}{8} \times 320 = 3 \times 40 = 120$$

13. The ratio of two numbers =  $4 : 7$

Let the two numbers be  $4x$  and  $7x$ , where  $x$  is the constant of proportionality.

Now, according to given condition,

$$(7x)^2 - (4x)^2 = 297$$

$$\Rightarrow 49x^2 - 16x^2 = 297$$

$$\Rightarrow 33x^2 = 297$$

$$\Rightarrow x^2 = \frac{297}{33} = 9$$

$$\Rightarrow x^2 = 3^2$$

$$\Rightarrow x = 3$$

(Powers are equal, base will be equal)

Hence, the required two numbers are  $4 \times 3 = 12$  and  $7 \times 3 = 21$ .

14. Let the required two numbers be  $5x$  and  $8x$ .

L.C.M. of  $5x$  and  $8x = 40x$

As per question,

$$40x = 200$$

$$\Rightarrow x = \frac{200}{40}$$

$$\Rightarrow x = 5$$

Hence, the required numbers are  $5 \times 5 = 25$  and  $8 \times 5 = 40$ .

15. The ratio of boys to the girls =  $5 : 3$

Sum of the terms of ratio =  $5 + 3 = 8$

Let the total number of students in the school be  $x$ .

Now, Number of boys =  $\frac{5}{8} \times$  Total number of students

$$\Rightarrow 300 = \frac{5x}{8}$$

$$\text{or } \frac{5x}{8} = 300$$

$$\Rightarrow 5x = 300 \times 8$$

$$\Rightarrow x = \frac{300 \times 8}{5} = 60 \times 8$$

$$x = 480$$

$\therefore$  Total number of students in school = 480.

Number of girls =  $480 - 300 = 180$

Hence, there are 180 girls in the school.

### EXERCISE 9.3

1. (i) If 12, 18, 40, 60 are in proportion, then

$$12 : 18 :: 40 : 60.$$

$$\text{Product of extremes} = 12 \times 60 = 720$$

$$\text{Product of means} = 18 \times 40 = 720$$

Product of extremes = product of means

Hence, 12, 18, 40, 60 are in proportion.

- (ii) If 3, 5, 6, 10 are in proportion, then

$$3 : 5 :: 6 : 10.$$

$$\text{Product of extremes} = 3 \times 10 = 30$$

$$\text{Product of means} = 5 \times 6 = 30$$

Product of extremes = product of means

Hence, 3, 5, 6, 10 are in proportion.

(iii) If 5, 8, 10, 16 are in proportion, then

$$5 : 8 :: 10 : 16.$$

$$\text{Product of extremes} = 5 \times 16 = 80$$

$$\text{Product of means} = 8 \times 10 = 80$$

Product of extremes = product of means

Hence, 5, 8, 10, 16 are in proportion.

(iv) If 10, 12, 5, 6 are in proportion, then

$$10 : 12 :: 5 : 6.$$

$$\text{Product of extremes} = 10 \times 6 = 60$$

$$\text{Product of means} = 12 \times 5 = 60$$

Product of extremes = product of means

Hence, 10, 12, 5, 6 are in proportion.

2. (i)  $7 : P :: 35 : 45$

Product of extremes = Product of means

$$7 \times 45 = P \times 35$$

$$\Rightarrow P = \frac{7 \times 45}{35}$$

$$\Rightarrow \boxed{P = 9}$$

(ii)  $P : 8 :: 27 : 72$

Product of extremes = Product of means

$$P \times 72 = 8 \times 27$$

$$\Rightarrow P = \frac{8 \times 27}{72}$$

$$\Rightarrow \boxed{P = 3}$$

(iii)  $3 : P :: 21 : 77$

Product of extremes = Product of means

$$3 \times 77 = P \times 21$$

$$\Rightarrow P = \frac{3 \times 77}{21}$$

$$\Rightarrow \boxed{P = 11}$$

(iv)  $P : 9 :: 30 : 54$

Product of extremes = Product of means

$$P \times 54 = 9 \times 30$$

$$\Rightarrow P = \frac{9 \times 30}{54}$$

$$\Rightarrow \boxed{P = 5}$$

3. Let the fourth proportional to 21, 10 and 84 be  $x$ .

Then,

$$21 : 10 :: 84 : x$$

$\Rightarrow$  Product of extremes = Product of means

$$\Rightarrow 21 \times x = 10 \times 84$$

$$\Rightarrow x = \frac{10 \times 84}{21}$$

$$\Rightarrow x = 10 \times 4$$

$$\Rightarrow x = 40$$

Hence, the fourth proportional to 21, 10 and 84 is 40.

4. Let the mean proportional between 6 and 24 be  $x$ .  
Then,

$$6 : x :: x : 24$$

$\Rightarrow$  Product of extremes = Product of means

$$\Rightarrow 6 \times 24 = x \times x$$

$$\Rightarrow x^2 = 144$$

$$\Rightarrow x^2 = (12)^2 \quad (\because 144 = 12 \times 12)$$

$$\Rightarrow x = 12$$

Hence, the mean proportional to 6 and 24 is 12.

5. Taking 8 and 15 as the extremes, we get 12 and 10 as means. Then,

$$8 : 12 :: 10 : 15$$

$$\Rightarrow 8 \times 15 = 12 \times 10$$

( $\because$  Product of extremes = Product of means)

$$\Rightarrow 120 = 120$$

Now, we change the order of means.

Then,  $8 : 10 :: 12 : 15$

$$\Rightarrow 8 \times 15 = 10 \times 12$$

(Product of extremes = Product of means)

$$\Rightarrow 120 = 120$$

Now, we interchange the extremes and means

$$12 : 8 :: 15 : 10$$

$$\Rightarrow 12 \times 10 = 8 \times 15$$

( $\because$  Product of extremes = Product of means)

$$\Rightarrow 120 = 120$$

Now, we change the order of mean.

$$12 : 15 :: 8 : 10$$

$$\Rightarrow 12 \times 10 = 15 \times 8$$

( $\because$  Product of extremes = product of means)

$$\Rightarrow 120 = 120$$

Thus, the required proportions are

$$8 : 12 :: 10 : 15; 8 : 10 :: 12 : 15$$

$$12 : 8 :: 15 : 10; 12 : 15 :: 8 : 10.$$

6. Let the number to be added in each of the given numbers be  $x$ .

Then,  $(25 + x) : (35 + x) :: (40 + x) : (55 + x)$

$$\Rightarrow (25 + x)(55 + x) = (35 + x)(40 + x)$$

( $\because$  Product of extremes = Product of means)

$$\Rightarrow 1375 + 25x + 55x + x^2 = 1400 + 35x + 40x + x^2$$

$$\Rightarrow 1375 + 80x + \cancel{x^2} = 1400 + 75x + \cancel{x^2}$$

(Cancelling  $x^2$  from both sides)

$$\Rightarrow 1375 + 80x = 1400 + 75x$$

$$\Rightarrow 80x - 75x = 1400 - 1375$$

$$\Rightarrow 5x = 25$$

$$\Rightarrow x = \frac{25}{5} = 5$$

Hence, 5 is added to each number to get the given numbers in proportion.

7. Let the number to be subtracted from each of the given numbers be  $x$ . Then,

$$(27 - x) : (38 - x) :: (7 - x) : (8 - x)$$

$$\Rightarrow (27 - x)(8 - x) = (38 - x)(7 - x)$$

( $\because$  Product of extremes = Product of means)

$$\Rightarrow 216 - 27x - 8x + x^2 = 266 - 38x - 7x + x^2$$

$$\Rightarrow 216 - 35x + x^2 = 266 - 45x + x^2$$

(Cancelling  $x^2$  from both sides)

$$\Rightarrow 216 - 35x = 266 - 45x$$

$$\Rightarrow -35x + 45x = 266 - 216$$

$$\Rightarrow 10x = 50$$

$$\Rightarrow x = 5$$

Hence, 5 must be subtracted from each number to obtain remainders in proportion.

8. The scale of a map is 1 : 25000000 means that if the distance of the map is 1 cm, then the actual distance is 25000000 cm.

$$25000000 \text{ cm} = 250 \text{ km}$$

(100000 cm = 1 km)

Distance on the map	Actual distance
1 cm	250 km
4 cm	$x$ km

Therefore,

$$1 : 4 :: 250 : x$$

$$\Rightarrow 1 \times x = 250 \times 4$$

$$\Rightarrow x = 1000$$

Hence, the actual distance between the two towns is 1000 km.

9. Ratio of income to expenditure = 8 : 5

Let the expenditure be ₹ $x$ .

Income = ₹48000 (given)

Therefore,

$$8 : 5 = 48000 : x$$

$$\Rightarrow 8 \times x = 5 \times 48000$$

( $\because$  Product of extremes = Product of means)

$$\Rightarrow x = \frac{5 \times 48000}{8}$$

$$\Rightarrow x = 30000$$

$\therefore$  Expenditure = ₹30000

$$\therefore \text{Saving} = \text{Income} - \text{Expenditure}$$

$$= ₹48000 - ₹30000 = ₹18000$$

$$\text{Saving} = ₹18000$$

10. Ratio of income to the saving = 15 : 2

Yearly saving = ₹7500

Let the yearly income be  $x$ .

Therefore, 15 : 2 =  $x$  : 7500

$$\Rightarrow 15 \times 7500 = 2 \times x$$

( $\because$  Product of extremes = Product of means)

$$\Rightarrow x = \frac{15 \times 7500}{2}$$

$$\Rightarrow x = 56250$$

$\therefore$  Yearly income of the person = ₹56250

$$\therefore \text{Monthly income} = ₹\left(\frac{56250}{12}\right)$$

( $\because$  1 year = 12 months)

$$\Rightarrow = ₹4687.50$$

Hence, the monthly income of the person is ₹4687.50.

### EXERCISE 9.4

1. The cost of 8 books = ₹72

$$\therefore \text{The cost of 1 book} = ₹\left(\frac{72}{8}\right) = ₹9$$

$$\therefore \text{The cost of 20 books} = ₹(9 \times 20) = ₹180.$$

Hence, the cost of 20 books is ₹180.

2. The weight of 16 bags of rice = 240 kg

$$\therefore \text{The weight of 1 bag of rice} = \frac{240}{16} \text{ kg} = 15 \text{ kg}$$

$\therefore$  The number of bags that contain 90 kg of rice

$$= \frac{90}{15} = 6$$

Hence, 6 rice bags will weigh 90 kg.

3. The cost of 13 toys = ₹117

$$\therefore \text{The cost of 1 toy} = ₹\frac{117}{13} = ₹9$$

$$\therefore \text{The cost of 10 toys} = ₹(9 \times 10) = ₹90$$

Hence, the cost of 10 toys is ₹90.

4. The cost of 25 apples = ₹65

$$\therefore \text{The cost of 1 apple} = ₹\left(\frac{65}{25}\right)$$

$$\therefore \text{The cost of 45 apples} = ₹\left(\frac{65}{25} \times 45\right) = ₹117$$

Hence, the cost of 45 apples is ₹117.

5. Time taken to cover 13 km = 1 hour

$$\text{Time taken to cover 1 km} = \frac{1}{13} \text{ hour}$$

$$\text{Time taken to cover 65 km} = \frac{65}{13} \text{ hours} = 5 \text{ hours}$$

Hence, Sunil will cover 65 km in 5 hours.

6. The weight of 7 containers of milk = 224 kg

$$\therefore \text{The weight of 1 container of milk} = \frac{224}{7} \text{ kg}$$

(Less containers, less milk)

$$= 32 \text{ kg}$$

∴ The weight of 11 such containers of milk  
 $= 32 \times 11 \text{ kg}$   
 $= 352 \text{ kg}$   
 (More containers, more milk)

Hence, the weight of 11 containers of milk is 352 kg.

7. In 3 hours, labourer earns = ₹156

∴ In 1 hour, labourer earn = ₹ $\left(\frac{156}{3}\right)$   
 (Less hours, less money)  
 $= ₹ 52$

∴ In 7 hours, labourer earns = ₹ $(52 \times 7)$   
 (More hours, more money)  
 $= ₹ 364$

Hence, he will earn ₹364 in 7 hours.

8. Let the number of cartons required be  $x$ .

Then,  $\frac{1464}{2318} = \frac{12}{x}$

⇒  $x = \frac{12 \times 2318}{1464} = 19$

Hence, 19 cartons will be needed to pack 2318 apples.

9. Length of iron rod weighing 82.15 kg = 24.8 m

Length of iron rod weighing 1 kg =  $\frac{24.8}{82.15} \text{ m}$

Length of iron rod weighing 26.5 kg =  $\frac{24.8 \times 26.5}{82.15} \text{ m}$   
 $= 8 \text{ m}$

Hence, length of iron rod weighing 26.5 kg is 8 m.

10. The monthly expenditure of a boarding house for 25 children = ₹ 24500

∴ Monthly expenditure for 1 child = ₹  $\left(\frac{24500}{25}\right)$   
 (Less children, less expenditure)  
 $= ₹ 980$

∴ Monthly expenditure for 18 children = ₹  $(980 \times 18)$   
 $= ₹ 17640$   
 (More children, more expenditure)

Hence, monthly expenditure of a boarding school for 18 children is ₹ 17640.

11. Distance covered by Ganesh in 2 hours = 8 km

Distance covered by Ganesh in 1 hour =  $\frac{8}{2} \text{ km} = 4 \text{ km}$

Distance covered by Ganesh in 45 min.  $\left(\text{or } \frac{45}{60} \text{ hour}\right)$

$= 4 \times \frac{45}{60} \text{ km} = 3 \text{ km}$

∴ Ganesh can cover 3 km in 45 minutes.

12. In 1 hour, the train covers a distance = 60 km  
 ∴ In 5 hours, the train covers a distance =  $5 \times 60 \text{ km}$   
 $= 300 \text{ km}$

Hence, the train covers 300 km in 5 hours.

13. The cost of travelling a distance of 900 km by train = ₹225

∴ The cost of travelling 1 km by train = ₹ $\left(\frac{225}{900}\right)$   
 (Less km, less fare)

∴ The cost of travelling 360 km by train  
 $= ₹\left(\frac{225}{900} \times 360\right)$   
 $= ₹90$  (More km, more fare)

Hence, the cost of travelling 360 km by the train is ₹90.

### EXERCISE 9.5

1. 210 men can complete a piece of work in 44 days.  
 ∴ 1 man can complete same piece of work in  $(44 \times 210)$  days.  
 (Less men, more days)

∴ 280 men will complete same piece of work  
 in  $\frac{44 \times 210}{280}$  days  
 (More men, less days)  
 $= 33$  days

Hence, 280 men will take 33 days to complete the work.

Alternative method:

No. of men	No. of days
210 ↓	44 ↑
280 ↓	$x$ ↑
∴ $210 \times 44 = 280 \times x$ (Inverse proportion)	
⇒ $x = \frac{210 \times 44}{280} = 33$ days	

No. of cows	No. of days
$x$ ↑	12 ↓
63 ↑	9 ↓
∴ $63 \times 12 = x \times 9$ (Inverse proportion)	
⇒ $x = \frac{63 \times 12}{9}$	
$x = 84$	

Hence, 84 cows will graze the same field in 9 days.

No. of boys	No. of days
100 ↓	40 ↑
160 ↓	$x$ ↑
∴ $100 \times 40 = 160 \times x$ (Inverse proportion)	
⇒ $x = \frac{100 \times 40}{160}$	
$x = 25$	

Hence, the provisions will last for 25 days.

4. 

No. of men	No. of days
51 ↓	12 ↑
36 ↓	x ↑

$$\therefore 51 \times 12 = 36 \times x \quad (\text{Inverse proportion})$$

$$\Rightarrow x = \frac{51 \times 12}{36}$$

$$x = 17$$

Hence, 36 men will take 17 days.

5. 

No. of men	No. of months
360 ↓	11 ↑
x ↓	9 ↑

$$\therefore 360 \times 11 = x \times 9 \quad (\text{Inverse proportion})$$

$$\Rightarrow x = \frac{360 \times 11}{9}$$

$$x = 440$$

No. of extra men =  $440 - 360 = 80$

Hence, 80 extra men must be employed to complete the work in 9 months.

6. 600 passengers have provisions for 50 days.  
 $\therefore$  1 passenger has provisions for  $(50 \times 600)$  days  
 (less passengers, more days)  
 $\therefore (600 + 150) = 750$  passengers have provisions  
 for  $\frac{50 \times 600}{750}$  days = 40 days  
 (More passengers, less days)

Hence, the provisions will last for 40 days.

7. 40 students have provisions for 45 days.  
 $\therefore$  1 student has provisions for  $(40 \times 45)$  days  
 (Less students, more days)  
 $\therefore (40 + 10) = 50$  students have provisions for  
 $\frac{40 \times 45}{50}$  days  
 (More students, less days)  
 $= 36$  days

Hence, the provisions will last for 36 days.

8. 400 cadets have food for 25 days.  
 $\therefore$  1 cadet has food for  $(400 \times 25)$  days.  
 (Less cadets, more days)  
 Since, 150 cadets are shifted to some other camp.  
 Therefore,  
 $\therefore (400 - 150) = 250$  cadets have food for  
 $\frac{400 \times 25}{250}$  days. (More cadets, less days)  
 $= 40$  days

Hence, the food will last for 40 days.

9. 

No. of men	No. of days
50 ↓	60 ↑
75 ↓	x ↑

$$\therefore 50 \times 60 = 75 \times x \quad (\text{Inverse proportion})$$

$$\Rightarrow x = \frac{50 \times 60}{75}$$

$$x = 40$$

Hence, 75 men will take 40 days to dig the trench.

10. 

No. of men	No. of days
9 ↓	6 ↑
27 ↓	x ↑

$$\therefore 9 \times 6 = 27 \times x \quad (\text{Inverse proportion})$$

$$\Rightarrow x = \frac{9 \times 6}{27}$$

$$\Rightarrow x = 2$$

Hence, 27 men will take 2 days.

11. 

speed (in km/hr)	time (in hrs.)
60 ↑	$4\frac{1}{3}$ ↓
40 ↑	x ↓

$$\therefore 60 \times \frac{13}{3} = 40 \times x \quad (\text{Inverse proportion})$$

$$\Rightarrow x = \frac{60 \times 13}{40 \times 3}$$

$$x = 6\frac{1}{2}$$

Hence, the bus will take  $6\frac{1}{2}$  hours to cover the distance.

### MULTIPLE CHOICE QUESTIONS

- $\therefore 16, 64, x$  and 72 are in proportion.  
 Then,  $16 : 64 :: x : 72$   
 Product of extremes = product of means  
 $16 \times 72 = 64 \times x$   
 $\Rightarrow x = \frac{16 \times 72}{64} = 18$   
 Hence, option (b) is correct.
- Cost of 20 pens = ₹50  
 $\therefore$  Cost of 1 pen = ₹ $\left(\frac{50}{20}\right)$   
 (Less pens, less cost)  
 $\therefore$  Cost of 50 pens = ₹ $\left(\frac{50}{20} \times 50\right)$   
 (More pens, more cost)  
 $= ₹125$   
 Hence, option (a) is correct.
- $3 : 17 = x : 102$   
 $\Rightarrow 3 \times 102 = 17 \times x$   
 ( $\therefore$  Product of extremes = product of means)  
 $\Rightarrow x = \frac{3 \times 102}{17} = 18$   
 Hence, option (d) is correct.



4.  $7 : x :: 35 : 45$   
 $\Rightarrow 7 : x = 35 : 45$   
 $\Rightarrow 7 \times 45 = x \times 35$   
(Product of extremes = Product of means)  
 $\Rightarrow x = \frac{7 \times 45}{35} = 9$

Hence, option (c) is correct.

5. 10 men can dig the same trench in 9 days.  
 $\therefore$  1 man can dig the same trench in  $(9 \times 10)$  days.  
(Less men, more days)

$\therefore$  15 men can dig the same trench in  $\frac{9 \times 10}{15}$  days  
(More men, less days)  
= 6 days

Hence, option (b) is correct.

6. In 1 hour (3600 sec), train covers a distance = 36000 m  
(1 hr = 3600 sec, 1 km = 1000 m)

$\therefore$  In 1 sec, the train covers a distance =  $\frac{36000}{3600}$  m  
= 10 m

$\therefore$  In 20 sec, the train will a distance cover =  $10 \times 20$  m  
= 200 m

Distance covered in crossing the pole = length of the train

Hence, option (b) is correct.

7. In  $\left(\frac{1}{2} \text{ hr} = 30 \text{ mins.}\right)$ , Rakesh can type = 2100 words

$\therefore$  In 1 min. Rakesh can type =  $\frac{2100}{30}$  words

$\Rightarrow$  In 5 minutes, Rakesh can types =  $\frac{2100}{30} \times 5$   
= 350 words

Hence, option (a) is correct.

8. In 6 min, the cyclist covers a distance = 1 km  
 $\therefore$  In 1 min, the cyclist covers a distance =  $\frac{1}{6}$  km

$\therefore$  In 60 min (1 hr), the cyclist covers a distance  
=  $\left(\frac{1}{6} \times 60\right)$  km  
= 10 km

Thus, speed of cyclist = 10 km/hrs

Hence, option (a) is correct.

9.  $A : B = 2 : 3$  and  $B : C = 4 : 5$   
Hence,  $A : C = 2 \times 4 : 3 \times 5$   
= 8 : 15

Hence, option (a) is correct.

10. Let the number to be added to each term of the ratio be  $x$ .

Then,  $(7 + x) : (12 + x) = 2 : 3$

$\Rightarrow \frac{7 + x}{12 + x} = \frac{2}{3}$

$\Rightarrow 3(7 + x) = 2(12 + x)$

(By cross multiplication)

$\Rightarrow 21 + 3x = 24 + 2x$

$\Rightarrow 3x - 2x = 24 - 21$  (By transposing)

$\Rightarrow x = 3$

Thus, 3 must be added to each term.

Hence, option (d) is correct.

11. Let the number to be subtracted from each term be  $x$ .  
Then,

$\frac{(17 - x)}{(11 - x)} = \frac{2}{1}$

$\Rightarrow (17 - x) = 2(11 - x)$

$\Rightarrow 17 - x = 22 - 2x$

$\Rightarrow 2x - x = 22 - 17$

$\Rightarrow x = 5$

Hence, option (b) is correct.

12.  $2A = 3B = 4C$ .

L.C.M. of 2, 3 and 4 is 12.

Dividing each term by 12, we get

$\frac{2A}{12} = \frac{3B}{12} = \frac{4C}{12}$

$\frac{A}{6} = \frac{B}{4} = \frac{C}{3}$

Thus,

$A : B : C = 6 : 4 : 3$

Hence, option (b) is correct.

### MENTAL MATHS CORNER

1.  $30 : P :: 50 : 75$

$30 : P = 50 : 75$

$\Rightarrow 30 \times 75 = P \times 50$

( $\therefore$  Product of extremes = Product of means)

$\Rightarrow P = \frac{30 \times 75}{50} = 45$

The number 30,  $P$ , 50 and 75 are in proportion, then the value of  $P$  is 45.

2. In 3 hours, the car covers a distance = 120 km

$\therefore$  In 1 hour, the car covers a distance =  $\frac{120}{3}$  km

= 40 km

$\therefore$  In 4 hours, the car covers a distance =  $40 \times 4$  km  
= 160 km

A car travels 120 km in 3 hours. In 4 hours, it will cover a distance of 160 km.

$$\begin{aligned}
3. \text{ The ratio of 2 weeks to 6 days} &= 2 \text{ weeks} : 6 \text{ days} \\
&= \frac{2 \text{ weeks}}{6 \text{ days}} \\
&= \frac{2 \times 7 \text{ days}}{6 \text{ days}} \quad (1 \text{ week} = 7 \text{ days}) \\
&= \frac{7}{3} = 7 : 3
\end{aligned}$$

The ratio of 2 weeks to 6 days is equal to **7 : 3**.

$$\begin{aligned}
4. \text{ Let the mean proportional to 9 and 25 be } x. \\
\text{Therefore, } 9 : x :: x : 25 \\
\therefore 9 : x = x : 25 \\
\Rightarrow 9 \times 25 = x^2 \\
\Rightarrow x^2 = 225 \\
\Rightarrow x^2 = (15)^2 \\
\text{(Powers are equal, base will be equal)} \\
\Rightarrow x = 15
\end{aligned}$$

The mean proportional to 9 and 25 is **15**.

$$5. \text{ Sum of the terms of ratio} = 3 + 4 = 7. \text{ Then,}$$

$$A's \text{ share} = ₹ \left( \frac{3}{7} \times 210 \right) = ₹90$$

$$B's \text{ share} = ₹ \left( \frac{4}{7} \times 210 \right) = ₹120$$

If ₹210 is divided between A and B in the ratio 3 : 4, then B's share is **₹120**.

$$6. \text{ If 6, } x, 24 \text{ are in continued proportion, then, } 6 : x :: x : 24.$$

$$\begin{aligned}
\therefore 6 : x = x : 24 \\
\Rightarrow 6 \times 24 = x \times x \\
\Rightarrow x^2 = 144 \\
\Rightarrow x^2 = (12)^2 \\
\Rightarrow x = 12
\end{aligned}$$

If 6,  $x$ , 24 are in continued proportion, then  $x$  is equal to **12**.

$$7. \text{ Let the third proportional to 8 and 12 be } x. \text{ Then,}$$

$$\begin{aligned}
8 : 12 :: 12 : x \\
\therefore 8 : 12 = 12 : x \\
\Rightarrow 8 \times x = 12 \times 12 \\
\Rightarrow x = \frac{144}{8} = 18
\end{aligned}$$

The third proportional to 8 and 12 is **18**.

$$8. \text{ Let the breadth of the rectangular field be } x.$$

Then, length of the rectangular field =  $2x$

Thus, perimeter of rectangular field

$$= 2 \times (\text{length} + \text{breadth}) = 2(2x + x) = 2(3x) = 6x$$

$$\begin{aligned}
\therefore \text{ Perimeter} &= 48 \text{ m} \\
6x &= 48
\end{aligned}$$

$$\Rightarrow x = \frac{48}{6} = 8$$

The length of a rectangular field is twice its breadth. If the perimeter of the field is 48 m, then its breadth is 8 m.

## REVIEW EXERCISE

$$1. \text{ The ratio of male and female workers} = 7 : 6$$

Let the number of female workers be  $x$ . Therefore,

$$7 : 6 = 203 : x$$

$$\Rightarrow 7 \times x = 6 \times 203$$

$$\Rightarrow x = \frac{6 \times 203}{7} = 174$$

Hence, there are 174 female workers in the factory.

$$2. (2x + 3) : (3x + 2) = 5 : 7$$

$$\Rightarrow \frac{2x + 3}{3x + 2} = \frac{5}{7}$$

$$\Rightarrow 7(2x + 3) = 5(3x + 2) \quad (\text{By cross multiplication})$$

$$\Rightarrow 14x + 21 = 15x + 10$$

$$\Rightarrow 15x - 14x = 21 - 10$$

$$\Rightarrow x = 11$$

Hence, the value of  $x$  is 11.

$$3. \text{ Let the number to be added in each term of the ratio be } x. \text{ Then,}$$

$$(3 + x) : (5 + x) = 4 : 5$$

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

$$\Rightarrow 5(3 + x) = 4(5 + x) \quad (\text{By cross multiplication})$$

$$\Rightarrow 15 + 5x = 20 + 4x$$

$$\Rightarrow 5x - 4x = 20 - 15$$

$$\Rightarrow x = 5$$

Hence, 5 must be added.

$$4. \text{ Let the two numbers be } 5x \text{ and } 7x.$$

As per question,

$$(7x)^2 - (5x)^2 = 216$$

$$\Rightarrow 49x^2 - 25x^2 = 216$$

$$\Rightarrow 24x^2 = 216$$

$$\Rightarrow x^2 = \frac{216}{24} = 9$$

$$\Rightarrow x = 3$$

Hence, the required numbers are  $5 \times 3 = 15$  and  $7 \times 3 = 21$ .

$$5. \text{ Let the antecedent be } x. \text{ Then,}$$

$$8 : 11 = x : 66$$

$$\Rightarrow 8 \times 66 = 11 \times x$$

$$\Rightarrow x = \frac{8 \times 66}{11} = 48$$

Hence, the antecedent is 48.

6. The given ratios are 4 : 3, 3 : 4, 5 : 8, 6 : 9

$$\text{or } \frac{4}{3}, \frac{3}{4}, \frac{5}{8}, \frac{6}{9}$$

L.C.M. of 3, 4, 8 and 9 is 72.

$$\frac{4}{3} = \frac{4 \times 24}{3 \times 24} = \frac{96}{72}$$

$$\frac{3}{4} = \frac{3 \times 18}{4 \times 18} = \frac{54}{72}$$

$$\frac{5}{8} = \frac{5 \times 9}{8 \times 9} = \frac{45}{72}$$

$$\frac{6}{9} = \frac{6 \times 8}{9 \times 8} = \frac{48}{72}$$

∴ The denominators are same.

∴ The given ratios in ascending order are

$$\frac{45}{72}, \frac{48}{72}, \frac{54}{72}, \frac{96}{72}$$

$$\Rightarrow \frac{5}{8}, \frac{6}{9}, \frac{3}{4}, \frac{4}{3}$$

Hence, 5 : 8, 6 : 9, 3 : 4, 4 : 3 are in ascending order.

7. Let the number to be added to each of the given numbers be  $x$ .

Then,  $(10 + x) : (17 + x) :: (24 + x) : (38 + x)$

$$\therefore (10 + x)(38 + x) = (17 + x)(24 + x)$$

(∵ Product of extremes = Product of means)

$$\Rightarrow 380 + 10x + 38x + x^2 = 408 + 17x + 24x + x^2$$

$$\Rightarrow 380 + 48x + x^2 = 408 + 41x + x^2$$

(Cancelling  $x^2$  from both sides)

$$\Rightarrow 48x - 41x = 408 - 380$$

$$\Rightarrow 7x = 28$$

$$\Rightarrow x = \frac{28}{7} = 4$$

Hence, 4 must be added to each of the given numbers.

8. Let the fourth term be  $x$ . Then,

$$5 : 7 :: 35 : x$$

$$\Rightarrow 5 : 7 = 35 : x$$

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

(∵ Product of extremes = Product of means)

$$\Rightarrow x = \frac{7 \times 35}{5} = 49$$

Hence, fourth term is 49.

9. The cost of 30 metres of cloth = ₹ 420

$$\therefore \text{The cost of 1 metre of cloth} = ₹ \left( \frac{420}{30} \right) = ₹ 14$$

(Less length, less cost)

$$\therefore \text{The cost of 48 metres of cloth} = ₹ (14 \times 48) \\ = ₹ 672$$

Hence, the cost of 48 metres of cloth is ₹ 672.

10. Let the earnings of 18 workers be ₹ $x$ .

It is a case of direct variation.

$$\therefore \frac{25}{1875} = \frac{18}{x}$$

$$\Rightarrow x = \frac{18 \times 1875}{25} = 1350$$

Hence, the earnings of 18 workers are ₹1350 per day.

$$\therefore 1 \text{ workers earn per day} = ₹ \left( \frac{1875}{25} \right)$$

$$\therefore 18 \text{ workers will earn per day} = ₹ (75 \times 18) \\ = ₹ 1350$$

Hence, 18 workers will earn ₹1350 per day.

11. 30 men can dig a trench in 54 days.

∴ 1 man can dig the same trench in  $(54 \times 30)$  days.  
(Less men, more days)

∴ 18 men can dig the same trench in  $\left( \frac{54 \times 30}{18} \right)$  days  
(More men, less days)  
 $= 90$  days

Hence, 18 men will take 90 days to dig the trench.

**Alternative method:**

Let 18 men will take  $x$  days to dig the trench.

No. of men	No. of days
30 ↑	54 ↓
18 ↑	$x$ ↓

∴  $30 \times 54 = 18 \times x$  (Indirect variation)

$$\Rightarrow x = \frac{30 \times 54}{18} = 90$$

## HOTS QUESTIONS

- The ratio of Sunidhi's height to her shadow = 3 : 1  
At the same time, the length of shadow of a tree = 14 ft.  
Let the height of the tree be  $x$  ft.  
Then,  $3 : 1 = x : 14$  (Direct variation)  
 $\Rightarrow 3 \times 14 = 1 \times x$   
 $\Rightarrow x = 42$   
Hence, the height of tree is 42 ft.
- $9 : 12 : 18 = x : y : 12$   
∴  $9 : 12 = x : y$  ... (i)  
and  $12 : 18 = y : 12$  ... (ii)  
From (ii),  $\frac{12}{18} = \frac{y}{12}$   
 $\Rightarrow y = \frac{12 \times 12}{18} = 8$

Putting the value of  $y$  in (i), we get

$$9 : 12 = x : 8$$

$$\frac{9}{12} = \frac{x}{8}$$

$$\Rightarrow x = \frac{9 \times 8}{12} = 6$$

Hence,  $x = 6, y = 8$ .



## Puzzle

### Page 158

Traveller	No. of loaves	No. of coins
1	5	–
2	3	–
3	–	8

Total numbers of loaves =  $5 + 3 = 8$

It is to be distributed in 3 travellers.

Share of each traveller =  $\frac{8}{3}$  loaves.

$$= 2\frac{2}{3} \text{ loaves.}$$

Now, the third traveller will pay 8 coins for his share of  $2\frac{2}{3}$  loaves.

First traveller gave  $\left(5 - \frac{8}{3}\right) = \frac{7}{3}$  loaves and

second traveller gave  $\left(3 - \frac{8}{3}\right) = \frac{1}{3}$  loaf to the third one.

The money should be divided between two travellers in the ratio equal to the shares of loaves given by them to third traveller.

Required ratio =  $\frac{7}{3} : \frac{1}{3} = \frac{7}{3} \times 3 : \frac{1}{3} \times 3 = 7 : 1$

First traveller should get 7 coins whereas the second traveller should get 1 coin.

### Page 163

Let the lengths of train and tunnel be  $x$  and  $y$  metres respectively.

Speed of train = 96 km/hr

$$= 96 \times \frac{5}{18} \text{ m/sec}$$

$$= \frac{80}{3} \text{ m/sec}$$

To enter a tunnel, the train covers a distance equal to its length.

Distance = Speed  $\times$  Time

$$x = \frac{80}{3} \times 3$$

$$x = 80$$

To pass the tunnel, the train covers a distance equal to the sum of its length and length of the tunnel.

Distance = Speed  $\times$  Time

$$(80 + y) = \frac{80}{3} \times 33$$

[ $\because$  Time = (30 + 3) seconds = 33 seconds]

$$(80 + y) = 80 \times 11$$

$$80 + y = 880$$

$$y = 880 - 80 = 800$$

Length of the train = 80 m

Length of the tunnel = 800 m

## VALUE BASED QUESTION SUMMATIVE ASSESSMENT

Let the quantity of milk and water in the mixture be  $4x$  and  $x$  respectively.

$$4x + x = 35$$

$$5x = 35 \quad x = 7$$

Original quantity of milk =  $4 \times 7 = 28$  litres

Original quantity of water = 7 litres.

Then, he adds another 7 litres of water.

Quantity of water in resulting mixture =  $(7 + 7)$  litres  
= 14 litres

Ratio of milk and water in resulting

mixture = 28 litres : 14 litres

$$= \frac{28 \text{ litres}}{14 \text{ litres}}$$

$$= \frac{28}{14} = \frac{2}{1} = 2 : 1$$

The milk man is **dishonest** as he mixes water into milk.