

## Ratio and Proportion

1. Find the ratio of each of the following in simplest form

$$\begin{aligned} \text{(i)} \quad & 78 \text{ paise to } 65 \text{ paise} \\ & = 78 \text{ paise} : 65 \text{ paise} \\ & = \frac{78 \times 12}{65 \times 12} \\ & = 12 : 5 \quad \text{Ans.} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 750 \text{ gm to } 2 \text{ kg} \\ & = 750 \text{ gm} : 2000 \text{ gm} \\ & = \frac{750}{2000} \\ & = 3 : 8 \quad \text{Ans.} \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & 15 \text{ hours to } 1 \text{ day} \\ & = 15 \text{ hours} : 24 \text{ hours} \\ & = \frac{15}{24} \\ & = 5 : 8 \quad \text{Ans.} \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad & 64 \text{ ml to } 1 \text{ litre} \\ & = 64 \text{ ml to } 1000 \text{ ml} = 64 : 1000 \\ & = \frac{64 \times 125}{1000 \times 125} \\ & = \frac{8}{125} \\ & = 8 : 125 \quad \text{Ans.} \end{aligned}$$

2. Express each of the following ratios in simplest form.

$$\begin{aligned} \text{(i)} \quad & 15 : 25 \\ & = 3 : 5 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 49 : 35 \\ & = 7 : 5 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & 90 : 72 \\ & = 5 : 4 \end{aligned}$$

3. In a school, there are 420 boys and 180 girls. Find the ratio of (i) girls to boys (ii) girls to total number of students (iii) boys to total number of students.

$$\begin{aligned} \rightarrow \text{(i)} \quad & \text{girls to boys} \\ & 180 : 420 \\ & = \frac{3 \times 180}{7 \times 420} \\ & = 3 : 7 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & \text{girls to total number of students} \\ & = 180 : (420 + 180) \\ & = 180 : 600 \\ & = \frac{180 \times 3}{600 \times 3} \\ & = 3 : 10 \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad & \text{boys to total number of students} \\ & 420 : (420 + 180) \\ & = 420 : 600 = \frac{7 \times 420}{10 \times 600} = 7 : 10 \end{aligned}$$

∴ girls to boys = 3 : 7  
girls to total students = 3 : 10  
boys to total students = 7 : 10

4. The ratio of tin and zinc in an alloy is 3:4. In 21 gm of alloy, find the quantity of (i) tin and (ii) zinc.

→ Given ratio = 3:4.

$$\text{Total} = (3+4) = 7.$$

$$\therefore \text{Quantity of tin} = \frac{3}{7} \times 21$$

Quantity of tin = 9 gm

$$\therefore \text{Quantity of zinc} = \frac{4}{7} \times 21$$
$$= 12 \text{ gm}$$

∴ Quantity of tin and zinc is 9 gm and 12 gm.

5. The angles of a triangle are in the ratio 3:5:7. Find the measure of each angle of the triangle.

→ Given ratio = 3:5:7

$$\text{Total} = (3+5+7) = 15.$$

$$\therefore 1^{\text{st}} \text{ angle} = \frac{3}{15} \times 180^\circ$$
$$= 36^\circ$$

$$2^{\text{nd}} \text{ angle} = \frac{5}{15} \times 180^\circ$$
$$= 60^\circ$$

$$3^{\text{rd}} \text{ angle} = \frac{7}{15} \times 180^\circ$$
$$= 84^\circ$$

∴ Measurement of three angles are  $36^\circ$ ,  $60^\circ$ ,  $84^\circ$ .

Q8. A ratio in simplest form is  $11:18$ . If its antecedent is 191, find its consequent.

$$\rightarrow \frac{11 \times 11}{18 \times 11} = \frac{191}{183}$$

∴ The consequent is 183.

Q9. Verify that:

$$\textcircled{1} 10:18 = 8:12$$

$$= 10 \times 10 = 18 \times 8$$

$$100 = 144 \quad \text{verified.}$$

$$\textcircled{2} 6:95 = 4.8:5.6$$

$$6 \times 5.6 = 95 \times 4.8$$

$$= 33.6 \neq 456 \quad \text{verified.}$$

Rule: product of extremes = product of means

Q8. Which of the following numbers in proportion?

$$\textcircled{i} 30, 42, 5, 7$$

$$30:42 = 5:7$$

$$30 \times 7 = 42 \times 5$$

$$210 = 210.$$

Yes, they are in proportion.

$$\textcircled{ii} 9, 13, 10, 14$$

$$= 9:13 = 10:14$$

$$14 \times 9 = 13 \times 10$$

$$126 \neq 130$$

No, they are not in proportion.

3. Find the value of  $x$  in each of the following proportions

(i)  $36:81 :: x:63$

$$81 \times x = 36 \times 63$$

$$\text{or, } x = \frac{36 \times 63}{81}$$

$$\text{or, } x = 28.$$

Ans 28.

(ii)  $27:x :: 63:84$

$$63 \times x = 27 \times 84$$

$$\text{or, } x = \frac{27 \times 84}{63}$$

$$\text{or, } x = 36.$$

Ans 36.

4. In a proportion, the 1<sup>st</sup>, 2<sup>nd</sup> and 4<sup>th</sup> terms are 32, 112 and 217 respectively. Find the 3<sup>rd</sup> term.

→ Let the term be  $x$

∴  $32:112 :: x:217$

$$\text{or, } 112 \times x = 217 \times 32$$

$$\text{or, } x = \frac{217 \times 32}{112}$$

$$\text{or, } x = 62$$

Ans The third term is 62.

5. An electric pole casts a shadow of length 20 metres at a time when a tree 6 metres high casts a shadow of length 8 metres. Find the height of the pole.

→ Shadow : height ::  $x$  : 6

$20 : 8 :: x : 6$

Let the height of the electric pole =  $x$ .

$$\text{or, } 8 \times x = 20 \times 6$$

$$\text{or, } x = \frac{20 \times 6}{8}$$

$$\text{or, } x = 15$$

∴ Height of the electric pole is 15 m.

6. The ratio of length and breadth of a rectangular plot is 9:5. If its breadth is 60 m, find its length.

→ Let the length be  $x$ .

$9 : 5 :: x : 60$

$$\text{or, } 5 \times x = 9 \times 60$$

$$\text{or, } x = \frac{9 \times 60}{5}$$

$$\text{or, } x = 108$$

∴ Length is 108 m.

———— x ————

CHAPTER 9 :- UNITARY METHOD

Unitary Method

1. The cost of 11 pens is ₹ 132

Find (i) the cost of 1 pen.

(ii) Cost of 16 pens.

→ Cost of 11 pens = ₹ 132.

$$\therefore \text{ " " 1 " " } = \frac{132}{11}$$

$$= ₹ 12.$$

$$\therefore \text{ Cost of 16 pens } = ₹ 12 \times 16$$

$$= ₹ 192$$

∴ Cost of 1 pen = ₹ 12

Cost of 16 pens = ₹ 192.

2. If the cost of 13 m of cloth is ₹ 1625, what will be the cost of 5 m of the cloth?

→ Cost of 13 m of cloth = ₹ 1625.

$$\therefore \text{ " " 1 " " } = \frac{1625}{13}$$

$$\therefore \text{ " " 5 " " } = \frac{1625 \times 5}{13}$$

$$= ₹ 625$$

∴ Cost of 5 m of cloth is ₹ 625.

3. If 6 m of a uniform iron rod weighs 21 kg, what will be the weight of 16 m of the same rod?

→ 6 m of iron rod weighs = 21 kg.

$$\therefore \text{ 1 " " " " } = \frac{21}{6}$$

$$\therefore \text{ 16 " " " " } = \frac{21}{6} \times 16$$

$$= 56 \text{ kg}$$

∴ An 16 m of iron rod weighs 56

4. A car travels 195 km in 3 hours. How long will it take to travel 325 km?

→ A car travels 195 km in 3 hours

$$\therefore \frac{195}{3} = \frac{195}{3}$$

$$\therefore \frac{195}{3} = \frac{325}{x} \Rightarrow x = \frac{325 \times 3}{195}$$

$$= 5 \text{ hours}$$

Ans To travel 325 km the car will take 5 hours.

5. A car covers 310 km in 5 hours. How much time will it take to cover 403 km?

→ To cover 310 km a car takes = 5 hours

$$\therefore \frac{310}{5} = \frac{310}{5}$$

$$\therefore \frac{310}{5} = \frac{403}{x} \Rightarrow x = \frac{403 \times 5}{310}$$

$$= \frac{403}{62} = 6 \frac{35}{62}$$

$$= 6.5 \text{ hours}$$

Ans The car will take 6 hours 30 minutes to cover 403 km. = 6 hours 30 minutes

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