

Ratio and Proportion

Understanding the Lesson

- Ratio and their comparison.
- Ratio using symbol.
- Comparison of two quantities when they are in the same unit.
- Same ratio in different situations.
- Equivalent ratio
- Proportion
- Using symbol of proportion '::' or '='
- Unitary method
- Word problems based on ratio, proportion and unitary method.

Conceptual Facts

- The comparison of two quantities by division is called ratio. For example, $\frac{2}{3}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}$, etc.
- We represent the ratio by a symbol ':'. For example: $\frac{2}{3} = 2 : 3$ or $\frac{3}{2} = 3 : 2$
- Two quantities can only be compared when they are in the same unit. For example, 4 cm : 5 cm or $\frac{3}{2}$ m : $\frac{4}{5}$ m.
- We can get equivalent ratios by multiplying or dividing the numerator and the denominator by the same number. For example, $\frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6} = \frac{4 \times 3}{6 \times 3} = \frac{12}{18}$. So, $\frac{2}{3}, \frac{4}{6}$ and $\frac{12}{18}$ are all equivalent ratios.
- If two ratios are equal, we say that they are in proportions and use the symbol '::' or '='. For example, $2 : 3 :: 4 : 6$ or $2 : 3 = 4 : 6$.
- If two ratios are not equal then we say that they are not in proportion. For example, $\frac{2}{3}$ and $\frac{4}{5}$ are not equal ratios. So they are not in proportions.
- In proportion four quantities are involved. The first and fourth terms are known as extreme and second and third terms are known as middle terms. For example, $2 : 3 :: 8 : 12$ where 2 and 12 are extreme and 3 and 8 are middle terms.
- Product of extreme terms = product of middle terms.
- We can use a method in which first we find the value of one unit and then the value of the required number of units. This method is called unitary method.

TRY THESE (PAGE 245)

Q1. In a class, there are 20 boys and 40 girls. What is the ratio of the number of boys to the number of girls?

Sol. Number of boys = 20

Number of girls = 40

\therefore Ratio of number of boys to the number of girls

$$= \frac{\text{Number of boys}}{\text{Number of girls}} = \frac{20}{40} = \frac{1}{2} \text{ or } 1 : 2$$

Thus, the required ratio is = 1 : 2.

Q2. Ravi walks 6 km in an hour while Roshan walks 4 km in an hour. What is the ratio of the distance covered by Ravi to the distance covered by Roshan?

Sol. Distance covered by Ravi = 6 km in an hour
 Distance covered by Roshan = 4 km in an hour
 Ratio of the distance covered by Ravi to the distance covered by Roshan

$$= \frac{\text{Distance covered by Ravi}}{\text{Distance covered by Roshan}}$$

$$= \frac{6 \text{ km}}{4 \text{ km}} = \frac{6 \div 2}{4 \div 2} = \frac{3}{2} \text{ or } 3 : 2$$

Thus, the required ratio is = 3 : 2.

TRY THESE (PAGE 246)

Q1. Saurabh takes 15 minutes to reach school from his house and Sachin takes one hour to reach school from his house. Find the ratio of the time taken by Saurabh to the time taken by Sachin.

Sol. Converting the time into same units, we get
 Time taken by Saurabh = 15 minutes
 Time taken by Sachin = 1 hour
 = 1 × 60 = 60 minutes
 [∵ 1 hour = 60 minutes]
 ∴ Ratio of the time taken by Saurabh to the time taken by Sachin

$$= \frac{\text{Time taken by Saurabh in minutes}}{\text{Time taken by Sachin in minutes}}$$

$$= \frac{15}{60} = \frac{15 \div 15}{60 \div 15} = \frac{1}{4} \text{ or } 1 : 4$$

Thus, the required ratio is = 1 : 4.

Q2. Cost of a toffee is 50 paise and cost of a chocolate is ₹ 10. Find the ratio of the cost of a toffee to the cost of a chocolate.

Sol. We know that ₹ 1 = 100 paise
 ∴ ₹ 10 = 10 × 100 = 10,000 paise.

So, the ratio of the cost of a toffee to the cost of a chocolate

$$= \frac{\text{Cost of a toffee in paise}}{\text{Cost of a chocolate in paise}}$$

$$= \frac{10}{10,000} = \frac{1}{1000}$$

Thus, the required ratio is 1 : 1000.

Q3. In a school, there were 73 holidays in one year. What is the ratio of the number of holidays to the number of days in one year?

Sol. Number of holidays in one year = 73
 Number of days in one year = 365
 [∵ 1 year = 365 days]
 ∴ Ratio of the number of holidays to the number of days in one year

$$= \frac{\text{Number of holidays}}{\text{Number of days in one year}} = \frac{73}{365}$$

$$= \frac{73 \div 73}{365 \div 73} = \frac{1}{5} \text{ or } 1 : 5$$

Thus, the required ratio = 1 : 5.

TRY THESE (PAGE 248)

Q1. Find the ratio of the number of notebooks to the number of books in your bag.

Sol. It is an activity. Try yourself.

Q2. Find the ratio of number of desks and chairs in your classroom.

Sol. It is an activity. Try yourself.

Q3. Find the number of students above 12 years of age in your class. Then, find the ratio of number of students with age above 12 years and the remaining students.

Sol. It is an activity. Try yourself.

Q4. Find the ratio of number of doors and the number of windows in your classroom.

Sol. It is an activity. Try yourself.

Q5. Draw any rectangle and find the ratio of its length to its breadth.

Sol. It is an activity. Try yourself.

EXERCISE 12.1

Q1. There are 20 girls and 15 boys in a class.

(a) What is the ratio of the number of girls to the number of boys?

(b) What is the ratio of the number of girls to the number of students in the class?

Sol. (a) Number of girls = 20
 Number of boys = 15
 Total number of students
 = 20 + 15 = 35

∴ Ratio of the number of girls to the number of boys

$$= \frac{\text{Number of girls}}{\text{Number of boys}} = \frac{20}{15}$$

$$= \frac{20 \div 5}{15 \div 5} = \frac{4}{3} \text{ or } 4 : 3$$

Thus, the required ratio is 4 : 3.

(b) Ratio of the number of girls to the number of students

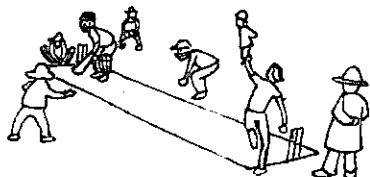
$$= \frac{\text{Number of girls}}{\text{Number of students}} = \frac{20}{35}$$

$$= \frac{20 \div 5}{35 \div 5} = \frac{4}{7} \text{ or } 4 : 7$$

Thus, the required ratio is 4 : 7.

Q2. Out of 30 students in a class, 6 like football, 12 like cricket and remaining like tennis. Find the ratio of

- Number of students liking football to the number of students liking tennis.
- Number of students liking cricket to total number of students.



Sol. Number of students in the class = 30
 Number of students liking football = 6
 Number of students liking cricket = 12
 Number of students liking tennis
 $= 30 - (6 + 12) = 30 - 18 = 12$

(a) Ratio of the number of the students liking football to the number of students liking tennis

$$= \frac{\text{Number of students liking football}}{\text{Number of students liking tennis}}$$

$$= \frac{6}{12} = \frac{6 \div 6}{12 \div 6} = \frac{1}{2} \text{ or } 1 : 2$$

Thus, the required ratio is 1 : 2.

(b) Ratio of the number of students liking cricket to the total number of students

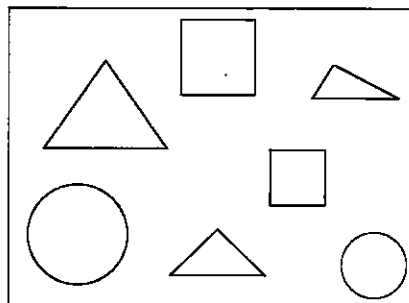
$$= \frac{\text{Number of students liking cricket}}{\text{Total number of students}}$$

$$= \frac{12}{30} = \frac{12 \div 6}{30 \div 6} = \frac{2}{5} \text{ or } 2 : 5$$

Thus, the required ratio is 2 : 5.

Q3. See the figure and find the ratio of

- Number of triangles to the number of circles inside the rectangle.
- Number of squares to all the figures inside the rectangle.
- Number of circles to all the figures inside the rectangle.



Sol. (a) Number of triangles = 3

Number of circles = 2

∴ Ratio of number of triangles to the number of circles

$$= \frac{\text{Number of triangles}}{\text{Number of circles}} = \frac{3}{2} \text{ or } 3 : 2$$

Thus, the required ratio is 3 : 2.

(b) Number of squares = 2

Number of all figures = 7

∴ Ratio of number of squares to the number of all the figures

$$= \frac{\text{Number of squares}}{\text{Number of all the figures}} = \frac{2}{7} \text{ or } 2 : 7$$

Thus, the required ratio is 2 : 7.

(c) Ratio of number of circles to the number of all the figures

$$= \frac{\text{Number of circles}}{\text{Number of all the figures}} = \frac{2}{7} \text{ or } 2 : 7$$

Thus, the required ratio is 2 : 7.

Q4. Distances travelled by Hamid and Akhtar in an hour are 9 km and 12 km. Find the ratio of speed of Hamid to the speed of Akhtar.

Sol. Distance travelled by Hamid = 9 km.

Distance travelled by Akhtar = 12 km.

Speed of Hamid = 9 km per hour

Speed of Akhtar = 12 km per hour

∴ Ratio of the speed of Hamid to the speed of

$$\text{Akhtar} = \frac{\text{Speed of Hamid}}{\text{Speed of Akhtar}}$$

$$= \frac{9}{12} = \frac{9 \div 3}{12 \div 3} = \frac{3}{4} \text{ or } 3 : 4$$

Thus, the required ratio is 3 : 4.

Q5. Fill in the following blanks:

$$\frac{15}{18} = \frac{\square}{6} = \frac{10}{\square} = \frac{\square}{30}$$

[Are these equivalent ratios?]

Sol. $\frac{15}{18} = \frac{\square}{6}$

$$\Rightarrow \square \times 18 = 15 \times 6$$

$$\Rightarrow \square = \frac{15 \times 6}{18} = \frac{90}{18} = \frac{90 \div 18}{18 \div 18} = \frac{5}{1} = 5.$$

$$\therefore \square = 5.$$

$$\frac{5}{6} = \frac{10}{\square}$$

$$\Rightarrow 5 \times \square = 6 \times 10$$

$$\Rightarrow \square = \frac{6 \times 10}{5} = \frac{60}{5} = 12$$

$$\therefore \square = 12.$$

$$\frac{10}{12} = \frac{\square}{30}$$

$$\Rightarrow 12 \times \square = 10 \times 30$$

$$\Rightarrow \square = \frac{10 \times 30}{12} = \frac{300}{12} = 25$$

$$\therefore \square = 25$$

Now the fractions, we have

$$\frac{15}{18} = \frac{5}{6} = \frac{10}{12} = \frac{25}{30}$$

$$\frac{15}{18} = \frac{15 \div 3}{18 \div 3} = \frac{5}{6} \quad [\text{HCF of 15 and 18 is 3}]$$

$$\frac{10}{12} = \frac{10 \div 2}{12 \div 2} = \frac{5}{6} \quad [\text{HCF of 10 and 12 is 2}]$$

$$\frac{25}{30} = \frac{25 \div 5}{30 \div 5} = \frac{5}{6} \quad [\text{HCF of 25 and 30 is 5}]$$

Thus $\frac{15}{18}$, $\frac{5}{6}$, $\frac{10}{12}$ and $\frac{25}{30}$ are all equivalent ratios.

Q6. Find the ratio of the following:

(a) 81 to 108 (b) 98 to 63

(c) 33 km to 121 km

(d) 30 minutes to 45 minutes

$$\text{Sol. (a) } 81 \text{ to } 108 = \frac{81}{108} = \frac{81 \div 27}{108 \div 27} = \frac{3}{4}$$

[HCF of 81 and 108 = 27]

Thus, the ratio = 3 : 4

$$(b) 98 \text{ to } 63 = \frac{98}{63} = \frac{98 \div 7}{63 \div 7} = \frac{14}{9}$$

[HCF of 98 and 63 = 7]

Thus, the ratio = 14 : 9

$$(c) 33 \text{ km to } 121 \text{ km} = \frac{33}{121} = \frac{33 \div 11}{121 \div 11} = \frac{3}{11}$$

[HCF of 33 and 121 = 11]

Thus, the ratio = 3 : 11

$$(d) 30 \text{ minutes to } 45 \text{ minutes}$$

$$= \frac{30}{45} = \frac{30 \div 15}{45 \div 15} = \frac{2}{3} \quad [\text{HCF of 30 and 45 = 15}]$$

Thus, the ratio = 2 : 3

Q7. Find the ratio of the following:

(a) 30 minutes to 1.5 hours

(b) 40 cm to 1.5 m

(c) 55 paise to ₹ 1

(d) 500 mL to 2 litres

Sol. (a) 1 hour = 60 minutes

$$\therefore 1.5 \text{ hours} = 60 \times 1.5 \text{ minutes} = 90 \text{ minutes}$$

$$\therefore \text{Ratio of 30 minutes to 1.5 hours}$$

$$= \text{Ratio of 30 minutes to 90 minutes}$$

$$= \frac{30}{90} = \frac{30 \div 30}{90 \div 30} = \frac{1}{3} = 1 : 3$$

[HCF of 30 and 90 = 30]

(b) 1 m = 100 cm

$$\therefore 1.5 \text{ m} = 1.5 \times 100 \text{ cm} = 150 \text{ cm.}$$

$$\therefore \text{Ratio of 40 cm to 1.5 m}$$

$$= \text{Ratio of 40 cm to 150 cm.}$$

$$\frac{40}{150} = \frac{40 \div 10}{150 \div 10} = \frac{4}{15} = 4 : 15$$

[HCF of 40 and 150 = 10]

(c) ₹ 1 = 100 paise

$$\therefore \text{Ratio of 55 paise to ₹ 1} = \text{Ratio of 55 paise to 100 paise}$$

$$= \frac{55}{100} = \frac{55 \div 5}{100 \div 5} = \frac{11}{20} = 11 : 20$$

[HCF of 55 and 100 = 5]

(d) 500 mL to 2 litres

$$1 \text{ litre} = 1000 \text{ mL}$$

$$\therefore 2 \text{ litres} = 2 \times 1000 \text{ mL} = 2000 \text{ mL}$$

$$\therefore \text{Ratio of 500 mL to 2 litres}$$

$$= \text{Ratio of 500 mL to 2000 mL}$$

$$= \frac{500}{2000} = \frac{500 \div 500}{2000 \div 500} = \frac{1}{4} = 1 : 4$$

[HCF of 500 and 2000 = 500]

Q8. In a year, Seema earns ₹ 1,50,000 and saves ₹ 50,000. Find the ratio of

(a) Money that Seema earns to the money she saves.

(b) Money that she saves to the money she spends.

Sol. (a) Money earned by Seema = ₹ 1,50,000

$$\text{Money saved by her} = ₹ 50,000$$

$$\therefore \text{Money spent by her}$$

$$= ₹ 1,50,000 - ₹ 50,000 = ₹ 1,00,000$$

$$\therefore \text{Ratio of money earned by Seema to the money saved by her}$$

$$= \frac{\text{Money earned}}{\text{Money saved}} = \frac{1,50,000}{50,000}$$

$$= \frac{15}{5} = \frac{15 \div 5}{5 \div 5} = \frac{3}{1} = 3 : 1$$

(b) Ratio of money saved by Seema to the money spent by her = $\frac{\text{Money saved}}{\text{Money spent}}$

$$= \frac{50,000}{1,00,000} = \frac{5}{10} = \frac{5 \div 5}{10 \div 5} = \frac{1}{2} = 1 : 2$$

Q9. There are 102 teachers in a school of 3300 students. Find the ratio of the number of teachers to the number of students.

Sol. Number of teachers = 102

Number of students = 3300

∴ Ratio of number of teachers to the number of students

$$= \frac{\text{Number of teachers}}{\text{Number of students}}$$

$$= \frac{102}{3300} = \frac{102 \div 6}{3300 \div 6} = \frac{17}{550} = 17 : 550$$

Q10. In a college, out of 4320 students, 2300 are girls, find the ratio of

(a) Number of girls to the total number of students.

(b) Number of boys to the number of girls.

(c) Number of boys to the total number of students.

Sol. Total number of students = 4320

Number of girls = 2300

∴ Number of boys = 4320 - 2300 = 2020

(a) Ratio of number of girls to the total number of students

$$= \frac{\text{Number of girls}}{\text{Total number of students}}$$

$$= \frac{2300}{4320} = \frac{2300 \div 20}{4320 \div 20} = \frac{115}{216} = 115 : 216$$

[HCF of 2300 and 4320 = 20]

(b) Ratio of number of boys to the number of girls

$$= \frac{\text{Number of boys}}{\text{Number of girls}}$$

$$= \frac{2020}{2300} = \frac{2020 \div 20}{2300 \div 20} = \frac{101}{115} = 101 : 115$$

(HCF of 2020 and 2300 = 20)

(c) Ratio of number of boys to the total number of students

$$= \frac{\text{Number of boys}}{\text{Total number of students}}$$

$$= \frac{2020}{4320} = \frac{2020 \div 20}{4320 \div 20}$$

$$= \frac{101}{216} = 101 : 216$$

[HCF of 2020 and 4320 = 20]

Q11. Out of 1800 students in a school, 750 opted basketball, 800 opted cricket and remaining opted table tennis. If a student can opt only one game, find the ratio of

(a) Number of students who opted basketball to the number of students who opted table tennis.

(b) Number of students who opted cricket to the number of students opting basketball.

(c) Number of students who opted basketball to the total number of students.

Sol. Total number of students = 1800

Number of students opting basketball = 750

Number of students who opted cricket = 800

Number of remaining students who opted table tennis = 1800 - (750 + 800)

$$= 1800 - 1550 = 250$$

(a) Ratio of number of students opted basketball to the number of students who opted table tennis

Number of students opting
basketball

= $\frac{\text{Number of students opting basketball}}{\text{Number of students opting table tennis}}$

$$= \frac{750}{250} = \frac{750 \div 250}{250 \div 250} = \frac{3}{1}$$

= 3 : 1 [HCF of 750 and 250 = 250]

(b) Ratio of the students who opted cricket to the number of students opting basketball

Number of students opting
cricket

= $\frac{\text{Number of students opting cricket}}{\text{Number of students opting basketball}}$

$$= \frac{800}{750} = \frac{800 \div 50}{750 \div 50} = \frac{16}{15}$$

= 16 : 15 [HCF of 800 and 750 = 50]

(c) Ratio of number of students who opted basketball to the total number of students

Number of students who opted
basketball

= $\frac{\text{Number of students who opted basketball}}{\text{Total number of students}}$

$$= \frac{750}{1800} = \frac{750 \div 150}{1800 \div 150} = \frac{5}{12}$$

= 5 : 12 [HCF of 750 and 1800 = 150]

Q12. Cost of a dozen pens is ₹ 180 and cost of 8 ball pens is ₹ 56. Find the ratio of the cost of a pen to the cost of a ball pen.

Sol. Cost of 1 dozen, i.e., 12 pens = ₹ 180

∴ Cost of 1 pen = ₹ $\frac{180}{12}$ = ₹ 15

Cost of 8 ball pens = ₹56

$$\therefore \text{Cost of 1 ball pen} = ₹ \frac{56}{8} = ₹ 7$$

Ratio of cost of 1 pen to cost of 1 ball pen

$$= \frac{\text{Cost of 1 pen}}{\text{Cost of 1 ball pen}} = \frac{15}{7} = 15 : 7$$

Thus required ratio is 15 : 7.

- Q13.** Consider the statement : Ratio of breadth and length of a hall is 2 : 5. Complete the following table that shows some possible breadths and lengths of the hall.

Breadth of the hall (in metres)	2	<input type="text"/>	40
Length of the hall (in metres)	5	50	<input type="text"/>

Sol. We have $2 : 5 :: \square : 50 = \frac{2}{5} = \frac{\square}{50}$

$$\Rightarrow \square \times 5 = 2 \times 50$$

$$\Rightarrow \square = \frac{2 \times 50}{5} = 20$$

We also have $2 : 5 :: 40 : \square$

$$\therefore \frac{2}{5} = \frac{40}{\square} \Rightarrow \square \times 2 = 40 \times 5$$

$$\Rightarrow \square = \frac{40 \times 5}{2} = 100$$

\therefore Required table is

Breadth of the hall (in metres)	2	20	40
Length of the hall (in metres)	5	50	100

- Q14.** Divide 20 pens between Sheela and Sangeeta in the ratio of 3 : 2.

Sol. We have $3 + 2 = 5$

Total number of pen = 20

$$\therefore \text{Sheela's share} = \frac{3}{5} \times 20 = 3 \times 4 = 12 \text{ pens}$$

$$\text{Sangeeta's shares} = \frac{2}{5} \times 20 = 2 \times 4 = 8 \text{ pens.}$$

Thus Sheela gets 12 pens and Sangeeta gets 8 pens.

- Q15.** Mother wants to divide ₹ 36 between her daughters Shreya and Bhoomika in the ratio of their ages. If age of Shreya is 15 years and age of Bhoomika is 12 years, find how much Shreya and Bhoomika will get?

Sol. Given that:

$$\text{Money got by Shreya} : \text{Money got by Bhoomika} = 15 : 12$$

$$\therefore \text{Sum} = 15 + 12 = 27$$

$$\text{Share of Shreya} = \frac{15 \times 36}{27} = ₹ 20$$

$$\text{Share of Bhoomika} = \frac{12 \times 36}{27} = ₹ 16$$

- Q16.** Present age of father is 42 years and that of his son is 14 years. Find the ratio of

- Present age of father to the present age of son.
- Age of the father to the age of son, when son was 12 years old.
- Age of father after 10 years to the age of son after 10 years.
- Age of father to the age of son when father was 30 years old.

Sol. Present age of father = 42 years.

Present age of his son = 14 years.

- (a) Ratio of present age of father to the present age of son

$$= \frac{42}{14} = \frac{42 \div 14}{14 \div 14} = \frac{3}{1} = 3 : 1$$

[HCF of 42 and 14 = 14]

- (b) When son was 12 years old, i.e., $14 - 12 = 2$ years ago father's age = $42 - 2 = 40$ years.

Ratio of the father's age to the son's age

$$\frac{40}{12} = \frac{40 \div 4}{12 \div 4} = \frac{10}{3} = 10 : 3$$

[HCF of 40 and 12 = 4]

- (c) Ratio of father's age after 10 years, i.e., $42 + 10 = 52$ years

to the age of son after 10 years, i.e., $= 14 + 10 = 24$ years

$$\frac{52}{24} = \frac{52 \div 4}{24 \div 4} = \frac{13}{6} = 13 : 6$$

- (d) Ratio of the son's age to the age of father when he was only 30 years

When father was 30 years, i.e., before $42 - 30 = 12$ years

Age of son was $= 14 - 12 = 2$ years

\therefore Required ratio

$$= \frac{30}{2} = \frac{30 \div 2}{2 \div 2} = \frac{15}{1} = 15 : 1$$

TRY THESE (PAGE 254)

Check whether the given ratios are equal, i.e., they are in proportion.

If yes, then write them in the proper form.

Q1. 1 : 5 and 3 : 15

$$\text{Sol. } 1 : 5 = \frac{1}{5} \text{ and } 3 : 15 = \frac{3}{15} = \frac{3 \div 3}{15 \div 3} = \frac{1}{5}$$

$\therefore 1 : 5$ and $3 : 15$ are equal ratios.

Thus $1 : 5 :: 3 : 15$

Q2. $2 : 9$ and $18 : 81$

$$\text{Sol. } 2 : 9 = \frac{2}{9} \text{ and } \frac{18}{81} = \frac{18 \div 9}{81 \div 9} = \frac{2}{9}$$

$\therefore 2 : 9$ and $18 : 81$ are equal ratios.

Thus $2 : 9 :: 18 : 81$

Q3. $15 : 45$ and $5 : 25$

$$\text{Sol. } 15 : 45 = \frac{15}{45} = \frac{15 \div 15}{45 \div 15} = \frac{1}{3}$$

$$\text{and } 5 : 25 = \frac{5}{25} = \frac{5 \div 5}{25 \div 5} = \frac{1}{5}$$

Since $\frac{1}{3}$ and $\frac{1}{5}$ are not equal.

$\therefore 15 : 45$ and $5 : 25$ are not proportional.

Q4. $4 : 12$ and $9 : 27$

$$\text{Sol. } 4 : 12 = \frac{4}{12} = \frac{4 \div 4}{12 \div 4} = \frac{1}{3}$$

$$\text{and } 9 : 27 = \frac{9}{27} = \frac{9 \div 9}{27 \div 9} = \frac{1}{3}$$

$\therefore 4 : 12$ and $9 : 27$ are equal ratios.

Thus $4 : 12 :: 9 : 27$

Q5. ₹ 10 to ₹ 15 and 4 to 6

$$\text{Sol. } ₹ 10 \text{ to } ₹ 15 = ₹ 10 : ₹ 15 = \frac{10}{15} = \frac{10 \div 5}{15 \div 5} = \frac{2}{3}$$

$$4 \text{ to } 6 = 4 : 6 = \frac{4}{6} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$$

$\therefore ₹ 10$ to ₹ 15 and 4 to 6 are equal ratios.

$\therefore ₹ 10 : ₹ 15 :: 4 : 6$

EXERCISE 12.2

Q1. Determine if the following are in proportion.

(a) 15, 45, 40, 120 (b) 33, 121, 9, 96

(c) 24, 28, 36, 48 (d) 32, 48, 70, 210

(e) 4, 6, 8, 12 (f) 33, 44, 75, 100

$$\text{Sol. (a) } 15 \text{ and } 45 = \frac{15}{45} = \frac{15 \div 15}{45 \div 15} = \frac{1}{3}$$

$$40 \text{ and } 120 = \frac{40}{120} = \frac{40 \div 40}{120 \div 40} = \frac{1}{3}$$

$\therefore 15 : 45 :: 40 : 120$

$\therefore 15, 45, 40$ and 120 are in proportion.

$$(b) 33 \text{ and } 121 = \frac{33}{121} = \frac{33 \div 11}{121 \div 11} = \frac{3}{11}$$

$$9 \text{ and } 96 = \frac{9}{96} = \frac{9 \div 3}{96 \div 3} = \frac{3}{32}$$

$$\text{Since } \frac{3}{11} \neq \frac{3}{32}$$

$\therefore 33, 121, 9$ and 96 are not in proportion.

$$(c) 24 \text{ and } 28 = \frac{24}{28} = \frac{24 \div 4}{28 \div 4} = \frac{6}{7}$$

$$36 \text{ and } 48 = \frac{36}{48} = \frac{36 \div 12}{48 \div 12} = \frac{3}{4}$$

$$\text{Since } \frac{6}{7} \neq \frac{3}{4}$$

$\therefore 24, 28, 36$ and 48 are not in proportion.

$$(d) 32 \text{ and } 48 = \frac{32}{48} = \frac{32 \div 16}{48 \div 16} = \frac{2}{3}$$

$$70 \text{ and } 210 = \frac{70}{210} = \frac{70 \div 70}{210 \div 70} = \frac{1}{3}$$

$$\text{Since } \frac{2}{3} \neq \frac{1}{3}$$

$\therefore 32, 48, 70$ and 210 are not in proportion.

$$(e) 4 \text{ and } 6 = \frac{4}{6} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$$

$$8 \text{ and } 12 = \frac{8}{12} = \frac{8 \div 4}{12 \div 4} = \frac{2}{3}$$

$\therefore 4 : 6 :: 8 : 12$

$\therefore 4, 6, 8$ and 12 are in proportion.

$$(f) 33 \text{ and } 44 = \frac{33}{44} = \frac{33 \div 11}{44 \div 11} = \frac{3}{4}$$

$$75 \text{ and } 100 = \frac{75}{100} = \frac{75 \div 25}{100 \div 25} = \frac{3}{4}$$

$\therefore 33 : 44 :: 75 : 100$

$\therefore 33, 44, 75$ and 100 are in proportion.

Q2. Write True (T) or False (F) against each of the following statements:

(a) $16 : 24 :: 20 : 30$ (b) $21 : 6 :: 35 : 10$

(c) $12 : 18 :: 28 : 12$ (d) $8 : 9 :: 24 : 27$

(e) $5.2 : 3.9 :: 3 : 4$ (f) $0.9 : 0.36 :: 10 : 4$

Sol. (a) $16 : 24 :: 20 : 30$

Product of the extreme terms = $16 \times 30 = 480$

Product of the middle terms = $24 \times 20 = 480$

\therefore The given statement (a) \rightarrow (T)

(b) $21 : 6 :: 35 : 10$

Product of the extreme terms = $21 \times 10 = 210$

Product of the middle terms = $6 \times 35 = 210$

\therefore The given statement (b) \rightarrow (T)

(c) $12 : 18 :: 28 : 12$

Product of the extreme terms = $12 \times 12 = 144$

Product of the middle terms = $18 \times 28 = 504$

Since $144 \neq 504$

 \therefore The given statement (c) \rightarrow (F)

(d) $8 : 9 :: 24 : 27$

Product of the extreme terms = $8 \times 27 = 216$

The product of the middle terms

$= 9 \times 24 = 216$

 \therefore The given statement (d) \rightarrow (T)

(e) $5.2 : 3.9 :: 3 : 4$

Product of the extreme terms

$= 5.2 \times 4 = 20.8$

Product of the middle terms = $3.9 \times 3 = 11.7$

Since $20.8 \neq 11.7$

 \therefore The given statement (e) \rightarrow (F)

(f) $0.9 : 0.36 :: 10 : 4$

Product of the extreme terms = $0.9 \times 4 = 3.6$

Product of the middle terms = $0.36 \times 10 = 3.6$

 \therefore The given statement (f) \rightarrow (T)

Q3. Are the following statements true?

(a) $40 \text{ persons} : 200 \text{ persons} = ₹ 15 : ₹ 75$

(b) $7.5 \text{ litres} : 15 \text{ litres} = 5 \text{ kg} : 10 \text{ kg}$

(c) $99 \text{ kg} : 45 \text{ kg} = ₹ 44 : ₹ 20$

(d) $32 \text{ m} : 64 \text{ m} = 6 \text{ sec} : 12 \text{ sec}$

(e) $45 \text{ km} : 60 \text{ km} = 12 \text{ hours} : 15 \text{ hours}$

Sol. (a) $40 \text{ persons} : 200 \text{ persons}$

$= \frac{40}{200} = \frac{40 \div 40}{200 \div 40} = \frac{1}{5}$

$₹ 15 : ₹ 75 = \frac{15}{75} = \frac{15 \div 15}{75 \div 15} = \frac{1}{5}$

 \therefore Statement (a) is true.

(b) $7.5 \text{ litres} : 15 \text{ litres}$

$= \frac{7.5}{15} = \frac{75}{150} = \frac{75 \div 75}{150 \div 75} = \frac{1}{2}$

$5 \text{ kg} : 10 \text{ kg} = \frac{5}{10} = \frac{5 \div 5}{10 \div 5} = \frac{1}{2}$

 \therefore Statement (b) is true.

(c) $99 \text{ kg} : 45 \text{ kg} = \frac{99}{45} = \frac{99 \div 9}{45 \div 9} = \frac{11}{5}$

$₹ 44 : ₹ 20 = \frac{44}{20} = \frac{44 \div 4}{20 \div 4} = \frac{11}{5}$

 \therefore Statement (c) is true.

(d) $32 \text{ m} : 64 \text{ m} = \frac{32}{64} = \frac{32 \div 32}{64 \div 32} = \frac{1}{2}$

$6 \text{ sec} : 12 \text{ sec} = \frac{6}{12} = \frac{6 \div 6}{12 \div 6} = \frac{1}{2}$

 \therefore Statement (d) is true.

(e) $45 \text{ km} : 60 \text{ km} = \frac{45}{60} = \frac{45 \div 15}{60 \div 15} = \frac{3}{4}$

$12 \text{ hours} : 15 \text{ hours} = \frac{12}{15} = \frac{12 \div 3}{15 \div 3} = \frac{4}{5}$

Since $\frac{3}{4} \neq \frac{4}{5}$

 \therefore Statement (e) is not true.

Q4. Determine if the following ratios form a proportion. Also, write the middle terms and extreme terms where the ratios form a proportion.

(a) $25 \text{ cm} : 1 \text{ m}$ and $₹ 40 : ₹ 160$

(b) $39 \text{ litres} : 65 \text{ litres}$ and $6 \text{ bottles} : 10 \text{ bottles}$

(c) $2 \text{ kg} : 80 \text{ kg}$ and $25 \text{ g} : 625 \text{ g}$

(d) $200 \text{ mL} : 2.5 \text{ litres}$ and $₹ 4 : ₹ 50$

Sol. (a) $25 \text{ cm} : 1 \text{ m} = 25 \text{ cm} : 100 \text{ cm}$ [$\because 1 \text{ m} = 100 \text{ cm}$]

$= \frac{25}{100} = \frac{25 \div 25}{100 \div 25} = \frac{1}{4}$

$₹ 40 : ₹ 160 = \frac{40}{160} = \frac{40 \div 40}{160 \div 40} = \frac{1}{4}$

 \therefore The given ratios are in proportion.Extreme terms are 25 cm and $₹ 160$.Middle terms are 1 m and $₹ 40$.

(b) $39 \text{ litres} : 65 \text{ litres} = \frac{39}{65} = \frac{39 \div 13}{65 \div 13} = \frac{3}{5}$

$6 \text{ bottles} : 10 \text{ bottles}$

$= \frac{6}{10} = \frac{6 \div 2}{10 \div 2} = \frac{3}{5}$

 \therefore The given ratios are in proportion.Extreme terms are 39 litres and 10 bottles .Middle terms are 65 litres and 6 bottles .

(c) $2 \text{ kg} : 80 \text{ kg} = \frac{2}{80} = \frac{2 \div 2}{80 \div 2} = \frac{1}{40}$

$25 \text{ g} : 625 \text{ g} = \frac{25}{625} = \frac{25 \div 25}{625 \div 25} = \frac{1}{25}$

Since $\frac{1}{40} \neq \frac{1}{25}$

 \therefore The given ratios are not in proportion.

(d) $200 \text{ mL} : 2.5 \text{ litres} = 2.5 \text{ litres} = 2.5 \times 1000 \text{ mL}$
 $= 2500 \text{ mL}$

$200 \text{ mL} : 2500 \text{ mL} = \frac{200}{2500} = \frac{200 \div 100}{2500 \div 100} = \frac{2}{25}$

$₹ 4 : ₹ 50 = \frac{4}{50} = \frac{4 \div 2}{50 \div 2} = \frac{2}{25}$

Since $\frac{2}{25} = \frac{2}{25}$

 \therefore The given ratios are in proportion.Extreme terms are 200 mL and $₹ 50$ Middle terms are 2.5 litres and $₹ 4$.

TRY THESE (PAGE 257)

Q1. Prepare five similar problems and ask your friends to solve them.

Sol. It is an activity. Try yourself.

Q2. Read the table and fill in the boxes.

Time	Distance travelled by Karan	Distance travelled by Kriti
2 hours	8 km	6 km
1 hour	4 km	□
4 hours	□	□

Sol. (i) 2 hours : 1 hour = 8 km : 4 km = 6 km : □

So, 2 hours : 1 hour = 6 km : □

Product of extremes = 2 × □

Product of middle terms = 1 × 6

Since time and distance are in proportion.

$$\therefore 2 \times \square = 1 \times 6$$

$$\Rightarrow \square = \frac{1 \times 6}{2} = 3$$

Thus □ = 3

(ii) 1 hour : 4 hours = 4 km : □

Product of extremes = 1 × □

Product of middle terms = 4 × 4

Since time and distance are in proportion.

$$\therefore 1 \times \square = 4 \times 4$$

$$\Rightarrow \square = 16$$

Thus □ = 16

(iii) 2 hours : 4 hours = 6 km : □

Product of extremes = 2 × □

Product of middle terms = 4 × 6

Since time and distance are in proportion.

$$\therefore 2 \times \square = 4 \times 6$$

$$\Rightarrow \square = \frac{4 \times 6}{2} = \frac{24}{2} = 12$$

Thus □ = 12

EXERCISE 12.3

Q1. If the cost of 7 m of cloth is ₹ 294, find the cost of 5 m of cloth.

Sol. Using unitary method, we have cost of 7 m of cloth = ₹ 294

$$\text{Cost of 1 m of cloth} = ₹ \frac{294}{7}$$

$$\begin{aligned} \text{Cost of 5 m of cloth} &= ₹ \left(\frac{294}{7} \times 5 \right) = ₹ (42 \times 5) \\ &= ₹ 210 \end{aligned}$$

Thus, the required cost = ₹ 210

Q2. Ekta earns ₹ 1500 in 10 days. How much she will earn in 30 days?

Sol. In 10 days Ekta earn ₹ 1500

$$\text{In 1 days Ekta will earn } ₹ \frac{1500}{10}$$

$$\text{In 30 days Ekta will earn } ₹ \frac{1500}{10} \times 30 = ₹ 4500$$

Thus the money earned by Ekta in 30 days = ₹ 4500.

Q3. If it has rained 276 mm in the last 3 days, how many centimeters of rain will fall in one full week (7 days)? Assume that the rain continues to fall at the same rate.

Sol. In last 3 days the rain falls = 276 mm

$$\text{In 1 day the rain falls} = \frac{276}{3} \text{ mm.}$$

$$\text{In 7 days the rain will fall} = \frac{276}{3} \times 7 \text{ mm.}$$

$$= 92 \times 7 \text{ mm} = 644 \text{ mm or } 64.4 \text{ cm}$$

$$[\because 1 \text{ cm} = 10 \text{ mm}]$$

Thus, the amount of rain fall in week = 64.4 cm.

Q4. Cost of 5 kg of wheat is ₹ 30.50.

(a) What will be the cost of 8 kg of wheat?

(b) What quantity of wheat can be purchased in ₹ 61?

Sol. (a) Cost of 5 kg of wheat = ₹ 30.50

$$\text{Cost of 1 kg of wheat} = ₹ \frac{30.50}{5}$$

$$\begin{aligned} \text{Cost of 8 kg of wheat} &= ₹ \left(\frac{30.50}{5} \times 8 \right) \\ &= ₹ 48.80 \end{aligned}$$

Thus, the required cost = ₹ 48.80

(b) The quantity of wheat purchased in ₹ 30.50 = 5 kg

$$\begin{aligned} \text{The quantity of wheat purchased in ₹ 1} \\ &= \frac{5}{30.50} \text{ kg} \end{aligned}$$

The quantity of wheat purchased in ₹ 61

$$= \frac{5 \times 61}{30.50} \text{ kg} = 10 \text{ kg}$$

Thus, the required quantity of wheat = 10 kg

Q5. The temperature dropped 15 degree Celsius in the last 30 days. If the rate of temperature drop remains the same, how many degrees will the temperature drop in the next ten days?

Sol. In last 30 days the quantity of drop in temperature = 15 degree Celsius

In last 1 day the quantity of drop in temperature

$$= \frac{15}{30} \text{ degree Celsius}$$

In last 10 days the quantity of drop is temperature

$$= \frac{15}{30} \times 10 \text{ degree Celsius}$$

$$= 5 \text{ degree Celsius}$$

Thus the required drop in temperature in last 10 days = 5 degree Celsius.

Q6. Shaina pays ₹ 7500 as rent for 3 months. How much does she has to pay for a whole year, if the rent per month remains same?

Sol. Amount of rent paid in 3 months = ₹ 7500

$$\text{Amount of rent paid in 1 month} = ₹ \frac{7500}{3}$$

$$\text{Amount of rent paid in 12 months} = ₹ \left(\frac{7500}{3} \times 12 \right) = ₹ 30,000$$

Thus the required amount of rent paid in 1 year = ₹ 30,000.

Q7. Cost of 4 dozen bananas is ₹ 60. How many bananas can be purchased for ₹ 12.50?

Sol. ∵ 1 dozen = 12 units

∴ 4 dozen of bananas

$$= 12 \times 4 = 48 \text{ bananas}$$

₹ 60 is the cost of 4 dozen

$$= 4 \times 12 = 48 \text{ bananas}$$

$$₹ 1 \text{ is the cost of } = \frac{48}{60} \text{ bananas}$$

$$₹ 12.50 \text{ is the cost of } = \frac{600}{60} \text{ bananas}$$

$$= 10 \text{ bananas}$$

Thus the required number of bananas = 10

Q8. The weight of 72 books is 9 kg. What is the weight of 40 such books?

Sol. Weight of 72 books = 9 kg

$$\text{Weight of 1 book} = \frac{9}{72} \text{ kg}$$

$$\text{Weight of 40 books} = \frac{9}{72} \times 40 \text{ kg} = 5 \text{ kg}$$

Hence, the required weight = 5 kg.

Q9. A truck requires 108 litres of diesel for covering a distance of 594 km. How much diesel will be required by the truck to cover a distance of 1650 km?

Sol. To cover 594 km, the amount of diesel required = 108 litres.

To cover 1 km, the amount of diesel will be

$$\text{required} = \frac{108}{594} \text{ litres}$$

To cover 1650 km, the amount of diesel required

$$= \frac{108 \times 1650}{594} \text{ litres} = 300 \text{ litres}$$

Thus, the required amount of diesel = 300 litres.

Q10. Raju purchases 10 pens for ₹ 150 and Manish buys 7 pens for ₹ 84. Can you say who got the pens cheaper?

Sol. For Raju,

$$\text{Cost of 10 pen} = ₹ 150$$

$$\text{Cost of 1 pen} = ₹ \frac{150}{10} = ₹ 15$$

For Manish,

$$\text{Cost of 7 pens} = ₹ 84$$

$$\text{Cost of 1 pen} = ₹ \frac{84}{7} = ₹ 12$$

$$\therefore ₹ 12 < ₹ 15$$

Thus Manish got the pens cheaper than Raju.

Q11. Anish made 42 runs in 6 overs and Anup made 63 runs in 7 overs. Who made more runs per over?

Sol. Number of runs made by Anish in 6 overs = 42

$$\text{Number of runs made by him in 1 over} = \frac{42}{6} = 7 \text{ runs.}$$

Number of runs made by Anup in 7 overs = 63

$$\text{Number of runs made by him in 1 over} = \frac{63}{7} = 9 \text{ runs.}$$

$$\therefore 9 \text{ runs} > 7 \text{ runs.}$$

Thus, Anup has made more runs.

Learning More Q & A

I. VERY SHORT ANSWER (VSA) QUESTIONS

Q1. Find the ratio of 75 cm to 1.5 m.

Sol. The given numbers are not in the same units. So, converting them into same units.

$$1.5 \text{ m} = 1.5 \times 100 \text{ cm} = 150 \text{ cm}$$

$$[\because 1 \text{ m} = 100 \text{ cm}]$$

∴ The required ratio is 75 cm : 150 cm.

$$= \frac{75}{150} = \frac{75+75}{150+75} = \frac{1}{2}$$

∴ Required ratio = 1 : 2

Q2. Give two equivalent ratios of 3 : 5.

Sol. Ratio 3 : 5 = $\frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$

Similarly 3 : 5 = $\frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$

Thus, 9 : 15 and 6 : 10 are the two equivalent ratios of 3 : 5.

Q3. Fill in the blank box.

$$\frac{3}{8} = \frac{\square}{24}$$

Sol. We have $\frac{3}{8} = \frac{\square}{24}$

$$\Rightarrow 8 \times \square = 3 \times 24 \Rightarrow \square = \frac{3 \times 24}{8} = 9$$

Thus $\square = 9$

Q4. Check whether the given ratios are equivalent

or not. $\frac{2}{7}, \frac{6}{21}$

Sol. We have $\frac{2}{7}, \frac{6}{21}$

LCM of 7 and 21 = 21

$$\therefore \frac{2 \times 3}{7 \times 3}, \frac{6 \times 1}{21 \times 1} = \frac{6}{21}, \frac{6}{21}$$

Thus $\frac{6}{21} = \frac{6}{21}$ ∴ They are equivalent ratios.

Q5. Divide 60 in the ratio of 2 : 3.

Sol. Sum = 2 + 3 = 5

$$\therefore \text{First part} = \frac{2}{5} \times 60 = 24$$

$$\text{Second part} = \frac{3}{5} \times 60 = 36$$

Thus, the required two parts = 24 and 36.

Q6. Find the ratio of the following:

(a) 56 to 63 (b) 55 to 120.

Sol. (a) We have 56 to 63 = $\frac{56}{63} = \frac{56 \div 7}{63 \div 7} = \frac{8}{9} = 8 : 9$

[HCF of 56 and 63 = 7]

(b) We have 55 to 120

$$= \frac{55}{120} = \frac{55 \div 5}{120 \div 5} = \frac{11}{24} = 11 : 24$$

[HCF of 55 and 120 = 5]

Q7. Ramesh deposited ₹ 2050 in a bank and in the month of January he withdrew ₹ 410 from his account on the last date of the month. Find the ratio of

(a) Money withdrawn to the total money deposited.

(b) Money withdrawn to the remaining amount in the bank.

Sol. Total money deposited = ₹ 2050

Amount of money withdrawn = ₹ 410

Amount of money left in the bank

$$= ₹ 2050 - ₹ 410 = ₹ 1640$$

(a) Ratio of money withdrawn to the total money deposited

$$= \frac{\text{Amount withdrawn}}{\text{Amount deposited}} = \frac{410}{2050} = \frac{1}{5}$$

∴ Required ratio = 1 : 5

(b) Ratio of money withdrawn to the money left in the bank

$$= \frac{\text{Amount withdrawn}}{\text{Amount left}} = \frac{410}{1640} = \frac{1}{4}$$

∴ Required ratio = 1 : 4

Q8. There are 180 students in a class. Number of girls are 75. Find the ratio of the girls to the number of boys.

Sol. Total number of students = 180

Number of girls = 75

Number of boys = 180 - 75 = 105

∴ Ratio of number of girls to the number of boys

$$= \frac{\text{Number of girls}}{\text{Number of boys}} = \frac{75}{105} = \frac{75 \div 15}{105 \div 15} = \frac{5}{7}$$

∴ Required ratio = 5 : 7

II. SHORT ANSWER (SA) QUESTIONS

Q9. Green paint is made by mixing blue, yellow and white paints in the ratio 2 : 7 : 1. How much blue paint is needed to make 64 litres of green paint?

Sol. Here, sum of ratios = 2 + 7 + 1 = 10

∴ Total quantity of green paint = 64 litres

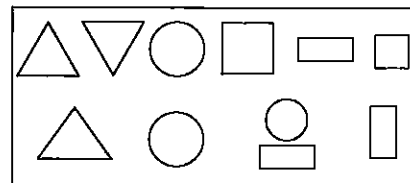
$$\text{Quantity of blue paint} = \frac{2}{10} \times 64 = 12.8 \text{ litres}$$

Therefore, the required blue paint = 12.8 litres.

Q10. From the figure, find the ratio of

(a) The number of squares to the number of triangles.

(b) The number of circles to the number of rectangles.



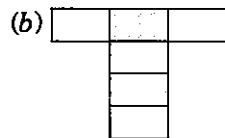
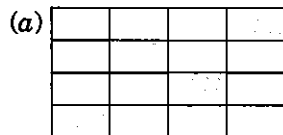
Sol. (a) Number of squares = 2
Number of triangles = 3

$$\therefore \text{Ratio} = \frac{2}{3} \text{ or } 2 : 3$$

(b) Number of circles = 3
Number of rectangles = 3

$$\therefore \text{Ratio} = \frac{3}{3} \text{ or } 1 : 1$$

Q11. In each of the following figures, find the ratio of the shaded region to the unshaded region.



Sol. (a) Number of shaded parts = 4
Number of unshaded parts = 12

$$\therefore \text{Ratio} = 4 : 12 = \frac{4}{12} = \frac{4 \div 4}{12 \div 4} = \frac{1}{3}$$

$$\therefore \text{Required ratio} = 1 : 3$$

(b) Number of shaded parts = 2
Number of unshaded parts = 4

$$\therefore \text{Ratio} = 2 : 4 = \frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}$$

$$\therefore \text{Required ratio} = 1 : 2$$

Q12. Are 20, 25, 12, 15 in proportion?

Sol. We have 20, 25, 12, 15

$$\text{Product of extremes} = 20 \times 15 = 300$$

$$\text{Product of middles} = 25 \times 12 = 300$$

Since both the products are same.

\therefore The four numbers 20, 25, 12, 15 are in proportion.

Q13. The first, second and fourth terms in a proportion are 32, 112, 217 respectively. Find the third term.

Sol. Let the third term be x .

\therefore 32, 112, x and 217 are in proportion.

$$\therefore 32 : 112 :: x : 217$$

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

$$\Rightarrow 112 \times x = 32 \times 217$$

$$\Rightarrow x = \frac{32 \times 217}{112} = 62$$

Thus, the third term = 62.

Q14. Find the value of x , if

(a) 8, x , x , 50 are in proportion.

(b) 36, 90, 90, x are in proportion.

Sol. (a) Since 8, x , x , 50, are in proportion.

$$\therefore x \times x = 8 \times 50$$

$$\Rightarrow x^2 = 400 \therefore x = 20$$

(b) Since 36, 90, 90, x are in proportion.

$$\therefore 36 \times x = 90 \times 90$$

$$\Rightarrow x = \frac{90 \times 90}{36} = 225 \therefore x = 225$$

Q15. The cost of 10 tables is ₹ 7500. Find the number of tables that can be purchased with ₹ 9000.

Sol. Number of tables purchased in ₹ 7500 = 10

$$\text{Number of tables purchased in ₹ 1} = \frac{10}{7500}$$

$$\therefore \text{Number of tables purchased in ₹ 9000}$$

$$= \frac{10 \times 9000}{7500} = 12$$

Q16. 39 packets of 12 pens each costs ₹ 374.40. Find the cost of 52 packets of 10 pens each.

Sol. Number of pens in 1 packet = 12

$$\text{Number of pens in 39 packets} = 12 \times 39 = 468$$

$$\text{Number of pens in 1 packet} = 10$$

$$\text{Number of pens in 52 packets} = 10 \times 52 = 520$$

$$\text{Now cost of 468 pen} = ₹ 374.40$$

$$\text{Cost of 1 pen} = ₹ \frac{374.40}{468}$$

$$\therefore \text{Cost of 520 pens} = ₹ \frac{374.40}{468} \times 520 = ₹ 416.$$

Test Yourself

I. VERY SHORT ANSWER (VSA) QUESTIONS

1. Express the ratio 36 : 200 in the simplest form.

2. If $A : B = 3 : 4$, Find two equivalent ratios.

3. Divide 75 in the ratio 3 : 2.

4. Find the ratio of the following:

(a) 35 cm to 45 cm (b) 75 kg to 135 kg

5. Fill in the blanks. $\frac{12}{15} = \frac{\square}{5} = \frac{8}{\square}$.

6. Ravi earns ₹ 1,50,000 and saves ₹ 90,000. Find the ratio of

(a) Money that Ravi earns to the money he saves.

(b) Money that Ravi spent to the money he saved.

7. There are 24 boys and 20 girls in a class.

(a) What is the ratio of number of girls to the number of boys?

(b) What is the ratio of number of boys to the number of girls?

8. There are 64 teachers and 1600 students in a school.

Find the ratio of the number of teachers to the number of students.

9. Are 30, 40, 45 and 60 in proportions?
 10. If 24, 16, x and 8 are in proportions, find the value of x .
 11. If the cost of 12 pens is ₹ 300. Find the cost of such 15 pens.
 12. A motorcycle covers 240 km in 10 litres of petrol. How much distance it will cover in 24 litres of petrol?

II. SHORT ANSWER (SA) QUESTIONS

13. If cost of a dozen soaps is ₹ 153.60, what will be the cost of 25 such soaps?
 14. Divide ₹ 70,000 in the ratio of 5 : 9.
 15. A car travels 90 km in $2\frac{1}{2}$ hours.

- (a) How much time is required to cover 30 km with the same speed?

- (b) Find the distance covered in 2 hours with the same speed.

16. Fill in the blanks.

- (a) If $2 : 3 :: x : 6$, then $x =$ _____

- (b) Product of _____ = Product of middles.

- (c) The simplest form of $25 : 35 =$ _____.

- (d) In a proportion, the product of first and fourth terms are called _____.

- (e) The lowest form of $65 : 75 =$ _____.

- (f) If $3 : 2$ is equivalent to $x : 4$, then $x =$ _____.

- (g) If $\frac{x}{12} = \frac{25}{60}$, then $x =$ _____.

- (h) If a, b, c and d are in proportions, then $a : b :: c :$ _____.

- (i) 1 km to 900 m in its lowest form is _____.

ANSWERS

1. 9 : 50
 2. 6 : 8 and 9 : 12
 3. 45 and 30
 4. (a) 7 : 9 (b) 5 : 9
 5. 4, 10
 6. (a) 5 : 3 (b) 2 : 3
 7. (a) 5 : 6 (b) 6 : 5
 8. 1 : 25
 9. Yes
 10. 12
 11. ₹ 375
 12. 576 km
 13. ₹ 320
 14. ₹ 25000, ₹ 45000

15. (a) $\frac{5}{6}$ hours

- (b) 72 km

16. (a) 4

- (b) extremes

- (c) 5 : 7

- (d) extreme

- (e) 13 : 15

- (f) 6

- (g) 5

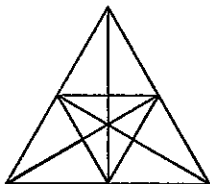
- (h) d

- (i) 10 : 9

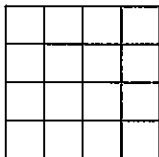
Internal Assessment

1. Find the ratio of the shaded parts to the unshaded parts in the following figures.

(a)

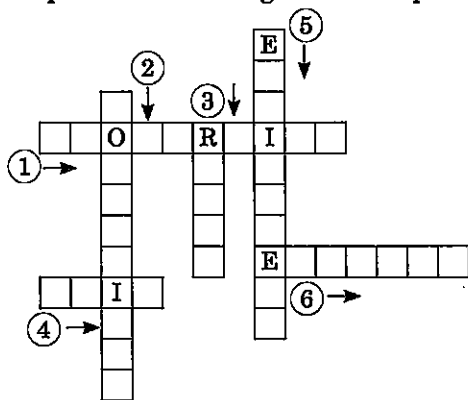


(b)



2. Write True (T) or False (F) against the each statement:
 (a) $\frac{2}{3}$ and $\frac{4}{6}$ are equivalent ratios. _____
- (b) 2 : 3 and 5 : 10 are in proportions _____.
- (c) If $4 : 5 :: 2 : x$, then $x = 5$ _____.
- (d) 2 : 5 and 5 : 2 are same ratios _____.
- (e) $35 : 45$ is equal to $7 : 9$ _____.
3. Fill in the blanks:
 (a) The simplest form of $36 : 63$ is _____.
- (b) The ratio $24 : 36$ in its lower form is _____.
- (c) In $45 : 18 :: 10 : 4$, 18 and 10 are _____ terms.
- (d) $\frac{4}{5}$ can be written as _____.
- (e) The lowest form of $150 : 45$ is _____.
4. A car travels 105 km in $3\frac{1}{2}$ hours. Find the distance covered by the car in 1 hour.
5. Ramesh made 45 runs in 10 overs and Ritik made 63 runs in 7 overs. Who made more runs?

6. Complete the following crossword puzzle.



1. If two ratios are equal, they are said to be in _____.
2. Ratio is the _____ of two quantities.
3. The comparison of two quantities by division is called _____.
4. Two quantities can be compared only if they are in the same _____.
5. $\frac{2}{3}$, $\frac{4}{6}$ and $\frac{12}{18}$ are all _____ ratios.
6. The first and fourth terms are known as _____ terms.

ANSWERS

- | | | | |
|--------------|------------|------------------|---------------|
| 1. (a) 1 : 3 | (b) 5 : 16 | 4. 30 km | 5. Ritik |
| 2. (a) T | (b) F | 6. 1. PROPORTION | 2. COMPARISON |
| (c) F | (d) F | 3. RATIO | 4. UNIT |
| (e) T | | 5. EQUIVALENT | 6. EXTREME |
| 3. (a) 4 : 7 | (b) 2 : 3 | | |
| (c) ratio | (d) 4 : 5 | | |
| (e) 10 : 3 | | | |

◆ Unit Assessment

SET-3

Time: 1 hour

M.M.: 20

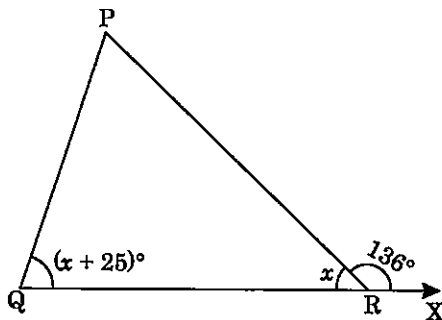
General Instructions: Same as paper-1

SECTION-A

1. If $10 : 16 :: 20 : x$, then find the value of x .
2. Fill in the blanks:
 - (i) 1 millimetre = ... m.
 - (ii) 1 kilometre = ... m.
3. Write the measure of any two reflex angles.
4. The measure of two angles of a triangle are 52° and 68° . Find the measure of third angle.

SECTION-B

5. The four angles of a quadrilateral are in the ratio $3 : 4 : 6 : 7$. Find the angles.
6. Find the number of degrees in
 - (i) $\frac{5}{2}$ right angles
 - (ii) $\frac{4}{5}$ right angles
7. Find the angles of $\triangle PQR$ shown below:



8. Two angles of a triangle are in the ratio $2 : 3$ and third angle is 60° . Find the other two angles of the triangle.
9. The diameter of a circle is 84 cm. Find the circumference of the circle.

OR

The circumference of a circle is 88 cm, find the diameter of the circle.

10. Draw a line segment $AB = 6.5$ cm. Draw the perpendicular bisector of AB .
11. Draw an angle of 70° with protractor. Bisect this angle using compasses and ruler.
12. Using ruler and compasses, construct a square of side 4.5 cm.

◇ Unit Assessment

SET-4

Time: 1 hour

M.M.: 20

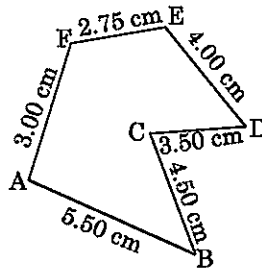
General Instructions: Same as paper-1

SECTION-A

- Find the value of x if 10, 20 and x are in continued proportions.
- Find two numbers whose sum is 100 and whose ratio is 9 : 16.
- If the measure of two right angles are $2x - 24$ and $3x - 16$, find the value of x .
- Three angles of a quadrilateral are 100° , 80° , 110° , find the fourth angle.

SECTION-B

- Using ruler and compasses, construct a rectangle whose adjacent sides are 6.5 cm and 4 cm.
- Find the perimeter of the following figure:

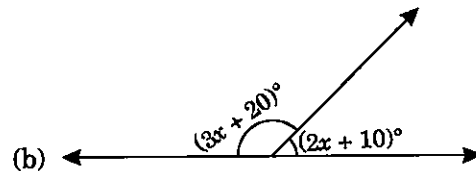
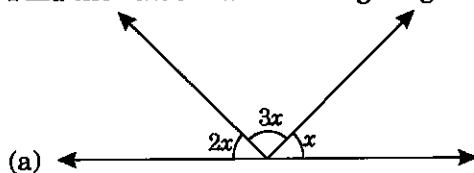


- Two sides of a triangle are 12 cm and 14 cm. The perimeter of the triangle is 36 cm. What is the length of the third side of the triangle?

OR

Ranjana runs around a square park of side 75 m. Anshika runs around a rectangular park of length 60 m and breadth 45 m. Who covers the greater distance?

- The area of a rectangle is 650 sq cm and one of its side is 13 cm. Find the perimeter of the rectangle.
- Draw an angle of 75° with protractor and then bisect it.
- Fill in the blanks:
 - A triangle can have ... right angle.
 - Parallel lines always lie in the ... plane.
 - A triangle has ... altitudes.
 - All the sides of a scalene triangle are of ... length.
- Find the value of x in each figure given below:



- Are the following in proportion?

$$4\frac{3}{4}, 7\frac{1}{3}, 57, 88$$