NCERT QUESTIONS WITH SOLUTIONS

EXERCISE : 12.1

1. There are 20 girls and 15 boys 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 girls to the total number of students in the class?

Sol. (a) The ratio of girls to that of boys

$= \frac{20}{15} = \frac{4}{3} = 4:3$

(b) The ratio of girls to total students

$= \frac{20}{20+15} = \frac{20}{35} = \frac{4}{7} = 4:7$

2. Out of 30 students in a class, 6 like football, 12 like cricket and remaining like tennis.

Find the ratio of

(a) Number of students liking football to number of students liking tennis.

(b) Number of students liking cricket to total number of students.

Sol. Total number of students = 30

Number of students like football = 6

Number of students like cricket = 12

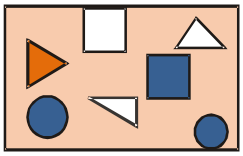
Thus, number of students like tennis

= 30 – 6 – 12 = 12

(a) The ratio of students liking football to that of tennis = $\frac{6}{12} = \frac{1}{2} = 1:2$

(b) The ratio of students liking cricket to that of total students = $\frac{12}{30} = \frac{2}{5} = 2:5$

3. See the figure and find the ratio of



(a) Number of triangles to the number of circles inside the rectangle.

(b) Number of squares to all the figures inside the rectangle.

(c) Number of circles to all the figures inside the rectangle.

Sol. (a) Ratio of number of triangles to that of circles inside the rectangle = $\frac{3}{2}$ = 3 : 2

(b) Ratio of number of squares to all figures inside the rectangle= $\frac{2}{7}$ = 2 : 7

(c) Ratio of number of circles to all figures inside the rectangle = $\frac{2}{7}$ = 2 : 7

4. 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. We know that, Speed = $\frac{\text{Distance}}{\text{Time}}$

Speed of Hamid = $\frac{9\text{km}}{1\text{h}}$ = 9 km/h and

Speed of Akhtar = $\frac{12\text{km}}{1\text{h}}$ = 12 km/h

Ratio of speed of Hamid to that speed of Akhtar = $\frac{9}{12} = \frac{3}{4}$ = 3 : 4

5. Fill in the following blanks :

$\frac{15}{18}=\frac{\square}{6}=\frac{10}{\square}=\frac{\square}{30}$ [Are these equivalent ratios?

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

Yes, these are equivalent ratios.

6. 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

Sol. (a) Ratio of 81 to 108 = $\frac{81}{108}=\frac{3}{4}$ = 3 : 4

(b) Ratio of 98 to 63 = $\frac{98}{63}=\frac{14}{9}$ = 14 : 9

(c) Ratio of 33 km to 121 km = $\frac{33}{121}=\frac{3}{11}$

= 3 : 11

(d)Ratio of 30 minutes to 45 minutes

= $\frac{30}{45}=\frac{2}{3}$ = 2 : 3

7. 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) 30 minutes to 1.5 hours

1.5 hours = 1.5 × 60 = 90 minutes

[∵ 1 hour = 60 minutes]

Now, ratio of 30 minutes to 1.5 hours = 30 minutes : 1.5 hours

⇒ 30 minutes : 90 minutes = $\frac{30}{90}=\frac{1}{3}$ = 1 : 3

(b) 40 cm to 1.5 m

1.5 m = 1.5 × 100 cm = 150 cm

[∵ 1 m = 100]

Now, ratio of 40 cm to 1.5 m

= 40 cm : 1.5 m

⇒ 40 cm : 150 cm = $\frac{40}{150}=\frac{4}{15}$ = 4 : 15

(c) 55 paise to ₹ 1

₹ 1 = 100 paise

Now, ratio of 55 paise to ₹ 1.

= 55 paise : 100 paise

⇒ $\frac{55}{100}=\frac{11}{20}$ = 11 : 20

(d) 500 ml to 2 litres

2 litres = 2 × 1000 ml = 2000 ml

[∵ 1 litre = 1000 ml]

Now, ratio of 500 ml to 2 litres

= 500 ml : 2 litres

⇒ 500 ml : 2000 ml = $\frac{500}{2000}=\frac{1}{4}$ = 1 : 4

8. 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. Total earning = ₹1,50,000 and Saving = ₹ 50,000

∴ Money spent = ₹ 1,50,000 – ₹ 50,000

= ₹ 1,00,000

(a) Ratio of money earned to money saved = $\frac{150000}{50000}=\frac{3}{1}=3:1$

(b) Ratio of money saved to money spent = $\frac{50000}{100000}=\frac{1}{2}=1:2$

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

Sol. Ratio of number of teachers to that of students = $\frac{102}{3300}=\frac{17}{550}$ = 17 : 550

10. 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 in school = 4320

Number of girls = 2300

Therefore, number of boys = 4320 – 2300 = 2020

(a) Ratio of girls to total number of students = $\frac{2300}{4320}=\frac{115}{216}$ = 115 : 216

(b) Ratio of boys to that of girls = $\frac{2020}{2300}=\frac{101}{115}$ = 101 : 115

(c) Ratio of boys to total number of students = $\frac{2020}{4320}=\frac{101}{216}$ = 101 : 216

11. 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 opted basketball = 750

Number of students opted cricket = 800

Therefore, number of students opted table tennis = 1800 – (750 + 800) = 250

(a) Ratio of students who opted basketball to that of opted table tennis = $\frac{750}{250}=\frac{3}{1}$P = 3 : 1

(b) Ratio of students who opted cricket to students opted basketball = $\frac{800}{750}=\frac{16}{15}$

= 16 : 15

(c) Ratio of students who opted basketball to total number of students = $\frac{750}{1800}=\frac{5}{12}$

= 5 : 12

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

Sol. Cost of a dozen pens (12 pens) = ₹ 180

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

Cost of 8 ball pens = ₹ 56

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

Ratio of cost of one pen to that of one ball pen = $\frac{15}{7}$ = 15 : 7

13. 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 metre)	10	□	40
Length of the hall (in metres)	25	50	□

Sol. Ratio of breadth and length = 2 : 5 = $\frac{2}{5}$

$\therefore$ Other equivalent ratios are

$= \frac{2}{5}\times\frac{10}{10}=\frac{20}{50}, \frac{2}{5}\times\frac{20}{20}=\frac{40}{100}$

Thus,

Breadth of the hall (in metre)	10	20	40
Length of the hall (in metres)	25	50	100

14. Divide 20 pens between Sheela and Sangeeta in the ratio of 3 : 2.

Sol. Ratio between Sheela and Sangeeta = 3 : 2

Total these terms = 3 + 2 = 5

Therefore, part of Sheela = $\frac{3}{5}$ of the total pens

$=\frac{3}{5}\times 20 = 12$ pens

And part of Sangeeta = $\frac{2}{5}$ of total pens

$= \frac{2}{5}\times 20 = 8$ pens

Thus, Sheela gets = 12 pens

and Sangeeta gets = 8 pens

15. 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. Ratio of the age of Shreya to that Bhoomika = $\frac{15}{12}=\frac{5}{4}$ = 5 : 4

Thus, ₹ 36 divide between Shreya to that Bhoomika in the ratio of 5 : 4

Shreya gets = $\frac{5}{9}$ of 36 = $\frac{5}{9}\times 36$ = ₹ 20

Bhoomika gets = $\frac{4}{9}$ of 36 = $\frac{4}{9}\times 36$ = ₹ 16

Hence, Shreya and Bhoomika will get ₹ 20 and ₹ 16 respectively.

16. Present age of father is 42 years, and his son is 14 years. Find the ratio of

(a) Present age of father to the present age of son.

(b) Age of the father to the age of son when son was 12 years old.

(c) Age of the father after 10 years to the age of son after 10 years.

(d) Age of father to the age of son when father was 30 years old.

Sol. (a) Ratio of father's present age to that of son = $\frac{42}{14}=\frac{3}{1}$ = 3 : 1

(b) When son was 12 years, i.e., 2 years ago, then father was (42 – 2) = 40 years

Therefore, the ratio of their ages

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

(c) Age of father after 10 years = 42 + 10 = 52 years
Age of son after 10 years = 14 + 10 = 24 years
Therefore, the ratio of their ages
$= \frac{52}{24} = \frac{13}{6} = 13 : 6$

(d) When father was 30 years old, i.e., 12 years ago, then son was (14 – 12) = 2 years old.
Therefore, the ratio of their ages
$= \frac{30}{2} = \frac{15}{1} = 15 : 1$

EXERCISE : 12.2

1. 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

Sol. (a) $15 : 45 = \frac{15}{45} = \frac{1}{3} = 1 : 3$

$40 : 120 = \frac{40}{120} = \frac{1}{3} = 1 : 3$

Since 15 : 45 = 40 : 120
Therefore, 15, 45, 40, 120 are in proportion.

(b) $33 : 121 = \frac{33}{121} = \frac{3}{11} = 3 : 11$

$9 : 96 = \frac{9}{96} = 3 : 32$

Since $33 : 121 \neq 9 : 96$
Therefore, 33, 121, 9, 96 are not in proportion.

(c) $24 : 28 = \frac{24}{28} = \frac{6}{7} = 6 : 7$

$36 : 48 = \frac{36}{48} = \frac{6}{8} = 6 : 8$

Since $24 : 28 \neq 36 : 48$
Therefore, 24, 28, 36, 48 are not in proportion.

(d) $32 : 48 = \frac{32}{48} = \frac{2}{3} = 2 : 3$

$70 : 210 = \frac{70}{210} = \frac{1}{3} = 1 : 3$

Since $32 : 48 \neq 70 : 210$
Therefore, 32, 48, 70, 210 are not in proportion.

(e) $4 : 6 = \frac{4}{6} = \frac{2}{3} = 2 : 3$

$8 : 12 = \frac{8}{12} = \frac{2}{3} = 2 : 3$

Therefore, 4, 6, 8, 12 are in proportion.

(f) $33 : 44 = \frac{33}{44} = \frac{3}{4} = 3 : 4$

$75 : 100 = \frac{75}{100} = \frac{3}{4} = 3 : 4$

Since 33 : 44 = 75 : 100
Therefore, 33, 44, 75, 100 are in proportion.

2. 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) $16 : 24 :: 20 : 30 \Rightarrow \frac{16}{24} = \frac{20}{30} \Rightarrow \frac{2}{3} = \frac{2}{3}$

Hence, it is True.

(b) $21 : 6 :: 35 : 10 \Rightarrow \frac{21}{6} = \frac{35}{10} \Rightarrow \frac{7}{2} = \frac{7}{2}$

Hence, it is True.

(c) $12 : 18 :: 28 : 12 \Rightarrow \frac{12}{18} = \frac{28}{12} \Rightarrow \frac{2}{3} \neq \frac{7}{3}$

Hence, it is False.

(d) $8 : 9 :: 24 : 27 \Rightarrow \frac{8}{9} = \frac{24}{27} \Rightarrow \frac{8}{9} = \frac{8}{9}$

Hence, it is True.

(e) $5.2 : 3.9 :: 3 : 4 \Rightarrow \frac{5.2}{3.9} = \frac{3}{4} \Rightarrow \frac{4}{3} \neq \frac{3}{4}$

Hence, it is False.

(f) $0.9 : 0.36 :: 10 : 4 \Rightarrow \frac{0.9}{0.36} = \frac{10}{4} \Rightarrow \frac{5}{2} = \frac{5}{2}$

Hence, it is True.

3. Are the following statements true :

(a) 40 persons : 200 persons = ₹ 15 : ₹ 75

(b) 7.5 litres : 15 litres = 5 kg = 10 kg

(c) 99 kg : 45 kg = ₹ 44 : ₹ 20

(d) 32 m : 64 m = 6 sec : 12 sec

(e) 45 km : 60 km = 12 hours : 15 hours

Sol. (a) 40 persons : 200 persons = $\frac{40}{200}=\frac{1}{5}$

$= 1 : 5$

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

Since, 40 persons : 200 persons = ₹ 15 : ₹ 75

Hence, the statement is true.

(b) 7.5 litres : 15 litres = $\frac{7.5}{15}=\frac{75}{150}=\frac{1}{2}$

$= 1 : 2$

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

Since, 7.5 litres : 15 litres = 5 kg : 10 kg

Hence, the statement is true.

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

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

Since, 99 kg : 45 kg = ₹ 44 : ₹ 20

Hence, the statement is true.

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

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

Since, 32 m : 64 m = 6 sec : 12 sec

Hence, the statement is true.

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

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

Since,

45 km : 60 km ≠ 12 hours : 15 hours

Hence, the statement is false.

4. Determine if the following ratios form a porportion. Also write the middle terms and extreme terms where the ratios form a proportion :

(a) 25 cm : 1 m and ₹ 40 : ₹ 160

(b) 39 litres : 65 litres and 6 bottles : 10 bottles

(c) 2 kg : 80 kg and 25 g : 625 g

(d) 200 ml : 2.5 l and ₹ 4 : ₹ 50

Sol. (a) 25 cm : 1 m = 25 cm : (1 × 100) cm

= 25 cm : 100 cm = $\frac{25}{100}=\frac{1}{4}$ = 1 : 4

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

Since, the ratios are equal, therefore these are in proportion.

Middle terms = 1 m, ₹ 40 and Extreme terms

= 25 cm, ₹160

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

6 bottles : 10 bottles = $\frac{6}{10}=\frac{3}{5}$ = 3 : 5

Since, the ratios are equal, therefore these are in proportion.

Middle terms = 65 litres, 6 bottles and Extreme terms = 39 litres, 10 bottles.

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

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

Since the ratios are not equal, therefore these are not in proportion.

(d) 200 ml : 2.5 litres = 200 ml : (2.5 × 1000) ml

= 200 ml : 2500 ml = $\frac{200}{2500}=\frac{2}{25}$ = 2 : 25

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

Since, the ratios are equal, therefore these are in proportion.

Middle terms = 2.5 litres, ₹ 4 and Extreme terms = 200 ml, ₹ 50

EXERCISE : 12.3

1. If the cost of 7 m of cloth is ₹ 1470, find the cost of 5 m of cloth.

Sol. Cost of 7 m of cloth = ₹ 1470

$\therefore$ Cost of 1 m of cloth = ₹ $\frac{1470}{7}$ = ₹ 210

$\therefore$ Cost of 5 m of cloth = ₹ 210 × 5 = ₹ 1050

Hence, the cost of 5 m of cloth is ₹ 1050

2. Ekta earns ₹ 3000 in 10 days. How much will she earn in 30 days?

Sol. $\because$ Earning in 10 days = ₹ 3000

$\therefore$ Earning in 1 day = ₹ $\frac{3000}{10}$ = ₹ 300

$\therefore$ Earning in 30 days = ₹ 300 × 30

= ₹ 9000

Hence, Ekta will earn ₹ 9000 in 30 days.

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

Sol. $\because$ Rainfall in 3 days = 276 mm

$\therefore$ Rainfall in 1 day = $\frac{276}{3}$ mm = 92 mm

$\therefore$ Rainfall in 7 days = 92 × 7 mm

= 644 mm

Hence, 644 mm = $\frac{644}{10}$ cm = 64.4 cm of rain will fall in one full week (7 days)

4. Cost of 5 kg of wheat is ₹ 91.50

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

(b) What quantity of wheat can be purchased in ₹ 183?

Sol. (a) $\because$ Cost of 5 kg of wheat = ₹ 91.50

$\therefore$ Cost of 1 kg of wheat = ₹ $\frac{91.50}{5}$

= ₹ 18.3

$\therefore$ Cost of 8 kg of wheat will be 18.3 × 8

= ₹ 146.4.

Hence, the cost of 8 kg of wheat will be ₹ 146.4.

(b) $\because$ In ₹ 91.5, the quantity of wheat that can be puchased = 5 kg.

$\therefore$ In ₹ 183, the quantity of wheat can be purchased = $\frac{5}{91.5}$ × 183 kg = 10 kg.

Hence, 10 kg of wheat can be purchased in ₹ 183.

5. The temperature dropped 15 degree 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. $\because$ Drop in temperature in 30 days

= 15 degrees

$\therefore$ Drop in temperature in 1 day

= $\frac{15}{30}$ degrees

$\therefore$ Drop in temperature in 10 days

= $\frac{15}{30}$ × 10 = 5 degrees.

Hence, the temperature will drop 5 degrees in the next ten days.

6. Shaina pays ₹ 15000 as rent for 3 months. How much does she has to pay for a whole year, if the rent per month remains same?

Sol. $\because$ 1 Year = 12 months

$\because$ Rent paid by Shaina for 3 months = ₹ 15,000

$\therefore$ Rent paid by Shaina for 1 month

= ₹ $\frac{15,000}{3}$ = ₹ 5000

$\therefore$ Rent paid by Shaina for 12 months

= ₹ (5000 × 12) = ₹ 60,000

Hence, Shaina will have to pay ₹ 60,000 for a whole year.

7. Cost of 4 dozens bananas is ₹ 180. How many bananas can be purchased for ₹ 90?

Sol. ∵ 1 dozen = 12 items

∴ 4 dozens = 12 × 4 items = 48 items

∴ Number of bananas that can be purchased for ₹ 180 = 48

∴ Number of bananas that can be purchased for ₹ 90 = $\frac{48}{180} \times 90 = 24$

Hence, 24 bananas can be purchased for ₹ 90.

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

Sol. ∵ Weight of 72 books = 9 kg

∴ Weight of 1 book = $\frac{9}{72}$ kg = $\frac{1}{8}$ kg

∴ Weight of 40 books = $\frac{1}{8} \times 40$ kg = 5 kg

Hence, the weight of 40 such books is 5 kg.

9. 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. Diesel required for covering a distance of 594 km = 108 litres

∴ Diesel required for covering a distance of 1 km = $\frac{108}{594}$ litres

∴ Diesel required for covering a distance of 1650 km = $\frac{108}{594} \times 1650$ litres

= 300 litres

Hence, 300 litres of diesel will be required by the truck to cover a distance of 1650 km.

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

Sol. For Raju

∵ Cost of 10 pens = ₹ 150

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

For Manish

∵ Cost of 7 pens = ₹ 84

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

So, Manish got the pens cheaper.

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

Sol. **For Anish**

∵ Runs made in 6 overs = 42

∴ Runs made per over = $\frac{42}{6}$ =7

For Anup

∵ Runs made in 7 overs = 63

∴ Runs made per over = $\frac{63}{7}$ = 9

So, Anup made more runs per over.