CLAS – 6 **CHAP– 12** **SUB: MATHS**

Ratio And Proportion

Ex. 12.1

Question 1. 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 girls to the total number of students in the class?

Answer: (a) The ratio of girls to that of boys = $\frac{20}{15} = 4:3$

(b) The ratio of girls to total students = $\frac{20}{20+15} = \frac{20}{35} = 4:7$

Question 2. Out of 30 students in a class, 6 like football, 12 like cricket and remaining like tennis. Find the ratio of:

(a) The number of students liking football to the number of students liking tennis. (b) The number of students liking cricket to the total number of students.

Answer: Total number of students = 30

Number of students like football = 6

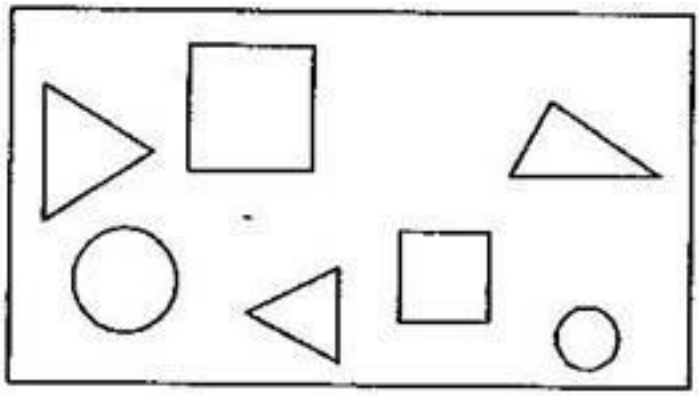
Number of students like cricket = 12

Thus number of students like tennis = 30 – 6 – 12 = 12

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

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

Question 3. See the figure and find the ratio of



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

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

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

Answer: (a) Ratio of number of triangle to that of circles = $\frac{3}{2}$ = 3 : 2

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

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

Question 4. Distances travelled by Hamid and Akhtar in an hour are 9 km and 12 km. Find the ratio of the speed of Hamid to the speed of Akhtar.

Answer: We know that, Speed = $\frac{\text{Distance}}{\text{Time}}$

Speed of Hamid = $\frac{9\text{ m}}{1\text{ h}}$ = 9 km/h and Speed of Akhtar = $\frac{12\text{ m}}{1\text{ h}}$ = 12 km/h Ratio of speed of Hamid to that of speed of Akhtar $\frac{9}{12} = \frac{3}{4}$ = 3 : 4

Question 5. Fill in the following blanks:

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

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

Yes, these are equivalent ratios.

Question 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

Answer: (a) Ratio of 81 to 108 = 27 x 3/27 x 4 = 3 : 4

(b) Ratio of 98 to 63 = $\frac{14 \times 7}{7 \times 9}$ = 14 : 9

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

(d) Ratio of 30 minutes to 45 minutes = $\frac{15 \times 2}{15 \times 3}$ = 2 : 3

Question 7. Find the ratio of the following:

(a) 30 minutes to 1 hour

(b) 40 cm to 1.5 m

(c) 55 paise to Re. 1

(d) 500 ml to 2 liters

Answer: (a) 30 minutes to 1 hour

1 hour = 1 x 60 = 60 minutes [∵ 1 hour = 60 minutes]

Now, ratio of 30 minutes to 1hour = 30 minutes: 60 minutes

$\Rightarrow$ 30 minutes: 60 minutes = $\frac{30 \times 1}{30 \times 2}$ = 1 : 2

(b) 40 cm to 1.5 m

1.5 m = 1.5 x 100 cm = 150 cm [∵ 1 m = 100 cm]

Now, ratio of 40 cm to 1.5 m = 40 cm: 1.5 m

$\Rightarrow$ 40 cm: 150 cm = $\frac{4 \times 10}{10 \times 15}$ = 4: 15

(c) 55 paise to Re. 1

Re. 1 = 100 paise

Now, ratio of 55 paisa to Re. 1 = 55 paisa : 100 paisa

$\Rightarrow \frac{5 \, X \, 11}{5 \, X \, 20}$ = 11 : 20

(d) 500 ml to 2 liters

2 liters = 2 x 1000 ml = 2000 ml [$\because$ 1 litre = 1000 ml]

Now, ratio of 500 ml to 2 liters = 500 ml : 2 liters

$\Rightarrow$ 500 ml: 2000 ml = $\frac{500 \, X \, 1}{500 \, X \, 4}$ = 1 : 4

Question 8. In a year, Seema earns Rs. 1,50,000 and saves Rs. 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.

Answer: Total earning = Rs. 1, 50,000 and Saving = Rs. 50,000

$\therefore$ Money spent = Rs. 1, 50,000 - Rs. 50,000 = Rs. 1, 00,000

(a) Ratio of money earned to money saved = $\frac{1,50,000}{50,000} = \frac{50,000 \, X3}{1 \, X \, 50,000}$ = 3 : 1

(b) Ratio of money saved to money spend = $\frac{50,000}{1,00,000} = \frac{50,000 \, X1}{50,000 \, X2}$ = 1 : 2

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

Answer: Ratio of number of teachers to that of students = $\frac{102}{3300} = \frac{17 \, X \, 6}{550 \, X6}$ = 17: 550

Question 10. In a college out of 4320 students, 2300 are girls. Find the ratio of:

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

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

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

Answer:

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

(b) Ratio of boys to that of girls = $\frac{2020}{2300} = \frac{101 \, x \, 20}{115 \, x \, 20}$ = 101 : 115

(c) Ratio of boys to total number of students = $\frac{2020}{4320} = \frac{101 \, x 20}{216 \, x 20}$ = 101 : 216

Question 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) The number of students who opted basketball to the number of students who opted table tennis.

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

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

Answer: Total number of students = 1800

Number of students opted basketball = 750

Number of students opted cricket = 800

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

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

(b) Ratio of students opted cricket to students opted basketball = $\frac{800}{750} = \frac{50 \, x \, 16}{50 \, x 15}$ = 16 : 15

(c) Ratio of students opted basketball to total no. of students = $\frac{750}{1800} = \frac{5 \, x \, 150}{150 \, x 12}$ = 5 : 12

Question 12. The cost of a dozen pens is Rs. 180 and

cost of 8 ball pens is Rs. 56. Find the ratio of the cost of a pen to the cost of a ball pen.

Answer: Cost of a dozen pens (12 pens) = Rs. 180

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

Cost of 8 ball pens = Rs. 56

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

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

Question 13. Consider the statement: Ratio of breadth and length of a ball is 2:5. Complete the following table that shows some possible breadths and lengths of the hall.

Breadth of the hall (in meters)	10	□	40
Length of the hall (in meters)	25	50	□

Answer: Ratio of breadth to length = 2: 5 = $\frac{2}{5}$

∴ 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 meters)	10	20	40
Length of the hall (in meters)	25	50	100

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

Answer: Ratio between Sheela and Sangeeta = 3 : 2

Total these terms = 3 + 2 = 5

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

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

Thus, Sheela gets = = 12 pens

And Sangeeta gets = = 8 pens

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

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

Thus, Rs. 36 divide between Shreya and Bhoomika in the ratio of 5 : 4.

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

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

Question 16. The present age of the father is 42 years and that of his son is 14 years. Find the ratio of:

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

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

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

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

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

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

Therefore, the ratio of their ages = $\frac{40}{12}$ = 10 : 3

(c) Age of the father after 10 years = 42 + 10 = 52 years

Age of the son after 10 years = 14 + 10 = 24 years

Therefore, ratio of their ages = $\frac{52}{24}$ = $\frac{4 \times 13}{6 \times 4}$ = 13 : 6

(d) When the father was 30 years old, i.e., 12 years ago, then the son was (14 – 12) = 2 years old

Therefore, the ratio of their ages = $\frac{30}{2}$ = $\frac{15 \times 2}{2 \times 1}$ = 15: 1

Ex. 12.2

Question 1. Determine 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

Answer: (a) 15: 45 = 1: 3

and 40 : 120 = 1 : 3

Since 15 : 45 = 40 : 120

Therefore 15, 45, 40, 120 are in proportion.

(b) 33 : 121 = 3 : 11 and 9 : 96 = 3 : 32

Since $33 : 121 \neq 9 : 96$

Therefore, 33, 121, 9, 96 are not in proportion.

(c) 24 : 28 = 6 : 7 and 36 : 48 = 3 : 4

Since $24 : 28 \neq 36 : 48$

Therefore 24, 28, 36, 48 are not in proportion.

(d) 32 : 48 = 2 : 3 and 70 : 210 = 1 : 3

Since $32 : 48 \neq 70 : 210$

Therefore 32, 48, 70, 210 are not in proportion.

(e) 4 : 6 = 2 : 3 and 8 : 12 = 2 : 3

Since 4 : 6 = 8 : 12

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

(f) 33 : 44 = 3 : 4 and 75 : 100 = 3 : 4

Since 33 : 44 = 75 : 100

Therefore 33, 44, 75, 100 are in ratio.

Question 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

Answer: (a) 16 : 25 : : 20 : 30 $\Rightarrow \frac{2}{3} = \frac{2}{3}$

Hence, it is True.

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

Hence, it is True.

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

Hence, it is False.

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

Hence, it is True.

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

Hence, it is False.

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

Hence, it is True.

Question 3. Are the following statements true:

(a) 40 persons : 200 persons = Rs. 15 : Rs. 75

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

(c) 99 kg : 45 kg = Rs. 44 : Rs. 20

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

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

Answer: (a) 40 persons: 200 persons = 1: 5

Rs. 15: Rs. 75 = 1: 5

Since, 40 persons: 200 persons = Rs. 15: Rs. 75

Hence, the statement is true.

(b) 7.5 liters : 15 liters = 1 :2

5 kg : 10 kg = 1 : 2

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

Hence, the statement is true.

(c) 99 kg: 45 kg = = 11: 5

Rs. 44: Rs. 20 = = 11: 5

Since, 99 kg : 45 kg = Rs. 44 : Rs. 20

Hence, the statement is true.

(d) 32 m : 64 m = 1 : 2

6 sec : 12 sec = 1 : 2

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

Hence, the statement is true.

(e) 45 km : 60 km = 3 : 4

12 hours : 15 hours = 4 : 5

Since, 45 km : 60 km $\neq$ 12 hours : 15 hours Hence,

the statement is false.

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

(a) 25 cm : 1 m and Rs. 40 : Rs. 160

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

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

200 ml: 2.5 ml and Rs. 4 : Rs. 50

Answer: (a) 25 cm: 1 m = 25 cm : (1 x 100) cm = 25 cm : 100 cm = = 1 : 4

Rs. 40: Rs. 160 = = 1 : 4

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

Middle terms = 1 m, Rs. 40 and Extreme terms = 25 cm, Rs. 160

(b) 39 liters: 65 liters = 3 :5 6

bottles : 10 bottles = = 3 : 5

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

Middle terms = 65 liters, 6 bottles and Extreme terms = 39 liters, 10 bottles

(c) 2 kg : 80 kg = = 1 : 40

25 g : 625 g = = 1 : 25

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

(d) 200 ml : 2.5 liters = 200 ml : (25 x 1000) liters = 200 ml : 2500 ml = = 2 : 25

Rs. 4 : Rs. 50 = = 2 : 25

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

Middle terms = 2.5 liters, Rs. 4 and Extreme terms = 200 ml, Rs. 50

Ex. 12.3

Question 1. If the cost of 7 m of cloth is Rs. 294, find the cost of 5 m of cloth. **Answer:**

The cost of 7 m of cloth = Rs. 294

∴ The cost of 1 m of cloth = Rs. 42

∴ Cost of 5 m of cloth = 42 x 5 = Rs. 210

Thus, the cost of 5 m of cloth is Rs. 210.

Question 2. Ekta earns Rs. 1500 in 10 days. How much will she earn in 30 days?

Answer: Earning of 10 days = Rs. 1500

∴ Earning of 1 day = = Rs. 150

∴ Earning of 30 days = 150 x 30 = Rs. 4500 Thus,

the earning of 30 days is Rs. 4,500.

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

Answer: Rain in 3 days = 276 mm

∴ Rain in 1 day = = 92 mm

∴ Rain in 7 days = 92 x 7 = 644 mm

Thus, the rain in 7 days is 644 mm.

Question 4. Cost of 5 kg of wheat is Rs. 30.50. What will be the cost of 8 kg of wheat? What quantity of wheat can be purchased in Rs. 61?

Answer: (a) Cost of 5 kg of wheat = Rs. 30.50

∴ Cost of 1 kg of wheat = = Rs. 6.10

∴ Cost of 8 kg of wheat = 6.10 x 8 = Rs. 48.80

(b) From Rs. 30.50, quantity of wheat can be purchased = 5 kg

∴ From Rs. 1, quantity of wheat can be purchased = $\frac{5}{30.50}$

∴ From Rs. 61, quantity of wheat can be purchased = 61 X $\frac{5}{30.50}$ = 10 kg

Question 5. 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?

Answer; ∴ Degree of temperature dropped in last 30 days = 15 degrees

∴ Degree of temperature dropped in last 10 days = $\frac{15X10}{30}$ =5 degrees

Thus, 5 degree Celsius temperature dropped in 10 days.

Question 6. Shains pays Rs. 7500 as rent for 3 months. How much does she has to pay for a whole year, if the rent per month remains same?

Answer: Rent paid for 3 months = Rs. 7500

∴

Rent paid for 1 month = Rs. 2500

∴ Rent paid for 12 months = 2500 x 12 = Rs. 30,000

Thus, the total rent for one year is Rs. 30,000.

Question 7. The cost of 4 dozens bananas is Rs. 60. How many bananas can be purchased for Rs. 12.50?

Answer: The cost of 4 dozen bananas = Rs. 60

The cost of 48 bananas = Rs. 60 [4 dozen = 4 x 12 = 48]

∵ From Rs. 60, number of bananas can be purchased = 48

∴ From Rs. 12.50. number of bananas can be purchased = $\frac{48X12.5}{60}$

= 10 bananas

Thus, 10 bananas can be purchased for Rs. 12.50.

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

Answer: The weight of 72 books = 9 kg

∴ The weight of 1 book = $\frac{1}{8}$

∴ The weight of 40 books = 40 x 1/8 = 5 kg

Thus, the weight of 40 books is 5 kg.

Question 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?

Answer: The quantity of diesel required by the truck to cover a distance of 594 km = 108 litres

∴ The quantity of diesel required by the truck to cover a distance of 1 km = 108 /594 = 2/11 litres

∴ The quantity of diesel required by the truck to cover a distance of 1650 km = 1650 X 2/11 litres = 300 litres

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

Question 10. Raju purchases 10 pens for Rs. 150 and Manish buy 7 pens for Rs. 84. Can you say who got the pen cheaper?

Answer: Raju purchase 10 pens for = Rs. 150

$\therefore$ Raju purchases 1 pen for = = Rs. 15

Manish purchases 7 pens for = Rs. 84

$\therefore$ Manish purchases 1 pen for = = Rs. 12

$\therefore$ Thus, Manish got the pens cheaper.

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

Answer: Anish made in 6 overs = 42 runs

$\therefore$ Anish made in 1 overs = $\frac{42}{7}$ = 7 runs

Anup made in 7 overs = 63 runs

$\therefore$ Anup made in 1 overs = $\frac{63}{7}$ = 9 runs

Thus, Anup made more runs per over.