CHAPTER 10

RATIO AND PROPORTION

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 the number of girls to the total number of students in the class?

Solutions:

Given

Number of girls = 20 girls

Number of boys = 15 boys

Total number of students = 20 + 15

= 35

(a) Ratio of the number of girls to the number of boys = 20 / 15 = 4 / 3

(b) Ratio of the number of girls to the total number of students = 20 / 35 = 4 / 7

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

Solutions:

Given

Number of students who like football = 6

Number of students who like cricket = 12

Number of students who like tennis = 30 – 6 – 12

= 12

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

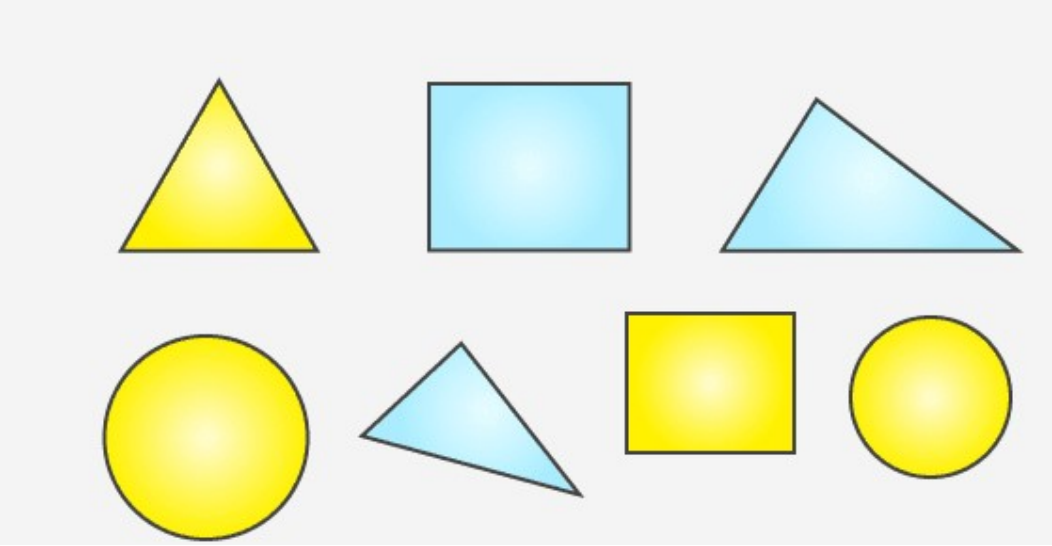
= 6 / 12 = 1 / 2

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

= 12 / 30

= 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.

Solutions:

Given in the figure

Number of triangles = 3

Number of circles = 2

Number of squares = 2

Total number of figures = 7

(a) Ratio of the number of triangles to the number of circles inside the rectangle

= 3 / 2

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

= 2 / 7

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

= 2 / 7

4. The distance travelled by Hamid and Akhtar in an hour is 9 km and 12 km, respectively. Find the ratio of the speed of Hamid to the speed of Akhtar.

Solutions:

We know that the speed of a certain object is the distance travelled by that object in an hour

Distance travelled by Hamid in one hour = 9 km

Distance travelled by Akhtar in one hour = 12 km

Speed of Hamid = 9 km/hr

Speed of Akhtar = 12 km/hr

The ratio of the speed of Hamid to the speed of Akhtar = 9 / 12 = 3 / 4

5. Fill in the blanks:

15 / 18 = ☐ / 6 = 10 / ☐ = ☐ / 30 [Are these equivalent ratios?]

Solutions:

15 / 18 = (5 × 3) / (6 × 3)

= 5 / 6

5 / 6 = (5 × 2) / (6 × 2)

= 10 / 12

5 / 6 = (5 × 5) / (6 × 5)

= 25 / 30

Hence, 5, 12 and 25 are the numbers which come in the blanks, respectively.

Yes, all 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

Solutions:

(a) 81 / 108 = (3 × 3 × 3 × 3) / (2 × 2 × 3 × 3 × 3)

= 3 / 4

(b) 98 / 63 = (14 × 7) / (9 × 7)

= 14 / 9

(c) 33 / 121 = (3 × 11) / (11 × 11)

= 3 / 11

(d) 30 / 45 = (2 × 3 × 5) / (3 × 3 × 5)

= 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

Solutions:

(a) 30 minutes to 1.5 hours

30 min = 30 / 60

= 0.5 hours

Required ratio = (0.5 × 1) / (0.5 × 3)

= 1 / 3

(b) 40 cm to 1.5 m

1.5 m = 150 cm

Required ratio = 40 / 150

= 4 / 15

(c) 55 paise to ₹ 1

₹ 1 = 100 paise

Required ratio = 55 / 100 = (11 × 5) / (20 × 5)

= 11 / 20

(d) 500 ml to 2 litres

1 litre = 1000 ml

2 litre = 2000 ml

Required ratio = 500 / 2000 = 5 / 20 = 5 / (5 × 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.

Solutions:

Money earned by Seema = ₹ 150000

Money saved by her = ₹ 50000

Money spent by her = ₹ 150000 – ₹ 50000 = ₹ 100000

(a) Ratio of money earned to money saved = 150000 / 50000 = 15 / 5

= 3 / 1

(b) Ratio of money saved to money spent = 50000 / 100000 = 5 / 10

= 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.

Solutions:

Given

Number of teachers in the school = 102

Number of students in the school = 3300

The ratio of the number of teachers to the number of students = 102 / 3300

= (2 × 3 × 17) / (2 × 3 × 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.

Solutions:

Given

Total number of students = 4320

Number of girls = 2300

Number of boys = 4320 – 2300

= 2020

(a) Ratio of the number of girls to the total number of students = 2300 / 4320

= (2 × 2 × 5 × 115) / (2 × 2 × 5 × 216)

= 115 / 216

(b) Ratio of the number of boys to the number of girls = 2020 / 2300

= (2 × 2 × 5 × 101) / (2 × 2 × 5 × 115)

= 101 / 115

(c) Ratio of the number of boys to the total number of students = 2020 / 4320

= (2 × 2 × 5 × 101) / (2 × 2 × 5 × 216)

= 101 / 216

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

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

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

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

Solutions:

Given,

Number of students in the school = 1800

The number of students who opted for basketball = 750

The number of students who opted for cricket = 800

The number of students who opted for table tennis = 1800 – (750 + 800) = 1800 – 1550 = 250

(a) Ratio of the number of students who opted for basketball to the number of students who opted for table tennis = 750 / 250 = 3 / 1

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

= 800 / 750 = 16 / 15

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

= 750 / 1800 = 25 / 60 = 5 / 12

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

Solutions:

Cost of a dozen pens = ₹ 180

Cost of 1 pen = 180 / 12

= ₹ 15

Cost of 8 ball pens = ₹ 56

Cost of 1 ball pen = 56 / 8

= ₹ 7

Hence, the required ratio is 15 / 7.

13. Consider the statement: The 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)	**10**		**40**
Length of the hall (in metres)	**25**	**50**	

Solutions:

(i) Length = 50 m

Breadth / 50 = 2 / 5

By cross multiplication

5× breadth = 50 × 2

Breadth = (50 × 2) / 5

= 100 / 5

= 20 m

(ii) Breadth = 40 m

40 / Length = 2 / 5

By cross multiplication

2 × Length = 40 × 5

Length = (40 × 5) / 2

Length = 200 / 2

Length = 100 m

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

Solutions:

Terms of 3:2 = 3 and 2

The sum of these terms = 3 + 2

= 5

Now, Sheela will get 3 / 5 of the total pens, and Sangeeta will get 2 / 5 of the total pens

Number of pens with Sheela = 3 / 5 × 20

= 3 × 4

= 12

Number of pens with Sangeeta = 2 / 5 × 20

= 2 × 4

= 8

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

Solutions:

Ratio of ages = 15 / 12

= 5 / 4

Hence, the mother wants to divide ₹ 36 in the ratio of 5:4

Terms of 5:4 are 5 and 4

The sum of these terms = 5 + 4

= 9

Here, Shreya will get 5 / 9 of the total money, and Sangeeta will get 4 / 9 of the total money

The amount Shreya get = 5 / 9 × 36

= 20

The amount Sangeeta get = 4 / 9 × 36

= 16

Therefore, Shreya will get ₹ 20, and Sangeeta will get ₹ 16.

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

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

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

(c) Age of 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

Solutions:

(a) Present age of father = 42 years

Present age of son = 14 years

Required ratio 42 / 14

= 3 / 1

(b) 2 years ago, the son was 12 years old. So, 2 years ago, the age of the father was

= 42 – 2 = 40 years

Required ratio = 40 / 12 = (4 × 10) / (4 × 3) = 10 / 3

(c) After ten years, the age of the father = 42 + 10 = 52 years

After 10 years, the age of the son = 14 + 10 = 24 years

Required ratio = 52 / 24 = (4 × 13) / (4 × 6)

= 13 / 6

(d) 12 years ago, the age of the father was 30

At that time, the age of the son = 14 – 12

= 2 years

Required ratio = 30 / 2 = (2 × 15) / 2

= 15 / 1