Ratio and Proportion

Exercise-31

Solution 1(1):

10, 9
First number = 10
Second number = 9

Ratio of the first number to the second number $= \frac{10}{9} = 10 : 9$

Ratio of the second number to the first number $= \frac{9}{10} = 9 : 10$

Solution 1(2):

7, 22
First number = 7
Second number = 22

Ratio of the first number to the second number $= \frac{7}{22} = 7 : 22$

Ratio of the second number to the first number $= \frac{22}{7} = 22 : 7$

Solution 1(3):

2, 5
First number = 2
Second number = 5

Ratio of the first number to the second number $= \frac{2}{5} = 2 : 5$

Ratio of the second number to the first number $= \frac{5}{2} = 5 : 2$

Solution 1(4):

7, 11
First number = 7
Second number = 11

Ratio of the first number to the second number $= \frac{7}{11} = 7 : 11$

Ratio of the second number to the first number $= \frac{11}{7} = 11 : 7$

Solution 1(5):

13, 17
First number = 13
Second number = 17

Ratio of the first number to the second number $= \frac{13}{17} = 13 : 17$

Ratio of the second number to the first number $= \frac{17}{13} = 17 : 13$

Solution 2:

1. 7 : 9
   Read as: Seven is to Nine
2. 10 : 6
   Read as: Ten is to Six
3. 30 : 10
   Read as: Thirty is to Ten
4. 5 : 20
   Read as: Five is to Twenty
5. 1 : 4
   Read as: One is to Four

Solution 3:

1. 15 : 6

$$\frac{15}{6} = \frac{15 \div 3}{6 \div 3} = \frac{5}{2} = 5 : 2$$

2. 20 : 60

$$\frac{20}{60} = \frac{20 \div 20}{60 \div 20} = \frac{1}{3} = 1 : 3$$

3. 25 : 45

$$\frac{25}{45} = \frac{25 \div 5}{45 \div 5} = \frac{5}{9} = 5 : 9$$

4. 12 : 30

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

5. 26 : 13

$$\frac{26}{13} = \frac{26 \div 13}{13 \div 13} = \frac{2}{1} = 2 : 1$$

6. 4 : 20

$$\frac{4}{20} = \frac{4 \div 4}{20 \div 4} = \frac{1}{5} = 1 : 5$$

7. 77 : 99

$$\frac{77}{99} = \frac{77 \div 11}{99 \div 11} = \frac{7}{9} = 7 : 9$$

8. 35 : 70

$$\frac{35}{70} = \frac{35 \div 35}{70 \div 35} = \frac{1}{2} = 1 : 2$$

Exercise-32

Solution 1:

Kamlesh's height = 140 cm

Aditi's height = 105 cm

Ratio of Kamlesh's height to Aditi's

$= \frac{140}{105} = \frac{140 \div 5}{105 \div 5} = \frac{28}{21} = \frac{28 \div 7}{21 \div 7} = \frac{4}{3} = 4 : 3$

$\therefore$ Ratio of Kamlesh's height to Aditi's = 4 : 3

Solution 2:

Cost of the notebook = Rs. 9

Cost of the pen = Rs. 15

Ratio of the cost of the pen to that of the notebook

$= \frac{15}{9} = \frac{15 \div 3}{9 \div 3} = \frac{5}{3} = 5 : 3$

$\therefore$ Ratio of the cost of the pen to that of the notebook = 5 : 3

Solution 3(1):

First quantity = 15 sec

Second quantity = 1 min = 60 sec

Ratio of the first quantity to the second

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

$\therefore$ Ratio of the first quantity to the second = 1 : 4

Solution 3(2):

First quantity = 90 paise

Second quantity = Re 1 = 100 paise

Ratio of the first quantity to the second

$= \frac{90}{100} = \frac{90 \div 10}{100 \div 10} = \frac{9}{10} = 9 : 10$

$\therefore$ Ratio of the first quantity to the second = 9 : 10

Solution 3(3):

First quantity = 1 m = 100 cm

Second quantity = 60 cm

Ratio of the first quantity to the second

$= \frac{100}{60} = \frac{100 \div 20}{60 \div 20} = \frac{5}{3} = 5 : 3$

$\therefore$ Ratio of the first quantity to the second = 5 : 3

Solution 3(4):

First quantity = 30 min

Second quantity = 1 hour = 60 min

Ratio of the first quantity to the second

$$= \frac{30}{60} = \frac{30 \div 30}{60 \div 30} = \frac{1}{2} = 1 : 2$$

$\therefore$ Ratio of the first quantity to the second = 1 : 2

Solution 3(5):

First quantity = 1 litre = 1000 ml

Second quantity = 600 ml

Ratio of the first quantity to the second

$$= \frac{1000}{600} = \frac{1000 \div 200}{600 \div 200} = \frac{5}{3} = 5 : 3$$

$\therefore$ Ratio of the first quantity to the second = 5 : 3

Solution 3(6):

First quantity = 250 g

Second quantity = 1 kg = 1000 g

Ratio of the first quantity to the second

$$= \frac{250}{1000} = \frac{250 \div 250}{1000 \div 250} = \frac{1}{4} = 1 : 4$$

$\therefore$ Ratio of the first quantity to the second = 1 : 4

Solution 4(1):

Second quantity = 75 paise

First quantity = Rs. 2 = 200 paise

Ratio of the second quantity to the first

$$= \frac{75}{200} = \frac{75 \div 25}{200 \div 25} = \frac{3}{8} = 3 : 8$$

$\therefore$ Ratio of the second quantity to the first = 3 : 8

Solution 4(2):

Second quantity = 1 min, 15 sec = (60 + 15) sec = 75 sec

First quantity = 15 sec

Ratio of the second quantity to the first

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

$\therefore$ Ratio of the second quantity to the first = 5 : 1

Solution 4(3):

Second quantity = 1.5 m = 1.5 x 100 cm = 150 cm

First quantity = 90 cm

Ratio of the second quantity to the first

$= \frac{150}{90} = \frac{150 \div 30}{90 \div 30} = \frac{5}{3} = 5 : 3$

$\therefore$ Ratio of the second quantity to the first = 5 : 3

Solution 4(4):

Second quantity = 500 g

First quantity = 2 kg = 2000 g

Ratio of the second quantity to the first

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

$\therefore$ Ratio of the second quantity to the first = 1 : 4

Exercise-33

Solution 1:

$\frac{\text{Number of cows}}{\text{Number of buffaloes}} = \frac{3}{7}$

but,

$\frac{\text{Number of cows}}{\text{Number of buffaloes}} = \frac{x}{28}$

$\therefore \frac{3}{7} = \frac{x}{28}$

$\therefore \frac{3}{7} = \frac{x}{4 \times 7}$

The denominator 28 is 4 times the denominator 7.

Hence we get x, by taking 4 times the numerator 3

$\therefore x = 3 \times 4$

$\therefore x = 12$

$\therefore$ The number of cows is 12.

Solution 2:

$\frac{\text{Number of boys}}{\text{Number of girls}} = \frac{5}{6}$

But,

$\frac{\text{Number of boys}}{\text{Number of girls}} = \frac{30}{x}$ (where x = number of girls)

$\therefore \frac{5}{6} = \frac{30}{x}$

The numerator 30 is 6 times the numerator 5.

Hence we get x, by taking 6 times the denominator 6.

$\therefore x = 6 \times 6$

$\therefore x = 36$

$\therefore$ The number of girls is 36.

Solution 3:

$$\frac{\text{Bigger number}}{\text{Smaller number}} = \frac{7}{2}$$

But,

$$\frac{\text{Bigger number}}{\text{Smaller number}} = \frac{21}{x} \text{ (where } x = \text{smaller number)}$$

$$\therefore \frac{7}{2} = \frac{21}{x}$$

$$\therefore \frac{7}{2} = \frac{7 \times 3}{x}$$

The numerator 21 is 3 times the numerator 7.

Hence, we get x , by taking 3 times the denominator 2.

$\therefore x = 3 \times 2$

$\therefore x = 6$

$\therefore$ The smaller number is 6.

Exercise-34

Solution 1(1):

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

$$20 : 10 = \frac{20}{10} = \frac{2}{1}$$

$$\because \frac{10}{5} = \frac{20}{10}$$

$\therefore$ The numbers 10, 5, 20, 10 are in proportion.

Solution 1(2):

$$4 : 6 = \frac{4}{6} = \frac{2}{3}$$

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

$$\because \frac{4}{6} = \frac{8}{12}$$

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

Solution 1(3):

$10 : 8 = \frac{10}{8} = \frac{5}{4}$

$6 : 4 = \frac{6}{4}$

$\because \frac{10}{8} \neq \frac{6}{4}$

$\therefore$ The numbers 10, 8, 6, and 4 are not in proportion.

Solution 2(1):

$8 : 12 = 2 : x$

$\therefore \frac{8}{12} = \frac{2}{x}$

But,

$\frac{8}{12} = \frac{4 \times 2}{4 \times 3} = \frac{2}{3}$

$\therefore \frac{2}{3} = \frac{2}{x}$

$\therefore x = 3$

Solution 2(2):

$4 : 5 = x : 50$

$\therefore \frac{4}{5} = \frac{x}{50}$

$\therefore \frac{4}{5} = \frac{x}{5 \times 10}$

In these two fractions, the denominator 50 = 10 times the numerator.

Hence, to get the unknown number,

take 10 times the numerator 4.

10 times 4 is 40.

$\therefore x = 40$

Solution 2(3):

$x : 6 = 10 : 15$

$\therefore \frac{x}{6} = \frac{10}{15}$

$\frac{10}{15} = \frac{5 \times 2}{5 \times 3} = \frac{2}{3}$

$\therefore \frac{x}{6} = \frac{2}{3}$

The denominator 6 is 2 times 3. So, we get the numerator, by taking 2 times the numerator 2, 2 times 2 = 4

$\therefore x = 4$

Solution 2(4):

$5 : x = 20 : 24$

$\therefore \quad \frac{5}{x} = \frac{20}{24}$

But,

$\frac{20}{24} = \frac{5}{6}$

$\therefore \quad \frac{5}{x} = \frac{5}{6}$

$\therefore \quad x = 6$

Exercise-35

Solution 1:

Ratio of tops = ratio of their costs

$\therefore \quad \frac{12}{17} = \frac{60}{x}$ (where x is cost of 17 tops)

Now, $60 = 5 \times 12$ (5 times the numerator)

$\therefore \quad x = 17 \times 5$ (5 times the denominator)

$\therefore \quad x = 85$

The cost of 17 tops is Rs. 85

Solution 2:

Ratio of subabhul saplings = ratio of their costs

$\therefore \quad \frac{100}{250} = \frac{90}{x}$ (where x is cost of 250 saplings)

But,

$\frac{100}{250} = \frac{50 \times 2}{50 \times 5} = \frac{2}{5}$

$\therefore \quad \frac{2}{5} = \frac{90}{x}$

Now, $90 = 45 \times 2$ (45 times the numerator)

$\therefore \quad x = 45 \times 5$ (45 times the denominator)

$\therefore \quad x = 225$

$\therefore \quad$ The cost of 250 saplings is Rs. 225

Solution 3:

Ratio of bags = ratio of their costs.

$\therefore \quad \frac{3}{7} = \frac{2250}{x}$ (where x is cost of 7 bags)

$2250 = 750 \times 3$ (750 times the numerator)

$\therefore \quad x = 750 \times 7$ (750 times the denominator)

$\therefore \quad x = 5250$

$\therefore \quad$ The cost of 7 bags is Rs. 5250

Solution 4:

Ratio of number of hours = Ratio of their respective distances

$\therefore \frac{5}{7} = \frac{4000}{x}$ (where x is the distance covered in 7 hours)

Now, 4000 = 800 x 5 (800 times the numerator)

$\therefore$ x = 800 x 7 (800 times the denominator)

$\therefore$ x = 5600

$\therefore$ The aeroplane will cover 5600 km in 7 hours.

Solution 5:

Ratio of length = ratio of their weights.

$\therefore \frac{10}{25} = \frac{250}{x}$ (where x is weight of a bar 25 cm long.)

Now, 250 = 25 x 10 (25 times the numerator)

$\therefore$ x = 25 x 25 (25 times the denominator)

$\therefore$ x = 625

$\therefore$ The weight of a 25 cm long bar is 625 g.

Solution 6:

Ratio of minutes = ratio of distance.

$\therefore \frac{60}{20} = \frac{24}{x}$ (where x is the distance travelled in 20 mintues)

$\therefore \frac{3}{1} = \frac{24}{x}$

Now, 24 = 8 x 3 (8 times the numerator)

$\therefore$ x = 8 x 1 (8 times the denominator)

$\therefore$ x = 8

$\therefore$ In 20 minutes, the vehicle travels 8 km.