

Let's discuss.



Let's learn.

Nilima's age is twice as much as Ramesh's. We can give the same information by saying that Nilima's and Ramesh's ages are in the proportion **2:1**. It is read as '**Two is to one**'. In mathematics, the proportion of two numbers can also be expressed as their ratio. The proportion 2:1 is written as $\frac{2}{1}$ in the form of a ratio.

Examples of Proportion in Daily Life



Example : Jankiamma's idlis and dosas are delicious. For idlis, she uses udad dal and rice in the proportion 1 cup dal to 2 cups of rice. But for dosas, the proportion is 1 cup dal to 3 cups of rice. That is, for idlis the proportion of dal and rice is 1:2 or the ratio is $\frac{1}{2}$ whereas for dosas, the proportion is 1:3 or the ratio is $\frac{1}{3}$.

Example : Margaret makes great biscuits. She uses 3 cups of wheat flour with 2 cups of sugar. It means that the proportion of sugar and flour in the biscuits is 2:3 or that the ratio is $\frac{2}{3}$.



Example : Flowers were distributed among the girls in equal proportions.

Fill in the empty boxes.

Girls	3	5	1
Flowers	12	32



$$\frac{\text{Number of girls}}{\text{Number of flowers}} = \frac{3}{12} = \frac{1}{4}$$

It means that every girl got 4 flowers.

The proportion of girls and flowers is 'One is to every four'. It is written as 1:4 or their ratio is written as $\frac{1}{4}$.

Example : Every student finds the ratio of his or her own age to that of his/her grandmother's.

John's age is 10 years and his grandmother's 65. John said the ratio was

$\frac{10}{65}$ for him. $\frac{10}{65} = \frac{10 \div 5}{65 \div 5} = \frac{2}{13}$ We can make use of equivalent fractions to write the ratio in the simplest form.

Example : Nikhil brought 12 guavas and 16 chikoos.

(1) Find the ratio of guavas to chikoos.

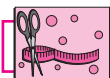
(2) Find the ratio of chikoos to guavas.

$$\begin{array}{l} \text{Ratio of guavas to chikoos} \\ \frac{\text{Number of guavas}}{\text{Number of chikoos}} = \frac{12}{16} = \frac{12 \div 4}{16 \div 4} = \frac{3}{4} \end{array}$$

\therefore Ratio of guavas to chikoos is $\frac{3}{4}$.

$$\begin{array}{l} \text{Ratio of chikoos to guavas} \\ \frac{\text{Number of chikoos}}{\text{Number of guavas}} = \frac{16}{12} = \frac{16 \div 4}{12 \div 4} = \frac{4}{3} \end{array}$$

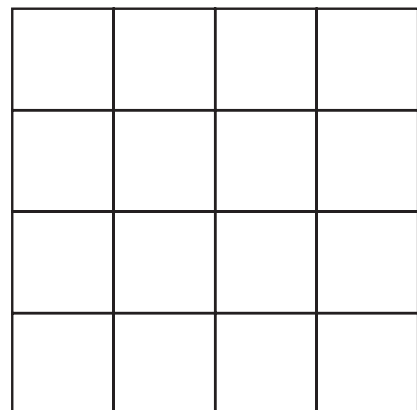
\therefore Ratio of chikoos to guavas is $\frac{4}{3}$.



Try this.

In the figure, colour some boxes with any colour you like and leave some blank.

- (1) Count all the boxes and write the number.
- (2) Count the coloured ones and write the number.
- (3) Count the blank ones and write the number.
- (4) Find the ratio of the coloured boxes to the blank ones.
- (5) Find the ratio of the coloured boxes to the total boxes.
- (6) Find the ratio of the blank boxes to the total boxes.





Let's learn.

Some Important Points about Ratio

Example : The weight of the large block of jaggery is 1 kg and a smaller lump weighs 200 g. Find the ratio of the weight of the lump of jaggery to that of the block.

$$\frac{\text{Weight of the lump}}{\text{Weight of the block}} = \frac{200}{1}$$

Is this right?

Is the weight of the lump 200 times that of the block?

What mistake have we made?

First we must measure both quantities in the same units.

It would be convenient to use grams here.

1kg = 1000 grams

∴ The block weighs 1000 g and the lump, 200 g.

$$\frac{\text{Weight of the lump}}{\text{Weight of the block}} = \frac{200}{1000} = \frac{2 \times 100}{10 \times 100} = \frac{2}{10} = \frac{1 \times 2}{5 \times 2} = \frac{1}{5}$$

Thus, the ratio of the weight of the lump of jaggery to that of the block is $\frac{1}{5}$.



Now I know -

When finding the ratio of two quantities of the same kind, their measures must be in the same units.

A ratio can be used to write an equation. Then it is easier to solve the problem.
Example : A hostel is to be built for schoolgoing girls. Two toilets are to be built for every 15 girls. If 75 girls will be living in the hostel, how many toilets will be required in this proportion?

Let us consider the proportion or ratio of toilets and girls. Let us suppose x toilets will be needed for 75 girls. The ratio of the number of toilets to the number of girls is $\frac{2}{15}$. Let us write this in two ways and form an equation.

$$\therefore \frac{x}{75} = \frac{2}{15}$$

$$\therefore \frac{x}{75} \times 75 = \frac{2}{15} \times 75 \quad (\text{Multiplying both sides by 75})$$

$$\therefore x = 2 \times 5$$

$$= 10$$

∴ 10 toilets will be required for 75 girls.



Practice Set 28

- In each example below, find the ratio of the first number to the second.
(1) 24, 56 (2) 63, 49 (3) 52, 65 (4) 84, 60 (5) 35, 65 (6) 121, 99
- Find the ratio of the first quantity to the second.
(1) 25 beads, 40 beads (2) 40 rupees, 120 rupees (3) 15 minutes, 1 hour
(4) 30 litres, 24 litres (5) 99 kg, 44000 grams (6) 1 litre, 250 ml
(7) 60 paise, 1 rupee (8) 750 grams, $\frac{1}{2}$ kg (9) 125 cm, 1 metre
- Reema has 24 notebooks and 18 books. Find the ratio of notebooks to books.
- 30 cricket players and 20 kho-kho players are training on a field. What is the ratio of cricket players to the total number of players?
- Snehal has a red ribbon that is 80 cm long and a blue ribbon, 2.20 m long. What is the ratio of the length of the red ribbon to that of the blue ribbon?
- Shubham's age today is 12 years and his father's is 42 years. Shubham's mother is younger than his father by 6 years. Find the following ratios.
 - Ratio of Shubham's age today to his mother's age today.
 - Ratio of Shubham's mother's age today to his father's age today
 - The ratio of Shubham's age to his mother's age when Shubham was 10 years old.



Let's learn.

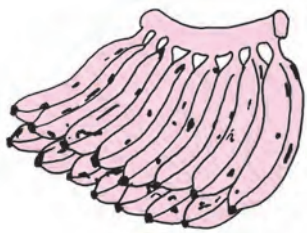
The Unitary Method

Vijaya wanted to gift pens to seven of her friends on her birthday. When she went to a shop to buy them, the shopkeeper told her the rate for a dozen pens.



- Can you help Vijaya to find the cost of 7 pens?
- If you find the cost of one pen, you can also find the cost of 7, right?





Example : A bunch of 15 bananas costs 45 rupees.
How much will 8 bananas cost?
Cost of 15 bananas, 45 rupees.
 \therefore Cost of 1 banana = $45 \div 15 = 3$ rupees
Therefore, the cost of 8 bananas is $8 \times 3 = 24$ rupees

Example : If a bunch of 10 flowers costs 25 rupees, how much will 4 flowers cost?

Cost of 10 flowers, 25 rupees.
 \therefore Cost of 1 flower = $\frac{25}{10}$ rupees
Therefore, cost of 4 flowers = $\frac{25}{10} \times 4 = 10$ rupees.



Now I know -

Find the cost of one article from that of many, by division.
Then find the cost of many articles from that of one, by multiplication.
This method of solving a problem is called the unitary method.

Practice Set 29

* Solve the following.

- (1) If 20 metres of cloth cost ₹3600, find the cost of 16 m of cloth.
- (2) Find the cost of 8 kg of rice, if the cost of 10 kg is ₹325.
- (3) If 14 chairs cost ₹5992, how much will have to be paid for 12 chairs?
- (4) The weight of 30 boxes is 6 kg. What is the weight of 1080 such boxes?
- (5) A car travelling at a uniform speed covers a distance of 165 km in 3 hours. At that same speed, (a) How long will it take to cover a distance of 330 km?
(b) How far will it travel in 8 hours?
- (6) A tractor uses up 12 litres of diesel while ploughing 3 acres of land. How much diesel will be needed to plough 19 acres of land?
- (7) At a sugar factory, 5376 kg of sugar can be obtained from 48 tonnes of sugarcane. If Savitai has grown 50 tonnes of sugarcane, how much sugar will it yield?
- (8) In an orchard, there are 128 mango trees in 8 rows. If all the rows have an equal number of trees, how many trees would there be in 13 rows?
- (9) A pond in a field holds 120000 litres of water. It costs 18000 rupees to make such a pond. How many ponds will be required to store 480000 litres of water, and what would be the expense?

