

UNIT-12

COMMERCIAL MATHEMATICS



- Ratio
- Proportion
- Percentage
- Profit – Percentage, Loss – Percentage
- Simple Interest
- Practical Mathematics
- Concept of Currency
- Bills and Cash Memo

12.1 Introduction

Money and business have a very important role in our daily life. There is a idiom in English—“**Money makes the mare go**”, which means all activities of life are based on money. Today one can not live or have universal acceptance without medium of information like television, radio newspaper, magazines etc. and news of capital or commercial. The importance of the information channel is to provide complete accounting of activities of whole day of financial and commercial world. There is a direct connection with this and every citizen. So it is necessary that you should be acquainted with these activities from beginning. To run the economic activities of daily life in a regular way, you have to make a daily accounting for which it is necessary to know the meaning of some important concepts. In this unit, to solve our day to day life problem we will study ratio, proportion, percentage, profit-loss, simple interest and behaviour mathematics. We will also see how we will change ratio, fraction, decimal, percentage etc. from one to another and how the application of percentage will be used in calculation of profit-loss. It is worth noting that the behaviour mathematics solves many problems of daily life in a simpler way.

Many calculations related to cost price-selling price problems are solved by practical mathematics very rapidly and with accuracy. The use of this mode of calculation is done by less educated people. Perhaps this method of calculation, which was conducted by the common man, was given the name of ‘practical mathematics’ due to this.

12.2 Ratio

We use Ratio in our practical life, with comparative words like small-big, less-more, light-heavy etc. Comparison is done in two ways. First through the difference, such as who is so big by whom, who is how much more than whom, and second who is how many times whom, and second one is who is how many times bigger than whom, who is how many times more than whom, etc. Can you tell that in both of these methods of comparison, when which is appropriate? Let us all discuss together.

Suppose that the age of Ramu is 14 years and age of Shalu is 10 years. Here, there is a small difference in the age of both, so, here comparison of ages of both is done through the difference method and we can easily say that, Ramu is $(14 \text{ years} - 10 \text{ years}) = 4 \text{ years}$ elder than Shalu or Shalu is 4 years younger than Ramu. But if there is very much difference in two like things, it is not appropriate to use difference method for comparison.

Imagine that a boy aged 10 years and his father's age is 40 years. Here, if we want to compare their ages, difference method will not be appropriate comparison of their ages by division will be $\frac{40}{10} = \frac{4}{1}$.

We can say that the father's age is four times the age of son.

There is a need to pay attention that when comparing two objects, if they have a qualitative difference, then comparing it by division is better than comparing by difference.

Let us understand it by example :

1. Assuming the price of a tractor to be ₹4,00,000 and the price of a motor cycle be ₹40,000. If we take difference of their prices it is ₹3,60,000 and comparing by division $\frac{4,00,000}{40,000} = \frac{10}{1}$.

Here, we can clearly say that the price of a tractor is 10 times the price of motor cycle.

Notice, the comparison by division is called Ratio.

2. Macey and Nisha scored 56 runs and 14 runs respectively in a game of cricket. How many times more runs is made by Macey than Nisha.

$$\text{Ratio of runs of Macey and Nisha} = \frac{56}{14} = \frac{4}{1}.$$

Hence, Macey scored four times the runs scored by Nisha.

Conclusion

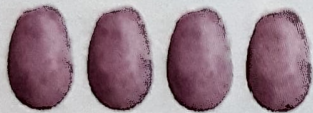
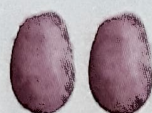
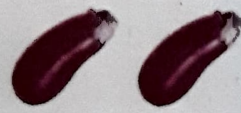
The way to express two same quantities as “how many times” is called Ratio. The ratio is represented by the sign ‘:’

In the above example 2, the ratio of runs scored by Macey and Nisha is written as 4 : 1.

Try it :

Draw the following table in your notebook :

Fill in the blanks :

First column	Second column	Comparison by difference	Comparison by division	Ratio
		$5 - 3 = 2$ Tomatoes	$5 \div 3 = \frac{5}{3}$	5 : 3
				
				
				

When we compare number of same type of objects or amount by division, then we can say that we have found the ratio of two numbers.

Ratio is the comparison of two numbers by division from which it is known that how many times one number is than that of other number or which parts of that.

If one number is ‘a’ and the other number is b ($a, b \neq 0$), then how would the two numbers be written as ratio ?

We know that to find the ratio of two numbers, we divide one number by another number. So, ratio of a and b = $\frac{a}{b} = a : b$.

In $a : b$, a and b are terms of the ratio. In $a : b$, a is called the first term or pre-term and b is called the second term or post term.

Think, make argument and draw conclusions :

Think, is the ratio possible between 3 and 0, 0 and 5 ? No, because the second term in 3 and 0 is 0 and first term in 0 and 5 is 0. So, it is not possible to find the ratio in them. No number is expressed as a ratio with zero. Therefore, we can say

While determining the ratio between two quantities, none of these quantities should be zero. Two quantities can be compared only if they are both in the same unit.

In $a : b$, a is the preterm and b is the postterm. If b is drawn to the preterm and a as the post term, then the form of ratio becomes $b : a$. It is called the inversion of $a : b$. As the inversion of $2 : 3$ is $3 : 2$ and inversion of $5 : 7$ is $7 : 5$.

Try it :

See the table given below and write the ratio of number of figures in column first and number of figures in column second and their inverse form :

First Column	Second Column	Ratio	Inverse
		4 : 5	5 : 4
			
			

Example 1 : Describe 3 and 4 in ratio.

Solution : 3 : 4

Example 2 : The length of a room is 8m and its breadth (width) is 500 cm. Write the length and breadth of the room in ratio.

Solution : 500 cm = 5m.

Ratio of length and breadth of the room = 8 : 5.

Example 3 : The ratio of two numbers is 5 : 3. Tell the first and second term :

Solution : First term = 5

Second term = 3

Example 4 : Write the inverse of 4 : 5.

Solution : The inverse of 4 : 5 is 5 : 4.

Exercise 12(a)

1. Write following questions in your exercise book and fill in the blanks :

(i) Ratio of 3 by 4 =

(ii) Ratio of 5 by 3 = 5 :

(iii) Ratio of 2 by 7 = : 7

(iv) Ratio of 4 by = 4 : 7

2. Express in ratio :

(i) 2 kg by 500 gram

(ii) 5 by 12

(iii) 13 by 75

(iv) 108 by 125

3. Draw the following table in your exercise book and write the ratio of marks obtained by Ramesh and Seema in every subject :

Subject	Marks of Ramesh	Marks of Seema	Ratio
Hindi	60	53	60 : 53
English	53	65	
Maths	75	62	
Science	48	55	
Drawing	63	71	

4. The length and breadth of a rectangular field are 29m and 25m respectively. Write the length and breadth of the field in ratio.

5. Write the following table in the exercise book and fill in the blanks.

Ratio	First Term (Antecedent)	Second term (Consequent)
7 : 8	7	—
13 : 21	—	21
73 : 85	—	—

6. Write inversion of following ratios :

(i) 3 : 14 (ii) 15 : 17 (iii) 25 : 37 (iv) 65 : 67

7. Tell the first term and second term :

(i) 3 : 7 (ii) 4 : 11 (iii) 13 : 27

12.2.1 Same Type of Ratio in different Circumstances

See the following examples

The length of a room is 40 metres and its width is 20 metres.

So, the ratio of the length of the room to the width = $\frac{40}{20} = \frac{2}{1} = 2 : 1$

There are 50 boys and 25 girls in a class.

Therefore, ratio of number of boys to number of girls = $\frac{50}{25} = \frac{2}{1} = 2 : 1$.

Here, is a similar ratio 2 : 1 in both examples. In minimum form, ratio of 40 : 20 and 50 : 25 are same, it is 2 : 1. They are called equivalent ratio.

Can you think some other examples that are equivalent to 2 : 1 ?

Note :

In the first question,

Ratio of width to the length = $\frac{20}{40} = \frac{1}{2} = 1 : 2$ and in the second question, ratio of number of girls to the number of boys = $\frac{25}{50} = \frac{1}{2} = 1 : 2$.

In both the examples, the ratio is same, 1 : 2.

The ratio of 20 : 40 and 25 : 50 in the lowest form are the same, it is 1 : 2. So, these are examples of equivalent ratios. Also, inverse of 2 : 1 is 1 : 2. It is clear from this that the ratio 2 : 1 and 1 : 2 are different. Similarly, try to understand the difference between 2 : 3 and 3 : 2 and 5 : 4 and 4 : 5.

Take a ratio 3 : 5. Find many of its variations.

Like $3 : 5 = \frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$; $\frac{3}{5} = \frac{3 \times 10}{5 \times 10} = \frac{30}{50}$; $\frac{3}{5} = \frac{3 \times 80}{5 \times 80} = \frac{240}{400}$;

Here, it is clear that if the numerator and denominator of the ratio of the fraction are multiplied by same amount then the ratio remains the same. i.e. if the first and second term of the ratio are multiplied by same non-zero number then the ratio will remain the same. Take one more example :

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

$$\text{and } \frac{1}{2} = \frac{1 \times 15}{2 \times 15} = \frac{15}{30}$$

Now, think yourself, what will be the result of dividing each term of the ratio by same non-zero number ? Discuss in the group.

Try it :

1. The ratio of number of boys and number of girls in the class 60:15, the ratio of number of boys and number of girls is 120 : 30 in class 7. Is the ratio between boys and girls of both classes equal ?
2. Find the ratio of the number of doors and the number of windows of your class.

12.2.2. The Simplest Form of Ratio

Some students of class 6 measured the length and breadth of a flag made of paper. They found that the length of the flag is 36 cm and the breadth is 24 cm. What is the ratio of the length and breadth of the flag ?

Ratio of length and breadth of the flag = 36 : 24



Example 5 : Write 36 : 24 in the simplest form :

First Method :

We know that $36 : 24 = \frac{36}{24}$

Write the fraction $\frac{36}{24}$ in the simplest form :

$$\frac{36}{24} = \frac{9}{6} = \frac{3}{2} \text{ (Dividing with 4 and 3 respectively)}$$

Express $\frac{3}{2}$ in the form of ratio :

$$\frac{3}{2} = 3 : 2.$$

We see that,

$$36 : 24 = \frac{36}{24} = \frac{3}{2} = 3 : 2$$

Second Method

See 36 : 24 :

Dividing each term by 2, we get 18 : 12,

Again, dividing each term by 2, 9 : 6

once again dividing each term by 3, 3 : 2

Now, we can't divide each term by any number other than 1. So, the simplest form of 36 : 24 is 3 : 2. We see that to express 36 : 24 in the simplest form, each term is divided by $2 \times 2 \times 3 = 12$

$$\text{So, } 36 : 24 = \frac{36}{12} : \frac{24}{12} = 3 : 2$$

Note, the greatest common divisor of 36 and 24 is 12.

Example 6. Find out the simplest form of 48 : 72. We see that the G.C.D. of 48 and 72 is 24.

So, dividing both terms by 24, we get $48 : 72 = 48/24 : 72/24 = 2 : 3$.

Conclusion :

To express a ratio in the Simplest form, we divide each term by the greatest common divisor of both terms.

Example 7. Write 15 and 25 in simplest ratio form.

Solution : Term 15 and 25 have g.c.d. = 5.

So, dividing each term by 5, we get

$$15 : 25 = \frac{15}{5} : \frac{25}{5} = 3 : 5$$

Example 8. Express 90 paise and ₹3 in simplest ratio form.

Solution : Ratio of 90 paise and ₹3

$$\begin{aligned} &= \frac{90 \text{ Paise}}{\text{₹3}} = \frac{90 \text{ Paise}}{300 \text{ Paise}} \\ &= \frac{90}{300} = \frac{90 \div 30}{300 \div 30} = \frac{3}{10} = 3 : 10 \end{aligned}$$

Example 9. Find the ratio of 3 hours with 45 min.

Solution : Ratio of 3 hours with 45 minutes

$$\begin{aligned} &= \frac{3 \text{ hours}}{45 \text{ minute}} \\ &= \frac{3 \times 60 \text{ minute}}{45 \text{ minute}} \end{aligned}$$

$$= \frac{180}{45} = \frac{180 \div 45}{45 \div 45}$$

$$= \frac{4}{1}$$

$$= 4 : 1$$

To find the ratio of hour and minute, Rupees and Paise, we first change, both the amounts in the same unit.

Conclusion

- The ratio is possible only in the same type of quantities (like quantities)
- After writing the quantities in the same unit as a ratio, the unit is not written with ratio i.e. ratio has no unit.
- The ratio is expressed in the simplest form.
- On multiplying and dividing both terms of the ratio by same non-zero number, ratio will remain unchanged.

Like $5 : 6 = 5 \times 2 : 6 \times 2 = 10 : 12$

$$15 : 21 = \frac{15}{3} : \frac{21}{3} = 5 : 7$$

Comparison of two ratios

“We take a group of two different flowers. The number of flowers in the groups of first flowers is two and three respectively, and in the second group of flowers, the number of flowers is five and eight respectively. The ratio of flowers in the first group of flowers is $2 : 3$ and in the second group of flowers, this ratio is $5 : 8$. Now, it is to see that :

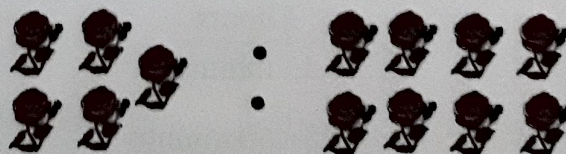
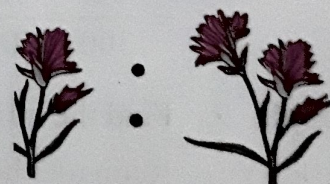
In $2 : 3$ and $5 : 8$, which ratio is large ?

Writing $2 : 3$ in form of fraction :

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

Writing $5 : 8$ in form of fraction :

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



Which fraction is greater in $\frac{2}{3}$ and $\frac{5}{8}$. How to find we ? Making both fractions with equal denominators :

$$\text{First fraction} = \frac{2}{3} = \frac{2 \times 8}{3 \times 8} = \frac{16}{24}$$

$$\text{Second fraction} = \frac{5}{8} = \frac{5 \times 3}{8 \times 3} = \frac{15}{24}$$

We see that, the fraction $\frac{16}{24}$ is greater than $\frac{15}{24}$.

So, fraction $\frac{2}{3}$ is greater than $\frac{5}{8}$

Thus, it is clear that, 2 : 3 is greater than 5 : 8

Try it :

The ratio of marks of Sita and Gita is 2 : 5 and 5 : 8 is the ratio of marks of Ashish and Sarvesh. Girls have higher marks ratio or boys ?

Jainul and Abid invested money in the share business in the ratio of 2 : 3. If ₹300 profit is to be distributed among both, then will both benefit by equally ? Think, profit should be distributed in the ratio of investment. Jainul will get $\frac{2}{5}$ of the profit and Abid will get $\frac{3}{5}$ of the profit. Who will get more profit ?

Let us consider different forms of Ratio

Consider 2 : 5

2 : 5 is written in the fraction form as $2 : 5 = \frac{2}{5}$

Again writing the fraction in the form of decimal $\frac{2}{5} = 0.4$.

Thus, the ratio can be expressed as fractions and decimals.

Ratio can be expressed in fraction and decimal.

Please Try

Convert 4 : 5 and 15 : 25 in fractions and decimals.

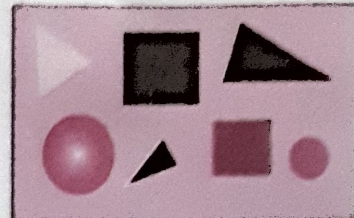
Exercise 12(b)

1. Look at the figure and find out the ratios :

(a) Number of triangles with number of circles within the rectangle

(b) Number of all squares to the number of all shapes within the rectangle.

(c) Number of all circles to the number of all shapes within the rectangle.



2. Find the ratio in the simplest form :

(i) 2 with 4

(ii) 15 with 3

(iii) 3.5 with 105

(iv) 50 paise with ₹3

(v) 2 metre with 6 cm

(vi) 2 hours with 30 minutes.

3. Write following ratios in the simplest form :

(i) 2 : 16

(ii) 18 : 90

(iii) 11 : 121

(iv) 13 : 39

(v) 36 : 72

(vi) 5 kg : 650 kg

4. Which ratio is larger ?

(i) In 3 : 5 and 5 : 8

(ii) In 2 : 7 and 6 : 8

(iii) In 40 Paise : ₹2 and in 60 Paise : ₹4.

5. Express following statements in ratios :

(i) The length of a farm is 4 times its breadth.

(ii) The age of Mohan is 3 times the age of his son Rajesh

(iii) The number of students passed in Mathematics in class 6 is $\frac{3}{4}$ of the number of students appeared in the exam.

6. There are 200 students in a school. 60 students out of them have fallen sick. Find the ratio of healthy students and sick students.

7. The monthly income of Abhinav is ₹5000. He spends ₹3000 monthly. Find the ratio :

(i) In the income and expenditure of Abhinav.

(ii) In the expenditure and income of Abhinav.

(iii) In the expenditure and saving of Abhinav.

8. Write the following in your exercise book and fill in the blanks :

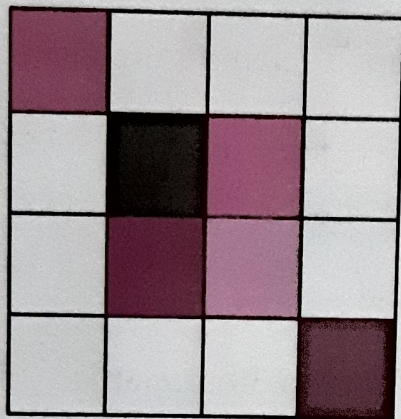
(i) $\frac{8}{4} = \frac{\dots\dots}{32}$

(ii) $\frac{\dots\dots}{8} = \frac{25}{50}$

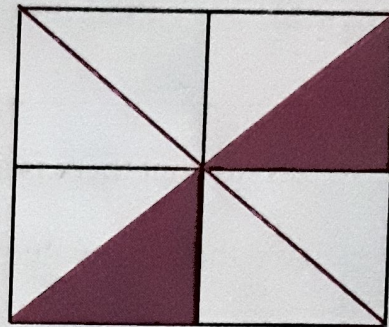
(iii) $\frac{16}{4} = \frac{48}{\dots\dots}$

(iv) $\frac{36}{\dots\dots} = \frac{72}{12}$

9. Write the ratio of the shaded region with the non-shaded region in the following figures in the simplest form :



(i)



(ii)

10. Distribute ₹80 between Suhani and Palak in the ratio of 3 : 2.

11. A woman wants to share ₹3600 among her daughters Shreya and Bhumika according to their ages. If age of Shreya is 15 years and Bhumika's age is 12 years, then how many rupees will they get ?

12.3 Proportion :

One day Sheela went to the market to buy tomatoes and onions. There, she saw prices of tomato and onion marked on the shop as below :

		Tomato (in Rs.)	Onion (in Rs.)
First shop	Price per 5 Kg	50	35
Second shop	Price per 40 kg	400	280

Seeing the prices of tomatoes and onions on each of the shops, Sheela started thinking that which item to purchase from which shop would be affordable i.e. cheap. She noticed that at the first shop, price is given per 5Kg, whereas at the second shop, price is given per 40 kg. on that day.

She found that the ratio of weights to the two shops is 5kg : 40 kg = 1 : 8.

Now, she got the ratio of values :

	First Shop	Second shop	Ratio
Tomato	₹50	₹400	1 : 8
Onion	₹35	₹280	1 : 8

She noticed that the prices of tomatoes and onions in both shops have the same ratio, as in their weights. Therefore, she concluded that the prices on both shops may be different in view, but there is no difference between them, because the ratio of the weight of the objects in the display price is the same in their values. Therefore, she can buy tomatoes and onions from any shop.

Such problems arise in daily life, where two ratios become equal in number. In the above example :

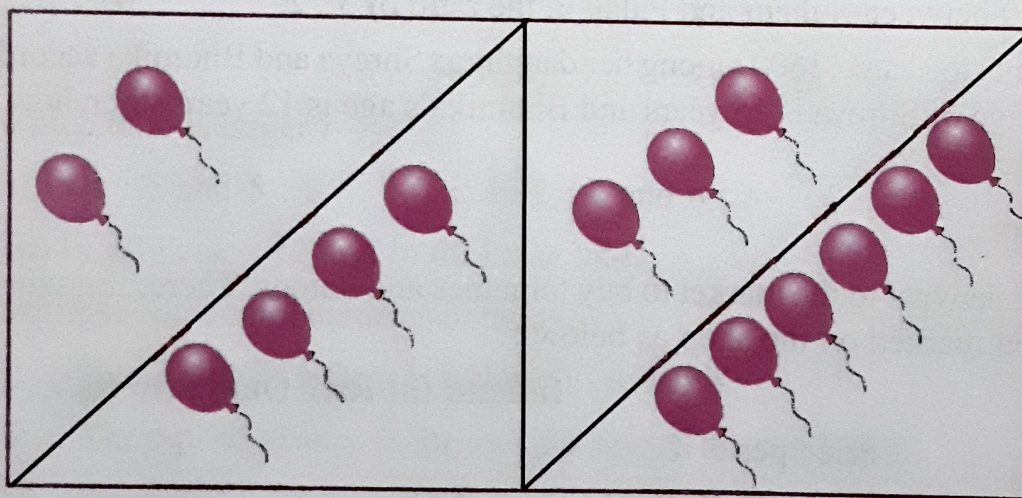
$$5\text{kg} : 40\text{ kg} = ₹50 : ₹400 = ₹35 : ₹280 = 1 : 8.$$

Two similar ratios are called proportion. To denote the proportion, “::” symbol is used.

For example, we can say that there is a proportion in $9 : 30$ and $15 : 50$, because both the values $\frac{9}{30}$ and $\frac{15}{50}$ have the same value $\frac{3}{10}$.

We write it as $9 : 30 :: 15 : 50$ and read “9 ratio 30 proportion 15 ratio 50”.

See the following figure :



- Figure 1 has two sections. Groups of balloons have been shown in both sections. By looking at these figures, find the ratio of the number of balloons in both groups of the first section and again, groups of the second section.

We see that there are 2 balloons in one group of the first section and 4 balloons in the second group. So, ratio of number of balloons in both groups of first section is $2 : 4$ or $1 : 2$ in the simplest form. Similarly, the number of balloons in first group of the second section is 3 and the number of balloons in second group of the second section is 6. Their ratio is $3 : 6$ or $1 : 2$.

In this way, we see that in both sections, the ratio of number of balloons in simplest form is 1 : 2.

So, $2 : 4 :: 3 : 6$

i.e., number of balloons in both section are in proportion.

Example 10 : Sheela scores 50 marks in Hindi and 40 marks in English. Rama scored 45 and 36 marks in the same exam. in Hindi and English respectively. Tell that :

- (i) What is the ratio of numbers (marks) obtained by Sheela and Rama in Hindi.
 - (ii) What is the ratio of marks obtained by Sheela and Rama in English.
- In Hindi, the ratio of marks obtained by Sheela and Rama is 50 : 45 and in the English subject the ratio is 40 : 36.

since, $50 : 45 = 10 : 9$

and $40 : 36 = 10 : 9$

Hence, $50 : 45 = 40 : 36$ or $50 : 45 :: 40 : 36$

Example 11 : The distance covered by a bicycle by a young man is shown in the following table. After looking at the table, answer the following questions :

- (i) What is the ratio between one and two hours time ?
- (ii) What is the ratio of distance covered in one hour and two hours ?

Time Duration (in hours)	1	2	3	4	5	—	—
Distance Covered (in Km)	12	24	36	48	—	72	—

It is clear from the table :

(i) Ratio of time, 1 hour : 2 hour = 1 : 2

(ii) Distance Ratio, 12 : 24 = 1 : 2

Make the above mentioned table in your exercise book and fill in the blanks and think of the proportion.

Thus, from examples 10 and 11, we find that :

The ratio of the marks obtained by Sheela and Rama in Hindi is equal to the ratio of marks obtained by them in English.

The ratio of time with time and ratio of distance with distance are equal.

Proportion is written without any unit in 4 terms and in place of '=' sign, proportionality :: sign is also used.

As $2 : 4 = 3 : 6$ is written is $2 : 4 :: 3 : 6$

and is read as "2 ratio 4 proportion 3 ratio 6".

Similarly,

$50 : 45 = 40 : 36$ or $50 : 45 :: 40 : 36$ and $1 : 2 = 12 : 24$ or $1 : 2 :: 12 : 24$ are also understood.

It is evident from the above examples that :

Four quantities or numbers or terms are proportional when the ratio of first and second and the ratio of third and fourth are equal.

In proportion, there are 4 terms, which are called first term, second term, third term and fourth term.

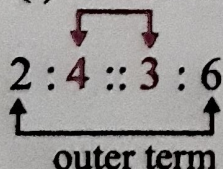
As in $1 : 2 :: 20 : 40$, first term is 1, second term is 2, third term is 20 and fourth term is 40.

Try it :

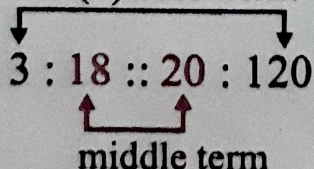
1. Are both the ratios $2 : 5$ and $40 : 100$ are equal ?
2. In $1 : 3 :: 8 : 24$, which term is 8 ?
3. Write in proportion :
10 rupees by 15 rupees and 4 by 6.

Out side term and Middle term

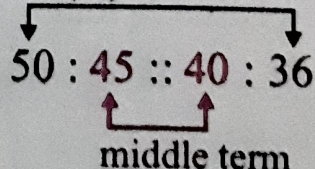
(i) middle term



(ii) outer term



(iii) outer term



In the above figure (i), first and fourth terms are called outside terms and second and third are called middle terms. Here 2 and 6 are outside terms and 4 and 3 are middle terms.

In figure (ii), outside terms are 3 and 120 i.e. the first and fourth terms.

Middle terms are 18 and 20 i.e. second and third terms.

In figure (iii), outside terms are 50 and 36 i.e. first and fourth terms.

Middle terms = 45 and 40 i.e. second and third terms.

- Make the following table in your practice note book, fill the blanks and pay attention to the equality and non-equality of product of outside term and product of middle terms :

S. No	Proportional Terms	Product of External terms	Product of Middle Terms	Does the product of external term = product of middle terms
1.	$1 : 2 :: 4 : 8$	8	8	Yes
2.	$5 : 6 :: 15 : 18$			
3.	$3 : 4 :: 24 : 32$			
4.	$2.5 : 2.4 :: 7.5 : 7.2$			
5.	$2 : 5 :: 4 : 10$			

From the study of the table, we conclude :

In the proportion :

Product of outside terms = Product of middle terms.

Try it :

3, 2, 4, 6 are four terms. Will it be correct to write terms as $3 : 2 :: 4 : 6$? If not then why ? Use condition of proportionality and confirm your statement.

In general

If four non-zero numbers are a, b, c, d respectively, then the condition that they are proportional if $ad = bc$.

Example 12. Are 12, 24, 24 and 48 in proportional ?

Solution : First Method $12 : 24 = \frac{12}{24} = 1 : 2$

$$24 : 48 = \frac{24}{48} = 1 : 2$$

Here, both ratios are equal

Thus 12, 24, 24 and 48 are in proportion.

Second Method :

Product of external terms = $12 \times 48 = 576$

Product of middle terms = $24 \times 24 = 576$

Here, we see that :

Product of outside terms = product of middle terms.

Thus, 12, 24, 24, 48 are in proportion.

i.e. $12 : 24 :: 24 : 48$.

Example 13 : Verify : $15 : 18 :: 45 : 54$ is true or not ?

Solution : Product of out side terms : $15 \times 54 = 810$.

Product of middle terms = $18 \times 45 = 810$.

i.e. product of outside terms = Product of middle terms. Thus,
 $15 : 18 :: 45 : 54$ is true.

Finding the unknown terms in questions of Proportion.

The second term is not known in the following proportion :

$$8 : \square :: 7 : 14.$$

Thus, by writing x for second unknown term, proportional terms are written as :

$$8 : x :: 7 : 14.$$

Product of out side terms = $8 \times 14 = 112$.

Product of Middle terms = $x \times 7 = 7x$

Product of middle terms = product of outside terms.

Thus, $7x = 112$.

$$x = \frac{112}{7} = 16$$

or, $x = 16$.

Try it :

- (i) Taking value of $x = 16$, put the value of x in $8 : x :: 7 : 14$ and verify the proportionality.
- (ii) The product of middle terms, in 4 proportional terms is 36. If one of the out side term is 3 then find the other, out side term.

Example 14. : Are the ratios 25 gram : 30 gram and 40 kg : 48 kg in proportion ?

Solution : $25 \text{ gm} : 30 \text{ gm} = \frac{25}{30} = \frac{5}{6} = 5 : 6$

$$40 \text{ kg} : 48 \text{ kg} = \frac{40}{80} = \frac{5}{6} = 5 : 6$$

So, $25 : 30 = 40 : 48$.

Hence, the ratios 25g : 30 g and 40kg : 48kg are in proportion.

Example 15 : Are the ratio of 30 cm with 3m and the ratio of 18 second with 5 minutes in proportion ?

Solution : Ratio of 30cm with 3m = $30 : 3 \times 100$ (1m = 100 cm) = $1 : 10$.

Ratio of 18 second with 5 minute = $18 : 5 \times 60$ (1 minute = 60 sec) = $3 : 50$

Here, $1 : 10 \neq 3 : 50$

Hence, The given ratios are not in proportion.

Example 16. Kalpana bought 4 pens in ₹20 and Anuradha bought 16 pens in ₹80. Whose pen were castly ?

Solution : The ratio of the number of pens bought by Kalpana and Anuradha is $4 : 16 = 1 : 4$.

Ratio of their prices = $20 : 80 = 1 : 4$

$4 : 16$ and $20 : 80$ are equal.

Thus, both bought pen in equal prices.

Exercise 12(c)

Four answers in question 1 and four answers in question 2 are given in following. Write the correct answer in your note book :

1. In proportionality terms $20 : 30 :: 60 : 90$:

- (i) 20 and 60 are middle terms
- (ii) 30 and 90 are out side terms

- (iii) 20 and 30 are out side terms
 (iv) 30 and 60 are middle terms
2. 25, 75, 500, 1000 are not in proportion because :
- (i) there is no outside terms here.
 (ii) product of outside terms $\neq$ product of middle terms.
 (iii) product of out side terms = product of middle terms
 (iv) The product of middle term = 3750.
3. Find the value of x in the following proportionality terms :
- (i) $x : 10 :: 20 : 40$ (ii) $16 : 8 :: 8 : x$
 (iii) $30 : 120 :: x : 300$ (iv) $2.5 : x :: 1.25 : 2.5$.
4. Write, whether the following statements are true or false :
- (i) $1 : 2 :: 2 : 4$
 (ii) The ratio 3 : 4 and ratio 3 : 5 are in proportion.
 (iii) 3 books : 12 buffalo :: 4 cows : 16 pens.
 (iv) Four terms of equal unit will be in proportion, if product of out side terms = product of middle term
5. The ratio of length and breadth of a rectangular room is 5 : 4. If the length of the room is 15 metres, then find the breadth.
6. In the school, laddus were prepared on 15 August to be distributed. The ratio of gram flour and sugar used is 1 : 3. If total 21 kg gram floor is used then find the amount of sugar used.
7. If 6, 18, x, 15 are in proportion then what would be the value of x ?
8. The ratio in the distances from Lucknow to Kanpur and distance from Lucknow to Prayagraj is 3 : 8 and the distance between Lucknow and Prayagraj is 200km, then what will be the distance between Lucknow and Kanpur ?
9. Boys and girls of a school planted plants separately in the ratio of 2 : 3. If total 1500 plants were planted in the school, then find out the number of plants planted by boys and girls separately.
10. Gaurav sold 10kg guava in ₹70 and Anil sold 5 kg of guava in ₹35. Whose guava is cheaper ? If so, then in which price they were selling the guava ? Are the both were sold in the same price ?

12.4 Percentage

Look at the forwarded picture and tell :

- How many squares are there ?
- A square coloured in black colour. It is in which part of the total squares.

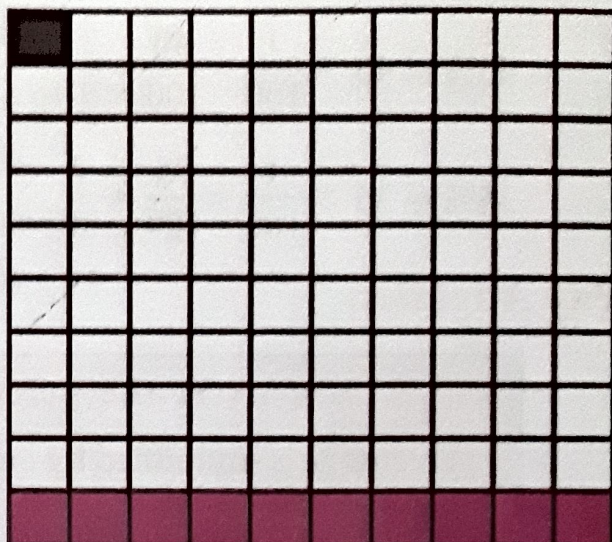
- How many squares are coloured in red ?
- Which part of the whole squares is the 10 squares of red colours ?

We see that :

A black coloured square is one hundredth ($1/100$)th of the whole squares.

Similarly,

10 squares of red coloured is ten hundredth $\frac{10}{100}$ of the whole square.



We call one hundredth as $\frac{1}{100}$ or 1 percent.

Similarly, 10 hundredth part is called $\frac{10}{100}$ or 10 percent.

Percent sign is represented as ‘%’.

See Also ,

$$8 \text{ in } 100 = \frac{8}{100} \quad \text{or } 8 \times \frac{1}{100} = 8\%$$

$$\frac{5}{50} = \frac{5 \times 2}{50 \times 2} = \frac{10}{100} \quad \text{or } 10 \times \frac{1}{100} = 10\%$$

Similarly,

$$80\% = \frac{80}{100} = 80 \times \frac{1}{100}$$

$$35.5\% = \frac{35.5}{100} = 35.5 \times \frac{1}{100}$$

Here, we have seen that :

- $\frac{1}{100}$ is written as percent sign, (%)
- 8% of 100 = 8, here 8 is the percentage on base 100.

Let's see how we change percentage into fraction

$$30\% = 30 \times \frac{1}{100} = \frac{30}{100} = \frac{3}{10}$$

$$40\% = 40 \times \frac{1}{100} = \frac{40}{100} = \frac{2}{5}$$

$$35\% = 35 \times \frac{1}{100} = \frac{35}{100} = \frac{7}{20}$$

Pay Attention

To convert the percentage into a fraction, the number of percentage is simplified by multiplying in it by $\frac{1}{100}$ in place of percentage sign %.

Converting Fraction into Percentage :

Example 17 : Convert the fraction $\frac{3}{20}$ into percent.

Solution : $\frac{3}{20} = \frac{3}{20} \times \frac{100}{100}$ (Because the value remains unchanged on multiplying both numerator and denominator by the same number)

$$= \left(\frac{3}{20} \times 100 \right) \times \frac{1}{100} = \left(\frac{3}{20} \times 100 \right) \%$$

$$= 15\%$$

Note : By multiplying numerator and denominator of $\frac{3}{20}$ by 5, it can be converted into 15%.

Example 18 : A Shopkeeper had 40 ice-cream cups. 25 cups were sold. How many percent of the total cups were sold ?

Solution : Sold part = $\frac{25}{40} = \frac{25}{40} \times \frac{100}{100} = \left(\frac{25}{40} \times 100 \right) \times \frac{1}{100}$

$$= 62.5 \times \frac{1}{100} = 62.5\%$$

Pay Attention :

To convert the fraction into percentage, we convert the fraction into such equivalent fraction, whose denominator should be 100. We put % sign in place of $\frac{1}{100}$.

Exercise 12(d)

- In the following tell the percentage on the base of 100 :
(i) 18% (ii) 24% (iii) 47% (iv) 63%
- Write the following in the simplest form of fraction :
(i) 12% (ii) 15% (iii) 75% (iv) 35%
- Convert the following fractions in percentage :
(i) $\frac{1}{4}$ (ii) $\frac{3}{20}$ (iii) $\frac{2}{5}$ (iv) $\frac{3}{4}$
- Fill in the blanks in the following table in your exercise notebook :

S.No.	Fraction form	Percentage
1	—	25%
2.	$\frac{3}{4}$	—
3.	—	16%
4.	$\frac{2}{5}$	—

Change of Percentage into Decimal Fraction :

See :

- Out of total squares 15 black coloured squares are :

15 hundredth part of total squares

$$= 15\% = \frac{15}{100}$$

$$= 0.15$$

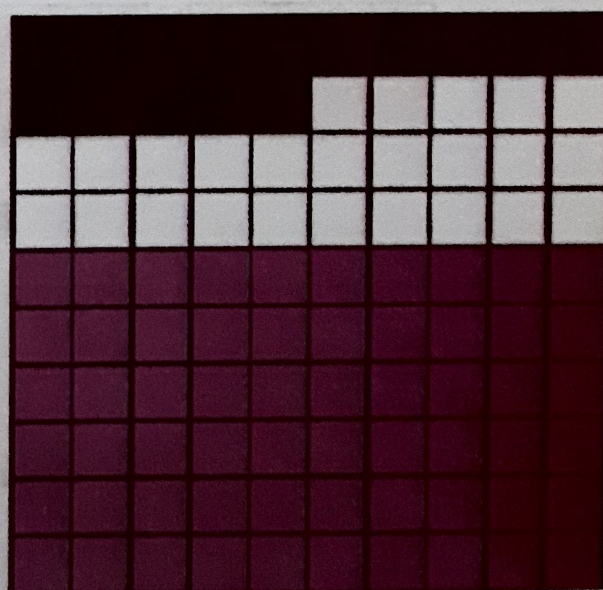
- 60 red squares, 60 hundredth part

$$\text{of total squares} = 60\% = \frac{60}{100}$$

$$= 0.60$$

Similarly,

$$75\% = 75 \times \frac{1}{100} = \frac{75}{100} = 0.75$$



Example 19 : Convert 65% into decimal fraction.

Solution : $65\% = 65 \times \frac{1}{100} = \frac{65}{100} = 0.65$

Try it :

In the following table, fill in the blanks in your exercise book

Percentage	45%	36%	78%	90%	12.5%	2.5%	200%	125%	—
Decimal fraction	0.45	—	—	—	—	—	—	—	0.5

To convert percentage into decimal remove % and replace decimal after two digit the left side.

To convert Decimal into Percentage

Convert 0.25 in percent

$$\begin{aligned} 0.25 &= 0.25 \times \frac{100}{100} = (0.25 \times 100) \times \frac{1}{100} \\ &= (0.25 \times 100)\% = 25\% \end{aligned}$$

Similarly, $0.085 = 0.085 \times \frac{100}{100} = (0.085 \times 100) \times \frac{1}{100}$
 $= (0.085 \times 100)\% = 8.5\%$

To convert decimal number in percentage, replacing decimal after two place right and write with % sign.

Exercise 12(e)

1. Convert the following in decimal :

(i) 25%

(ii) 35%

(iii) 30%

(iv) 80%

2. Convert the following in percentage :

(i) 0.12

(ii) 0.03

(iii) 0.025

(iv) 1.25

3. In the following table, fill in the blanks :

S.No.	Fraction form	Decimal	Percentage
1.	2/20	—	—
2.	—	0.3	—
3.	—	—	80%
4.	—	0.08	—
5.	—	—	5%

Find the value of a number according to Percentage :

Let us know the method of determining the value of any amount to the given percentage :

What will be the 35% of 500 ?

Here, 500 is given, 35% of this is to be known

$$35\% \text{ of } 500 = 500 \times 35\% = 500 \times 35 \times \frac{1}{100} = 175$$

Similarly, 30% of 360 = $360 \times 30\%$

$$= 360 \times 30 \times \frac{1}{100} = 108$$

Example 20. Shruti scored 65% of marks in the annual examination. If the total marks is 500, how many marks does Shruti get ?

Solution : Marks obtained by Shruti = $65\% \text{ of } 500 = 500 \times 65\%$
 $= 500 \times 65 \times \frac{1}{100} = 325$

To display an amount as a percentage of another amount :

View the picture

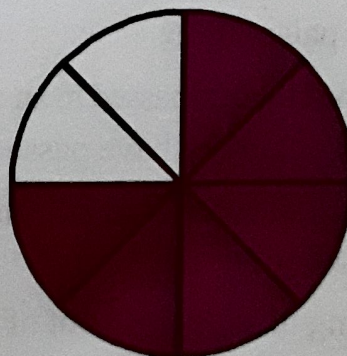
What percentage of the picture is shaded ?

We see that 6 parts out of 8 parts i.e.,

$\frac{6}{8}$ parts are shaded.

$$\frac{6}{8} = \frac{6}{8} \times \frac{100}{100} = \frac{6}{8} \times 100 \times \frac{1}{100}$$

$$= \left(\frac{6}{8} \times 100 \right) \% = 75\%$$



Example 21. Pratiksha scored 490 marks out of 700 in the annual examination. What percentage of total number did she get ?

Solution. Percentage of marks $= \frac{490}{700} \times \frac{100}{100} = \left(\frac{490}{700} \times 100 \right) \times \frac{1}{100}$

$$= \left(\frac{490}{700} \times 100 \right) \% = 70\%$$

Example 22. There are 500 children in a school, out of which in the annual examination 375 children passed. There are 800 children in another school, out of which 500 children passed in the annual examination. Which school has better result ?

Solution. The passing percentage of Children of first school

$$= \frac{375}{500} \times \frac{100}{100} = \frac{375}{500} \times 100 \times \frac{1}{100}$$
$$= \left(\frac{375}{500} \times 100 \right) \% = 75\%$$

Passing percentage of children of second school

$$= \frac{500}{800} \times \frac{100}{100} = \frac{500}{800} \times 100 \times \frac{1}{100} = \left(\frac{500}{800} \times 100 \right) \% = 62.5\%$$

Thus, the result of first school was better

Exercise 12(f)

1. How much will it be ?
 - (i) 30% of 250
 - (ii) 40% of 300
 - (iii) 45% of 120 kg
 - (iv) 75% of 678 litre
2. What percentage will it be ?
 - (i) 48 out of 144
 - (ii) 55 kg out of 220 kg
 - (iii) 25 paise of ₹5
 - (iv) 450 gram of 18 kilogram
3. 75% of the children passed in an examination. If 1500 children appeared in the examination, how many children have passed ?
4. There are 2800 children in a school. Of them, 980 are girls. What percentage of boys are in school ?
5. According to a report, 5 out of 10 deadly diseases for children in rural areas are due to polluted water, find how many percentage of diseases are caused due to polluted water?

6. There are 400 girls in a school, but due to some reasons about 12% of girls leave the school then find how many girls leave the school ?
7. In a blood donation camp, 300 members make voluntary blood donation. If only 30% of people of the total area of that place have donated blood, then find out the number of people who do not donate blood.
8. Under the Rural Toilets Construction Scheme, the government is granting ₹9000 to each family below poverty line. If in a village, a total of ₹10,80,000 were distributed under this scheme, then how many percentage of families were benefited in that village, if total 200 families reside in that village ?
9. There are total 40 wards in a municipality under the Mosquito Elimination Scheme, there is a provision of ₹2500 per annum on fagging in whole city. If the budget of one crore rupees is approved on general health then what percentage of the sanctioned amount is being spent on mosquito eradication ?
10. 16% of girls of a Girl school are suffering from Anaemia. If a total of 1920 tablets of iron were distributed to the girls at the rate of 30 tablets per girl child in some month by the Health Department, what is the number of girls receiving education in the school ?

Finding the increased percentage

Example 23. The price of diesel was ₹27.50 per litre. Now its value increased to ₹33.00 per litre. How much percentage increase is there in diesel price ?

Solution. Increased price of diesel

$$\begin{aligned} &\text{Current price of diesel per litre} - \text{Earlier (Previous) price of diesel per litre} \\ &= ₹(33.00 - 27.50) \text{ per litre} = ₹ 5.50 \text{ per litre} \end{aligned}$$

$$\text{Percentage increase in price} = \frac{\text{Increase in price}}{\text{Previous price}} \times 100$$

$$= \frac{5.50}{27.50} \times 100 = \frac{550}{27.50}$$

$$\therefore \text{Increase in price} = 20\%$$

Let us know how to find the percentage increase in value :

First we find the increased value

Then, divide by the previous value

Now, change the obtained fraction or quotient into the percentage

Example 24. The population of a town was 5,17,524 in the 1981 census. In the 1991 census, this population was 6,46,905. What percentage of the city's population is increased ?

Solution. Population in 1991 = 6,46,905

Population in 1981 = 5,17,524

Thus, increase in population = 6,46,905 – 5,17,524 = 1,29,381

Percentage increase in population = $\frac{\text{increase in population}}{\text{previous population}} \times 100$

$$= \frac{1,29,381}{5,17,524} \times 100$$

$$= \frac{1,29,38100}{5,17,524} = 25$$

Hence, the population of the city was increased by 25%.

Finding a Reduced (Decreased) Percentage

Example 25. The price of sugar was ₹16.00 per kg. Its value decreased to ₹14.00 per kg. What percentage of the sugar decreased ?

Solution. Reduction in price of sugar = ₹(16.00 – 14.00) per kg = ₹ 2.00 per kg.

Percentage decrease in price of sugar

$$= \frac{\text{reduction in the price}}{\text{original price}} \times 100$$

$$= \frac{2}{16} \times 100 = 12.50$$

In this way, we see

$$\text{Percentage increase} = \frac{\text{increased value}}{\text{original value}} \times 100$$

$$\text{Percentage decrease} = \frac{\text{decreased value}}{\text{original value}} \times 100$$

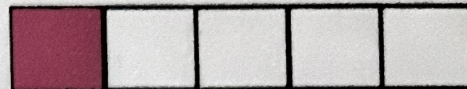
Exercise 12(g)

1. How much will it be :

- (i) 12% of ₹ 150 (ii) 40% of 60 kg
(iii) 15% of 2.5 metre (iv) 75% of 1250 litre

2. Look at the figure and tell :

- (i) The shaded part is which part of the whole part.
(ii) What percentage of the shaded part is to the whole part ?



3. Convert the following into the percentage :

- (i) $1/5$ (ii) $3/8$ (iii) $3/25$ (iv) $1\frac{3}{5}$

4. Change the following into decimal :

- (i) 12.5% (ii) 45% (iii) 62.5% (iv) 85%

5. Fill in the blanks in your exercise book :

S.No.	Fraction form	Decimal form	Percent form	Percentage
(i)	$\frac{2}{5}$	—	—	—
(ii)	—	0.4	—	—
(iii)	—	—	40.5%	—
(iv)	—	—	—	8

6. What percentage will it be ?

- (i) ₹10 of ₹50 (ii) 22.5 metre of 90 metre
(iii) 135 kg of 450 kg (iv) 42 litre of 100 litre

Pick out the correct option in question 7 to 9.

7. A tempo was moving at a speed of 25 km/hr. His speed increased by 5%. Now, its speed will be :

- (a) 30 km/hr (b) 105 km/hr
(c) 26.25 km/hr (d) 23.75 km/hr

8. The temperature of some places was 40°C in the month of April on 10th. Due to the rain on the next day, the temperature fell by 30%. Now the temperature will be :

- (a) 70°C (b) 10°C (c) 12°C (d) 28°C

9. The price of an object was ₹800. It's price decreased by 8%. Now, the new price will be :
(a) ₹64 (b) ₹736 (c) ₹864 (d) ₹792
10. 15% of the people in a village are illiterate. If the population of the village is 2400, how many people in the village are illiterate ?
11. Rahim gets 33 marks out of 50 marks in mathematics and 36 out of 60 marks in Hindi. In which subject Rahim gets good marks ?
12. There are 2500 men and 2400 women in a village. In the other village there are 4000 men and 3600 women. In which village there is more percentage of women ?
13. Akram scored 12 marks out of 20 in a subject. What percentage of marks did he get?
14. In a garden, 37.5% of trees are of jamun. The remaining trees are of mango. If the total number of trees in the garden are 400, then what is the number of mango trees ?
15. Madan bought 90 apples from the market. If 20% of apples are bad, then how many apples are good ?
16. There are 600 soldiers in a camp. 60 more soldiers came. How many percent increase in soldiers ?
17. A pillar is 16 metres long. Its 40% is red, 25% is black and the remaining is yellow. How many metres will the yellow painted part is ?
18. The population of a village decreases by 12%. If the population of the village is 25000, how many people will be in the village after the population decreases ?
19. There were 80,000 voters in an election area. Out of two candidates, one candidates gets 60% of votes cast. If total 80% votes cast, how many votes will the other candidate get?
20. One rod was 72 cm long. Out of this, 9 cm long pegs were made by cutting. How many percent of the rod is now reduced ?
21. The number of children in class 6 in a school is 15% of the total school children. If the number of children in class 6 is 51, how many children are there in the school ?
22. Under the Rural Electrification Project, on average ₹180 is spent per month on lightening of 2 bulbs and running of one fan per family. If the expenditure of electricity generation increases of 20% then how much will be the cost of electricity per family per month ?

Profit-Loss

Buying is a normal process of our daily life. The price in which an item is purchased, is called its cost price and the price in which it is sold, is called its selling price. Generally it is clear that if the cost price of an item is less than its selling price then there is a profit in selling the item and the profit is equal to the difference between the selling price and the cost price. Let's write this as :

$$\text{Profit} = \text{Selling Price} - \text{Cost Price}$$

If the selling price of the item is less than the cost price, then there is a loss in selling the item and the loss is equal to the different between the cost price and the selling price, we write it in this way :

$$\text{Loss} = \text{Cost Price} - \text{Selling Price}$$

Profit and loss are determined only on the cost price.

Let's consider the relationship between cost price, selling price, profit and loss. Above, we have checked that when the selling price > Cost Price, then there is a profit in selling the item.

$$\text{Profit} = \text{Selling price} - \text{Cost price.}$$

When the selling price < Cost price, then there is a loss in selling the item.

$$\text{Loss} = \text{Cost price} - \text{Selling price}$$

Example 26. Ramesh bought an old bicycle in ₹650 and spent ₹150 on repairing of that. He sold the bicycle in ₹825. How much profit did he get ?

$$\begin{aligned} \text{Cost price of the bicycle} &= ₹650 \\ \text{Expenses in Repairing} &= ₹150 \\ \text{Actual cost Price} &= ₹(650 + 150) = ₹800 \\ \text{Selling price of the bicycle} &= ₹825 \\ \therefore \text{Profit} &= \text{Selling price} - \text{Actual cost price.} \\ &= ₹(825 - 800) = ₹25. \end{aligned}$$

In this way, before selling the item, additional expense done on the item like wages, vehicle fees, repairing etc., are called over head charges ? There over head charges become part of the cost price.

Thus, in case of over head charges,

$$\text{Actual cost price} = \text{Price of item at time of buying} + \text{Over head charges.}$$

Exercise 12(h)

1. Fill in the blanks in the following table in your exercise book :

S.No.	Cost Price (in Rs.)	Selling Price (in Rs.)	Profit (in Rs.)	Loss (in Rs.)
1.	100	115		—
2.		1500	300	—
3.	700		—	150
4.	1200	1100	—	

2. Rahim bought a clock in ₹1400 and sold it in ₹1600. How much did he gain ?
3. Geeta sold a sari in ₹750, she suffered a loss of ₹125. Find the cost price of the sari.
4. A farmer bought a cow in ₹13000 and sold it in a loss of ₹2500. In what price the farmer sold the cow ?
5. Harish bought an old Scooter in ₹7000 and spent ₹600 in its repairing. Tell the cost price of the scooter.
6. David purchased a house in ₹48000. He spent ₹2000 in its painting and decoration. He sold that house for ₹55000. Tell how much profit has he get ?

12.5.1. Profit – Percent, Loss – Percent

- Teacher will develop the concept of profit-loss and borrow etc. To the students by playing role of shop keepers and customers.

Example 27 : A book seller bought a book in ₹20 and sold it in ₹21 and the other book seller bought a book in ₹50 and sold it in ₹51.

Think :

- (i) How much profit did the first book seller have ?
- (ii) How much profit did the second book seller have ?
- (iii) Which book seller have more profit ?

For the first book seller ?

Cost price = ₹20

Selling price = ₹21

Profit = ₹ (21 – 20) = ₹1

For the second book seller :

Cost price = ₹50

Selling price = ₹51

Profit = ₹ (51 – 50) = ₹1



You see that both sellers are getting the same profit. In such a situation, would it be right to say that the business of both of them is running smoothly and well ? No, why ? Now, think about it.

Is the money investment of both of them is equal to take the total profit ? No. profit is same but the money investment are different. The first book seller earned ₹1 profit by investing ₹20 and other earned ₹1 profit by investing ₹50 which is two and half times more than as invested by first. It is obvious that the first book seller is more beneficial than the other because he is taking the same benefit in less investment where as the second book seller is earning by investing more amount.

Try it :

- (i) Ramesh sells pencil of ₹10 price in ₹15 and Anwar sells pencil of ₹30 in ₹35. Who earned more profit and why ?
- (ii) A lemon seller bought 4 lemons in ₹5 and sold 5 lemons in ₹4 . Think, the seller is in profit or in loss ?
- (iii) Take some companions of your class and tell them from different ways of investing money and taking examples of less investment from some and more investment from some develop the concept of selling price and calculate the profit and loss.

Let's consider whether there will be equal benefits on applying the same money (same cost price) ? Will there be different profit or loss or different money ? In reply, you must say sometimes yes, sometimes no.

Take an example :

Ambika's father purchased a cow in ₹1500 and sold it in ₹1800, Ambika's uncle also purchased a cow in ₹1500 but because of the broken horn of the cow, uncle got only ₹1200 where he sold that cow, Cost prices is same but one gets benefited but other gets loss.

There is another way of capital investment - investing the capital in ratio. When the capital is in ratio, how will the profit and loss be divided ? Think about it. For ex. Ganesha and Govind invested their money in a business in the ratio 2 : 3 and at the end of the year, how will the profit of ₹500 be distributed among them ?

Would it be advisable to share equal benefits ? Not at all. Let's understand, according to 2 : 3, Ganesha gets 2 and Govind will get a share of 3 i.e. Ganesha will get $\frac{2}{5}$ th of total profit and Govind will get $\frac{3}{5}$ th part of total profit. Ganesha will be benefited with $\frac{2}{5}$ th of profit i.e. $\frac{2}{5}$ th of ₹500 = ₹200. How much benefit will Govind get this profit will be what part of the total profit ? Find out.

You have Learnt

- (i) Comparing two or more than two ratios.
- (ii) To find equality or inequality of fractions or ratios from the unitary methods.

Now, we will learn calculation based on 100 units in place of 1 unit :

Take the example of the beginning of this paragraph (12.5)

For the first Book Seller :

Profit on cost price of ₹20 = ₹1

∴ Profit on cost price of ₹1 = ₹1/20

$$\therefore \text{Profit on cost price, ₹100} = ₹ \left(\frac{1}{20} \times 100 \right) \\ = ₹5$$

$$\therefore \text{Profit} = 5\%$$

For the Second Book Seller

$$\text{Profit on ₹50, cost price} = ₹1$$

$$\therefore \text{Profit on ₹1 cost price} = ₹1/50$$

$$\therefore \text{Profit on cost price of ₹100} = ₹ \left(\frac{1}{50} \times 100 \right) \\ = ₹2$$

$$\therefore \text{Profit} = 2\%$$

Thus, it is obvious that Profit earned by first book seller = 5%

Profit earned by Second book seller = 2%

Thus, the business of first book seller is more beneficial than the second book seller.

Profit or loss is represented in percentage to compare profit or loss in two business men.

Example 28. Kamla bought a sewing machine in ₹500 and sold it in ₹540. How much percent of profit does she get ?

$$\text{Cost Price} = ₹500$$

$$\text{Selling price} = ₹540$$

Selling price is greater than the cost price

$$\therefore \text{Profit} = \text{Selling price} - \text{Cost price} \\ = ₹ (540 - 500) = ₹40$$

First Method

$$\begin{aligned} \text{Profit : Cost price} &= 40 : 500 \\ &= 8 : 100 \text{ (making second term 100)} \\ \text{Profit} &= 8\%. \end{aligned}$$

Second Method

$$\begin{aligned} \text{Profit on cost price of ₹500} &= ₹40 \\ \therefore \text{Profit on cost price of ₹1} &= ₹ \frac{40}{500} \\ \therefore \text{Profit on cost price of ₹100} &= ₹ \frac{40 \times 100}{500} \\ &= ₹8 \\ \therefore \text{Profit} &= 8\% \end{aligned}$$

$$\text{We see, profit percent} = 40 \times \frac{100}{500}$$

$$\therefore \text{Profit percent} = \frac{\text{Profit} \times 100}{\text{Cost price}}$$

$$\text{Profit percent} = \text{Profit} \times \frac{100}{\text{Cost price}}$$

$$\text{In this way, loss percent} = \text{loss} \times \frac{100}{\text{Cost price}}$$

Example 29 : A trader buys wheat at a rate of ₹500 per quintal and sells it at the rate Rs 450 per quintal Tell the percentage of loss/

Solution : Cost price = ₹500 per quintal
 Selling price = ₹450 per quintal
 Loss of trader = cost price – selling price
 = ₹ (500 – 450)
 = ₹50 per quintal

$$\text{Loss percent} = \text{Loss} \times \frac{100}{\text{Cost price}} = 50 \times \frac{100}{500} = 10$$

Thus, the trader, will get a loss of 10%.

Example 30. Gopal bought a radio in ₹300. In how much rupees should be sold to get 20% profit ?

Solution : Cost price of Radio = ₹300
 Profit = cost price of 20%
 = ₹ $\frac{300 \times 20}{100}$ = ₹60

Selling price of Radio = Cost price + Profit
 = ₹ (300 + 60)
 = ₹360

Hence, Gopal should sell the radio in ₹360.

Example 31. Rita sold a cow on the profit of 25%. If Rita get total profit of ₹350 then find out the selling price of the cow ?

Solution

$$\text{Total Profit} = ₹350$$

$$\text{Profit - percent} = ₹25.$$

$$\therefore \text{ If ₹25 is the profit, cost price} = ₹100$$

$$\therefore \text{ If ₹1 is the profit, cost price} = ₹100/25$$

$$\begin{aligned}\therefore \text{ If profit is ₹350, cost price} &= \frac{100 \times 350}{25} \\ &= ₹1400\end{aligned}$$

$$\text{Selling price of the cow} = \text{Cost price} + \text{Profit}$$

$$= ₹(1400 + 350) = ₹1750$$

Example 32 : A bicycle when sold in ₹1800, there is a loss of 10%. What will be the cost price of the bicycle ?

Solution : Loss = 10%

i.e. The item of 100 cost price is sold in ₹90.

$$\therefore \text{ If the selling price is ₹90, cost price} = ₹100$$

$$\therefore \text{ If the selling price is ₹1, cost price} = ₹100/90$$

$$\begin{aligned}\therefore \text{ If the selling price is ₹1800, cost price} \\ = ₹100 \times 1800/90 = ₹2000\end{aligned}$$

Example 33 : A person bought 4 dozen eggs at the cost of ₹15 per dozen. Six of them are broken and he sold the rest of them at ₹20 per dozen. Tell profit or loss in percentage.

Solution : Cost of 4 dozen eggs = ₹15 × 4 = ₹60

Broken eggs = 6

$$\begin{aligned}\text{Remaining eggs} &= (4 \times 12 - 6) \text{ eggs} \\ &= (48 - 6) \text{ eggs} = 42 \text{ eggs}\end{aligned}$$

$$\therefore \text{ Selling price of 12 eggs} = ₹20$$

$$\therefore \text{ Selling price of 1 egg} = ₹\frac{20}{12}$$

$$\therefore \text{ Selling price of 42 eggs} = ₹\frac{20 \times 42}{12} = ₹70$$

$$\text{Selling price} = ₹70$$

$$\begin{aligned}\text{Profit} &= \text{Selling price} - \text{Cost price} \\ &= ₹ (70 - 60) = ₹10\end{aligned}$$

$$\begin{aligned}\text{Profit Percent} &= \frac{\text{Profit} \times 100}{\text{Cost Price}} \\ &= \frac{10 \times 100}{60} = 16\frac{2}{3}\end{aligned}$$

A person gets a profit of $16\frac{2}{3}\%$

Exercise 12(i)

1. Fill in the blanks wherever it is possible, in the following table in your exercise book.

S.N.	Cost Price (in ₹)	Selling Price (in ₹)	Profit (in ₹)	Loss (in ₹)	Profit % (in %)	Loss % (in %)
1.	200	212	.....		.....	
2.	500	480		.....		.....
3.	.....	495	45		.....	
4.	800	825	.....		.....	
5.	1200	.....	144		.....	

- A shopkeeper purchased a book in ₹10 and sold it in ₹11. What will be the profit percentage?
- A merchant purchased 10kg Ghee in ₹1500 and sold at the rate of ₹200 per Kg. Tell how much profit percent does he get?
- A heater was purchased in ₹180 and sold in ₹160. Find what percentage of loss has happened?
- If a watch was purchased in ₹360 and sold on 10% profit, then find its selling price.
- Romesh purchased a scooter in ₹36000. In what amount did he sell it to earn a profit of 30%.
- A tape recorder was sold in ₹880 with a loss of 12%. Find out its cost price.
- Mohit bought a Almirah in ₹2500 and sold it with a loss of 6%. Find out the selling price of the Almirah.
- A furniture seller sold a Sofa set in ₹4620 with a profit of 5%. Find out his profit.

10. Find the percentage profit or percentage loss, if
- | | |
|-------------------------|------------------------|
| (a) Cost price = ₹120 | Selling Price = ₹150 |
| (b) Cost price = ₹500 | Selling price = ₹650 |
| (c) Cost price = ₹90.75 | Selling price = ₹60.50 |
11. There is loss of 8% on selling 7 tables in ₹1288. Find the cost price of one table.
12. A fruit-seller bought some oranges at a price of ₹10 per dozen and sold them at a price of ₹9 per dozen. Find his loss percent.
13. A person bought 5 dozen eggs at ₹12 per dozen. 10 out of them have broken and he sold the rest at ₹18 per dozen. Find his percentage profit or loss.
14. Explain, which are true and which are false in following :
- (1) Profit percentage = $\frac{\text{Profit}}{\text{Cost Price}}$
 - (2) 20% profit means, ₹20 profit on cost price of ₹100 and selling price ₹80.
 - (3) Profit percent or loss percent are always calculated on cost price.

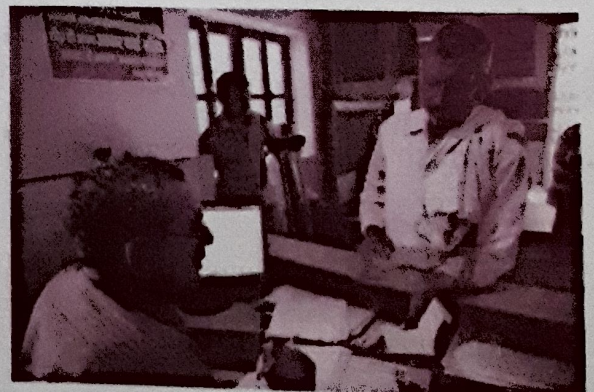
Simple Interest

It is often seen that it is very difficult to work in any practical life of a person without lending transactions. The process of lending is done by banks, cooperative societies or any other person. Do you know that there is some condition in the transaction of lending ? You should be aware that the lender keeps certain conditions in front of the borrower, under which the lender has to pay the borrower a yearly or monthly at a rate of some rupees more on ₹100.

The amount of money he lends is called Principal. amount. The amount of money that is paid on completion of the term of the condition is called mixed amount and the money paid more than the principle amount is called the interest. Let's understand this by an example :

Example 34. Ramesh borrowed ₹500.00 from a bank at a rate 4% annual interest. Calculate the interest after two years.

Solution : Principal amount = ₹500.00
 Time : 2 years
 Rate = 4% annual
 Interest of ₹100 is 1 year = ₹4
 $\therefore$ Interest of ₹1 in 1 year = ₹ $\frac{4}{100}$



$$\therefore \text{Interest of ₹500 in 1 year} = ₹4 \times 500/100$$

$$\therefore \text{Interest of ₹500 in 2 years} = ₹ \frac{4 \times 500 \times 2}{100}$$

$$= ₹40$$

$$\therefore \text{Interest} = ₹40$$

Think the following

1. A farmer takes ₹5000 loan from a bank to buy bulls. After one year, he pays ₹5500 to the bank and returns the loan. Think, why did the bank given loan to the former ?
2. A trader deposited ₹3,000 in bank. He withdraw the total money from the bank after 2 years. The bank gave him ₹3300 back. Think why the trader deposited the money in the bank ?

Notice it :

1. The bank has given loan to get more money.
2. The trader deposited the money in the bank to get more money than he deposited.

It is clear that returned money is more than the borrowed money or more money is received from the amount deposited. This excess money has been given the name 'interest'.

Deposited or borrowed money which is returned more than that money is called interest.

- The amount of deposit or loan is called 'principal amount'.
- For a fixed period, money is deposited or dept. remains. This period is called 'Time'.
- The interest received for 1 year on the principal amount of ₹100 is called 'interest rate'. We express interest rate by 'rate' also.
- Rate of interest is also used as in the form of percent third monthly or percent six monthly or half-yearly or per rupees per moths.

Interest depends on following three things :

- How much money has been deposited or borrowed ?
- For how much time did the money deposited or borrowed ?
- At which interest rate did the money deposited or borrowed ?

Example 35. Santosh took ₹1,500 loan from a bank to buy a bicycle and after 1 year, he returned ₹1620 and deposited the loan. Tell what interest Santosh has given ?

Solution : Principal amount = ₹1500
Amount Refunded = ₹1620
Interest = Amount Refunded – Principal amount
= ₹1,620 – ₹1,500
= ₹120

Types of Interest

There are two kinds of interest :

- (1) Simple Interest
- (2) Compound Interest

Interest per year is the same in finding simple interest. While compound interest starts increasing from the second year. This is because in the second year interest is calculated on the added amount of principal amount and interest of first year. Similarly, in the third year, interest is calculated on the added amount of principal amount and interest of first year and interest of second year. In this unit, we will study simple interest and use the word interest for simple interest. Compound interest will be studied in the next class.

Example 36. Find the interest of 1 year at the rate of 4% half yearly for ₹500.

Solution

Principal amount = ₹500
Time period = 1 year = 2 half yearly
Rate of half yearly = 4%.

First Method

Interest of first half year on ₹100 = ₹4

Interest of first half year on ₹1 = ₹ $\frac{4}{100}$

Interest of first half year on ₹500 = $\frac{500 \times 4}{100}$

Interest of two half years on ₹500 = $\frac{500 \times 4 \times 2}{100}$

∴ Simple Interest = ₹40

Second Method

Simple interest of 1 half year = 4% of ₹500

$$= \frac{500 \times 4}{100}$$

$$= ₹20$$

Simple interest of 2 half years = ₹2 × 20

$$= ₹40$$

Example 37 : ₹400 is borrowed at the rate of 6% annual interest for 3 years. Find out the interest.

Solution

First Method

In 1 year interest on ₹100 = ₹6

In 1 year interest on ₹1 = ₹6/100

In 3 years interest on ₹400 = ₹ $\frac{400 \times 6 \times 3}{100}$

$$= ₹72$$

Second Method

Interest of 1 year = 6% of ₹400

$$= \frac{6}{100} \text{ of ₹400}$$

$$= ₹400 \times \frac{6}{100}$$

∴ Interest of 3 years = $\frac{400 \times 6 \times 3}{100}$

$$= ₹72$$

Look at the solution of the above example 37 and tell :

- (i) ₹400 is what type of money
- (ii) $6\% = \frac{6}{100}$, what does it represents ?
- (iii) 3 is used for what ?

We see that :

- (i) ₹400 is the principal amount
- (ii) 6% or $\frac{6}{100}$ is the interest rate.
- (iii) 3 has been used to tell the time.

From the above examples, we conclude that the interest is related to the principal amount, time and interest rate. All four means the value of any one of the principal amount, time, interest rate and the interest depends on the value of the remaining three. Their relation is written as the following formula :

$$\text{Interest} = \frac{\text{Principal amount} \times \text{Rate} \times \text{Time}}{100}$$

We can also calculate the interest rate from the following poem :

“Principal, interest rate, time, Mohan multiplies

Divide by 100, interest will be available immediately”.

Here Mohan is addressed as a student.

Example 38 : Find the simple interest at the rate of 12% annually on ₹500 for 3 years.

Solution Principal amount = ₹500

Time = 3 years

Rate = 12% annually

$$\begin{aligned} \text{Interest} &= \frac{\text{Principal amount} \times \text{Rate} \times \text{Time}}{100} \\ &= \frac{₹500 \times 12 \times 3}{100} \\ &= ₹180 \end{aligned}$$

Try it :

- (i) Of how much principal amount, will be the interest ₹360 for 2 years at annual rate of 10% ?
- (ii) Sumit borrowed some money from Mohit at the rate of 5% annual interest. Mohit lended the whole money in the same day to Virju at a rate of $8\frac{1}{2}\%$ annual interest. After one year, Mohit has get the benefit of ₹350 in these transaction. How much money did Sumit give to Mohit ?

Amount

Ashraf borrowed ₹1500 from the bank to buy a bicycle at an annual rate of 4%. Simple interest and completed the loan in 2 years. How much interest did Ashraf paid to the bank ? Also, that how much money did Ashraf return to the bank ?

Principal Amount = ₹1500

Rate = 4% annual

Time = 2 years.

$$\begin{aligned}\text{Interest} &= \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100} \\ &= ₹ \frac{1500 \times 4 \times 2}{100} \\ &= ₹120\end{aligned}$$

Money returned to the bank of Ashraf
 $= (\text{Principal Amount} + \text{Interest})$
 $= ₹ (1500 + 120)$
 $= ₹1620$

Here, ₹1620 is called the amount.

Amount	=	Principal + Interest
Principal	=	Amount - Interest
Interest	=	Amount - Principal

Example 39 : If principal amount = ₹2500, time = 2 years,
 Rate = 12% annual, find the interest and the amount.

Solution : Interest $= \frac{P \times R \times T}{100} = ₹600$ (where P = Principal,
 R = Rate, T = Time)

$$\begin{aligned}\text{Amount} &= \text{Principal} + \text{Interest} \\ &= ₹2500 + ₹600 = ₹3100\end{aligned}$$

Example 40 : Mata Prasad took loan of 5 packet urea manure at the rate of 12% annual interest from the Resource committee, at ₹230 per packet. At the end of the year, how much money should he give to the committee ?

Solution : Price of 5 packet urea manure $= ₹230 \times 5 = ₹1150$

$$\begin{aligned}\text{Interest} &= ₹ \frac{1150 \times 12 \times 1}{100} \\ &= ₹138\end{aligned}$$

$$\text{Amount} = ₹1150 + ₹138 = ₹1288.$$

At the end of the year, Mata Prasad will have to give to the committee = ₹1288

Example 41 : At what annual interest rate will the amount of any money becomes 3 times in 10 years ?

Solution : Let the principal amount = ₹100
Amount = 3 times the principal = ₹300
Interest = ₹300 – ₹100 = ₹200
 $\therefore$ Interest on ₹100 in 10 years = ₹200
 $\therefore$ Interest on ₹100 in 1 year = ₹ $\frac{200}{10}$ = ₹20
Annual Interest rate = 20%.

Example 42 : The amount in 2 years at 6% annual rate is ₹560. Find the principal amount.

Solution : $\therefore$ Interest of 1 year on ₹100 = ₹6
 $\therefore$ Interest of 2 years on ₹100 = ₹2 $\times$ 6 = ₹12
Amount = ₹100 + ₹12 = ₹112
 $\therefore$ If Amount is ₹112, principal amount = ₹100
 $\therefore$ If Amount is ₹1, principal = ₹ $\frac{100}{112}$
 $\therefore$ If Amount is ₹560, principal amount = ₹ $\frac{100 \times 560}{112}$ = ₹500

Exercise 12 (j)

1. Interest = $\frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$ and fill in the blanks in the following questions after writing in your copy :

- (a) $\boxed{} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$ (b) Principal = $\frac{\text{Interest} \times 100}{\text{Rate} \times \boxed{}}$
(c) Rate = $\frac{\text{Interest} \times 100}{\boxed{} \times \text{Time}}$ (d) Time = $\frac{\text{Interest} \times 100}{\text{Principal} \times \boxed{}}$
(e) Interest = $\frac{\text{Principal} \times \text{Rate} \times \text{Time}}{\boxed{}}$

2. Draw the following table in your note book and fill in the blanks :

S.No.	Principal (in Rs.)	Interest (in Rs.)	Amount (in Rs.)
(i)	100	10	$\boxed{\phantom{000}}$
(ii)	500	$\boxed{}$	525
(iii)	$\boxed{}$	50	600
(iv)	1000	$\boxed{}$	1120

3. Tell the rate of interest :

S.No	Principal Amount	Time	Interest	Rate of Interest
(i)	₹100	1 year	₹8	
(ii)	₹400	1 year	₹20	
(iii)	₹600	2 years	₹72	

4. Calculate the interest

S.No	Principal Amount	Rate	Time	Interest
(i)	100	7%	3 years	
(ii)	500	4%	5 years	
(iii)	50	2 paisa per rupees per month	4 month	

5. By selecting the correct options from given below in bracket and fill in the blank in your note book. (Interest, Principal, Rate, Amount)
- (a) The money which is borrowed or lend to some one, is called
- (b) The additional amount to be paid for the use of the money borrowed, is called
- (c) = Principal + Interest
- (d) Amount – Interest =
6. Calculate the annual interest rate, if principal = ₹100, time = 1 year and amount = ₹107.
7. A former borrowed ₹2400 at the rate of 12% annual interest. He fulfilled the loan by giving ₹1200 and one cow after $2\frac{1}{2}$ years. Find the value of the cow.
8. What is the meaning of ₹12.5% annual interest ? Write.
9. George gave ₹3600 donation to a school. 6 scholarship of same amount are delivered from the interest of the donation amount. If there is an interest of 10% on this donation amount annually, then find the amount of each scholarship.
10. Karim takes a loan of ₹15000 from a bank to plant a garden. For the purchase of plants, after giving 20% discount on the loan, bank takes simple interest at the rate of 9% annually on the remaining amount Karim pay to full fill the loan.
11. At what annual simple interest, the amount of any money will become 4 times in 20 years ?

12.7. Applied Mathematics (Practice)

With the development of human civilization, the interaction and process of purchase and selling of goods was started. In the earliest period, people used to calculate the mathematical problems related to daily life orally calculating the rate of objects or their measurement in the smallest part for the calculation by computing them and adding them to determine the values of objects in the simplest form. Even today, many people find the values of objects easily by using this method.

The simplest method of calculation used in the practical life is called applied mathematics. Most of the activities in it are verbal.



Salim's Shop

Mohan bought 4 kg potato at the rate of 3.75 per kg from Salim's shop. Mohan was calculating the price of potato in his mind, then Salim said pay ₹15.00, how long will you keep adding ? Mohan was in surprise, on the calculation of Salim. He asked him about the art of calculating amount so quickly Salim laughed and said :

Hey brother :

1. At the rate of ₹3, ₹12
2. At the rate of 50 paisa, ₹2
3. At the rate of 25 paisa, ₹1

In this way, at the rate of ₹3.75, price of 4 kg potato = ₹15

- The calculation method of the price as mentioned by the Salim vendor is as following :

₹4.00	At the rate of ₹1.00 per kg
₹12.00	At the rate of ₹3.00 per kg
₹2.00	At the rate of ₹0.50 per kg
₹1.00	At the rate of ₹0.25 per kg
₹15.00	At the rate of ₹3.75 per kg

$$50 \text{ paisa of ₹1} = \frac{1}{2}$$

$$25 \text{ paisa of 50 paisa} = \frac{1}{2}$$

- We can calculate or find the price of 4 kg potato at the rate of ₹3.75 per kg applied mathematics in the following way :

₹4.00	At the rate of ₹1.00 per kg
₹16.00	At the rate of ₹4.00 per kg
₹1.00	At the rate of ₹0.25 per kg
₹15.00	At the rate of ₹3.75 per kg

$$25 \text{ paisa of ₹1} = \frac{1}{4}$$

This method of calculation used in practice in daily life is called practical mathematics.

Most of the process in Practice mathematics are verbal and quick. For this quick practice of calculating $\frac{1}{2}$ (half), $\frac{1}{4}$ (one-fourth), $\frac{1}{3}$ (one-third), $1\frac{1}{4}$, $1\frac{1}{2}$ of a number is required.

Conclusion

In the practical mathematics, the calculation of required value can be done in different ways but it is best to adopt the simplest and easy method with own understanding.

Example 43. To make a shirt, 2.25 meter of cloth is required. How much cloth is required for making 15 such shirts ?

Solution :

$$\text{Cloth of 5 shirts} = \frac{1}{2} \times 10 \text{ cloth of shirt.}$$

2.25 meter	cloth used in 1 shirt
22.50 meter	cloth used in 10 shirts
11.35 meter	cloth used in 5 shirts
33.75 meter	cloth used in 15 shirts

Example 44. Find the product of 28.4 and 99.5 by the method of practical mathematics.

Solution :

28.4	multiplying 28.4 by 1
2840.0	multiplying 28.4 by 100
14.2	multiplying 28.4 by 0.5
2825.8	multiplying 28.4 by 99.5

$$0.5 = 1/2 \text{ of } 1$$

Exercise 12(k)

Choose the correct options and fill in the blanks in following questions :

1.

1	3.50
10	35.00
20	.....

- (a) 65.00 (b) 70.00 (c) 75.00 (d) 80.00

2.

1	2.25
10	22.5
12	.....

- (a) 25.00 (b) 28.00 (c) 27.00 (d) 30.00

3.

1	1.25
10	12.50
5	.....

- (a) 6.25 (b) 6.50 (c) 7.00 (d) 5.00

- In a school 175 meter of thick cloth was purchased at the rate of ₹4.25 per meter. Find out the price of total cloth by practice mathematics.
- The weight of one bag potato is 79.740 kg. Find out the weight of such 151 bags potato by practice mathematics.
- Find the price of 95kg sugar at the rate of ₹16.25 per kg by using practice mathematics.
- A car gives an average of 16.50 km in one liter petrol. How far can the car go in 15 liter petrol . Find out by practice mathematics.

Concept of Currency

1. Exchange System

Introduction

The need for cooperation of each other was realised with the socialization of human beings and to make the life simple and convenient, the exchange of the items produced by us to other person and the items produced by other person for the use of us is called process of exchange system.

Example :

1. Akshara sold the junk papers collected by her mother in Deepawali to the scrap vender and bought garland of it.
2. Vimal gave two Chocolates to Manya and two pens to Aastha, but Manya started to insist her mother for the pen, then on the mother's explanation, Manya gave a Chocolate to Aastha and became happy by getting one pen from Aastha.
3. When Pranjal went to the shop to buy a pen, the shopkeeper said that go home and bring 10 rupees, then you can take this pen.

After looking on the above examples, it was known that Akshara received a garland by giving the paper, Manya received a pen with a chocolate and Pranjal got the pen by giving 10 rupees. All of them have their favourite items by changing (exchanging) their own objects. This system is called the exchange system.

Pay Attention

With the above examples, Akshara and Manya received their favourite objects by exchanging their objects while Pranjal did not give the object, he gave the money (rupees) and received the desired object.

Commodity Exchange

When we give our objects to some one and receive the object we need from him, then this is called commodity exchange.

Service Exchange

When someone gives his services and receives services from others, it is called service exchange.

Currency Exchange

When some one gives a symbolic form of money (rupees, cheque, money transfer etc.) and receive goods or services or his need, it is called currency exchange.

Need of Currency

From the ancient time, people used to travel long distances for doing business. Due to the difficulties of the routes and the overwhelming majority of their objects by giving their objects to others to get objects in exchange but due to the heavy weight of the goods and to ease the exchange of goods easily at all places, an all-inclusive currency was needed. like-gold coins, silver coins, paper money, currency of other metals etc.

Characteristics of Money

The following are the major characteristics of currency in all countries of the world :

1. Currency should be convenient to carry from one place to another.
2. There should be not more difference in the value of the currency.
3. The currency should be certified.
4. Convenient to exchange currency.
5. The (dummy) model of currency can not be drawn easily.

Like any note (letter currency) issued by the Indian government can conveniently move from one place to another. The value of ₹10 note will remain ₹10 in the entire India.

Read and give Answer :

1. Akshat gave his toffee to his sister and took her ball. What did Akshat exchanged with his sister ?
2. When vimal assisted his brother in the weeding of the field, his brother helped in white wash of Vimal's house. Which exchange both brothers did ?
3. Sunil bought sweets from a shop. The shopkeeper took ₹250 from Sunil. Which exchange Sunil did with the shopkeeper.

Bill

today, when we ask for many items at a shop and ask how much will have to pay, the shopkeeper use a paper, on which the serial number, the value (price) of the items per unit and the total price are printed, for writing the list of items on it and tells the total expenditure on all. It is called Bill or Invoice as :

Computers & Printers

Kalyanpur, Bhubaneswar

200-020 Street, Project New Cyber Building, Unit No. 10/10, 1st Floor, 1st Block, Kalyanpur, Bhubaneswar, Odisha-751005

Customer's Name: _____ Date: _____

Address: _____

S.N.	Particulars	Unit	Rate	Amount
1				
2				
3				
4				
5				
6				
7				
Total				

Signature: _____

Purchased Via: Vinnu Nigam Limited

(Regd. Office Shakti Bhawan)
EDSD - KANARI MASARI, UP,
RAMRAULI, UP

Printed Date: 10/01/2017

Receipt No.		Payment Receipt	
001001614514	001001614514	001001614514	001001614514
Date: 10/01/2017	Number: 001001614514	Number: 001001614514	Number: 001001614514
Account No. 001001614514	Number: 001001614514	Number: 001001614514	Number: 001001614514
Customer Name: NAMPSI	Number: 001001614514	Number: 001001614514	Number: 001001614514
Address: OPS NAGARAH/OPP. BALLAHABAD, ALLAHABAD	Number: 001001614514	Number: 001001614514	Number: 001001614514
Cash	Number: 001001614514	Number: 001001614514	Number: 001001614514
Total Amount Received: 710.00	Number: 001001614514	Number: 001001614514	Number: 001001614514

Received Amount: Seven Hundred Ten Rupees And Zero Paise Only

Received By: SUJMANI

Received For: SUJMANI

Cash Memo

When purchasing or selling an item is done cashmemo is made by the seller. Cash memo is an non-transferable sheet that is a proof of paying money.

The following points are mentioned in the Cash memo :

- Date
- Serial Number
- Registration number of the seller, name address and telephone number.
- Name of the buyer
- Discount (if any)
- Item and service Tax, including rate.
- Number of items, unit, price (Rate)
- Total cash received
- Signature of Cashier.

Form for Cash Memo

Serial No. _____

Date: _____

Buyer Name: _____

Buyer Address: _____

Buyer Phone: _____

Item Description: _____

Unit: _____

Rate: _____

Amount: _____

Signature: _____

In this unit we learned :

- What is ratio, it has been explained by many examples.
- The ratio is always calculated in the amounts of same units.
- While determining the ratio of two amounts, none of these should be zero.
- The ratio can be changed in decimal of fraction.
- When two ratios are same, then they are in proportion. Thus, these are four terms in proportion.
- In the proportion, the product of outside terms is equal to the product of middle terms.

7. We can change percent into fraction and fraction into percent.
8. In the process of purchase and selling, there is possibility of profit and loss both. If the cost price < selling price, then there is a profit and if cost price > selling price, then there is a loss.

Thus, Profit = Selling Price – Cost Price

and Loss = Cost Price – Selling Price

Profit and Loss are calculated in percentage also,

$$9. \text{ Profit percent} = \frac{\text{Profit} \times 100}{\text{Cost Price}}$$

$$\text{Loss percent} = \frac{\text{Loss} \times 100}{\text{Cost Price}}$$

Thus, profit percentage and loss percentage are calculated on cost price only.

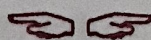
10. When the consumer borrows money from a person or institution for a fixed period and returns some money in addition to the money taken in exchange, that additional money is called interest. It has two types :

(1) Simple Interest

(2) Compound Interest

$$\text{Simple Interest} = \frac{\text{Principal} \times \text{Rate} \times \text{Time}}{100}$$

11. The method of calculating practically in daily life is called Practice mathematics. Under it, the value of any object are calculated by breaking into smaller parts according to convenience.
12. When some one gives money or service to other to receive items or service of his own need, then this system is called the exchange system.
13. When someone pays money or receives the item or service of his need, then it is called currency exchange.
14. Features of Currency.
15. Bill and Cashmemo.



ANSWERS

Exercise 12(a)

1. (i) 3:4 (ii) 5 : 3 (iii) 2 : 7 (iv) 7, 2. (i) 4 : 1, (ii) 5 : 12, (iii) 13 : 75, (iv) 108 : 125
3. 53 : 65, 75 : 62, 48 : 55, 63 : 71, 4. 29 : 25 5. 8, 13, 73, 85 6. (i) 14 : 3, (ii) 17 : 15
(iii) 37 : 25, (iv) 67 : 65 7. (i) 3 first term, second term = 7; (ii) 4 — first term, 11 — second
term; (iii) 13 — first term, 27 — second term.

Exercise 12 (b)

1. (a) 3 : 2 (b) 2 : 7 (c) 2 : 7, 2. (i) 1 : 2 (ii) 5 : 1 (iii) 1 : 30 (iv) 1 : 6 (v) 100 : 3
(vi) 4 : 1, 3. (i) 1 : 8 (ii) 1 : 5 (iii) 1 : 11 (iv) 1 : 3 (v) 1 : 2 (vi) 100 : 13, 4. (i) $5 : 8 > 3$
: 5, (ii) $6 : 8 > 2 : 7$ (iii) 40 paise : ₹ 2 > 60 paise : ₹ 4 5. (i) 4 : 1 (ii) 3 : 1 (iii) 3 : 4, 7.
(i) 5 : 3 (ii) 3 : 5 (iii) 3 : 2, 8. (i) 64 (ii) 4 (iii) 12 (iv) 6 10. ₹48, ₹32, (11) ₹ 2000, ₹ 1600,

Exercise 12 (c)

1. (iv) 2. (ii) 3. (i) 5, (ii) 4, (iii) 75 (iv) 5, 4. (i) True (ii) False (iii) False (iv) True,
5. 12 meter, 6. 63 kg. 7. 5, 8. 75 km. 9. 600 plants, 900 plants, 10. Prices of both are same,
₹ 7 per kg.

Exercise 12 (d)

1. (i) 18 (ii) 24 (iii) 47 (iv) 63, 2. (i) $\frac{3}{25}$ (ii) $\frac{3}{20}$ (iii) $\frac{3}{4}$ (iv) $\frac{7}{20}$, 3. (i) 25% (ii) 15%
(iii) 40% (iv) 75%, 4. (1) $\frac{1}{4}$ (2) 75% (3) $\frac{4}{25}$ (4) 40%

Exercise 12 (e)

1. (i) 0.25 (ii) 0.35 (iii) 0.30 (iv) 0.8, 2. (i) 12% (ii) 3% (iii) 2.5% (iv) 125%, 3. (i) 0.1,
10% (2) $\frac{3}{10}$, 30% (3) $\frac{4}{5}$, 0.8, 4. $\frac{2}{25}$, 8% (5) $\frac{1}{20}$, 0.05

Exercise 12 (f)

1. (i) 75 (ii) 120 (iii) 54 kg. (iv) 508.5 liter, 2. (i) 33.3% (ii) 25% (iii) 5% (iv) 2.5%,
3. 1125 children 4. 65% 5. 50%, 6. 48 girls, 7. 700, 8. 60%, 9. 1% 10. 400

Exercise 12 (g)

1. (i) ₹ 18 (ii) 24 kg. (iii) 0.375 meter (iv) 937.5 liter, 2. (i) $\frac{1}{5}$ (ii) 20% 3. (i) 20% (ii)
37.5% (iii) 12% (iv) 160% 4. (i) 0.125 (ii) 0.45 (iii) 0.625 (iv) 0.85 5. (i) 0.40, 40%, 40, (ii)
 $\frac{1}{25}$, 4%, 4 (iii) $\frac{81}{200}$, 0.405, 40.5 (iv) $\frac{2}{25}$, 0.08, 8% 6. (i) 20%, (ii) 25% (iii) 30% (iv) 4.2%

(7) (c) 26.25 km. per hr. 8. (d) 28°C 9. (b) ₹ 736 10. 360, 11. in maths 12. in first village 13. 60% 14. 250, 15. 72 apples 16. 10% 17. 5.6 metr, 18. 22000 people 19. 25600, 20. 12.5% 21. 340, 22. ₹ 216.

Exercise 12 (h)

1. (i) ₹ 15 (ii) ₹ 1200 (iii) ₹ 550 (iv) ₹ 100 2. ₹ 200 3. ₹ 875, 4. ₹ 10500 5. ₹ 7600 6. ₹ 5000.

Exercise 12 (i)

1. (i) ₹ 12, 6% (ii) ₹ 20, 4% (iii) ₹ 450, 10% (iv) ₹ 25, 3.125%, (v) ₹ 1344, 12%, 2. 10% 3. 33.3% 4. $11\frac{1}{9}\%$ 5. ₹ 396, 6. ₹ 46800 7. ₹ 1000 8. ₹ 2350 9. ₹ 220 10. (a) 25% profit (b) 30% profit (c) $33\frac{1}{3}\%$ loss 11. ₹ 200 12. 10% loss, 13. Profit of 25%, 14. (1) False (2) False (3) True.

Exercise 12 (j)

1. (a) Interest (b) Time (c) Principal (d) Rate (e) 100 2. (i) 110 (ii) 25 (iii) 550 (iv) 120 3. (i) 8% annually (ii) 5% annually (iii) 6% annually 4. (i) ₹ 21 (ii) ₹ 100 (iii) ₹ 4, 5. (a) Principal (b) Interest (c) Amount (d) Principal 6. 7% annually 7. ₹ 1920. 8. on ₹ 100 one year interest, 9. ₹ 60, 10. ₹ 16,320 11. 15% annually

Exercise 12 (k)

1. (b) ₹ 70.00 2. (c) ₹ 27.00 3. (a) 6.25 4. ₹ 743.75 5. 12042.250 kg. 6. ₹ 1543.75 7. 247.50 km.

