Chapter 13

PERCENTAGE

Some students in the class were discussing about some problem. Many said, "When I was coming to school today, I saw a big banner on the cloth shop. It said, "Discount, Discount, Discount, 10 percent!" What does this mean?"

Arun said, "If you buy cloth for 100 rupees, you will get a relaxation of 10 rupees. That means you'll get the cloth for Rs. 90, that is the discount you get."

Mary enquired, "If I buy cloth for Rs. 40; how much discount shall I get?"

Salma replied, "You will get a discount of Rs. 4, which means you'll have to pay 36 Rs."

Mary said, "But in the examination marksheet also. The marks obtained are written in percent."

Ramesh said slowly, "Where else do we use this?"

Salma was excited and said, "Let us make a list of situations, where we use percentage."

All the students thought about it and wrote some examples:

(i) In the exams Anil got 93 percent marks.
(ii) In the last annual examination, 87 percent girls and 76 percent boys passed.
(iii) Bank gives an interest of 5 percent on savings or deposited amount.
(iv) In business loss and gain is expressed in percent.
(v) 70 percent people in the country live in villages.
(vi) 15 percent of discount on fans sold during writer.

Why do we Need Percentage?

In an exam Uma got 8 marks out of 10, Vinay got 15 out of 20. Can you say, who got better marks?

To compare the marks obtained by both Uma & Vinay. The denominators of the fractions will have to be equated

Therefore Uma's marks will be : $\frac{8}{10} = \frac{8\times 2}{10\times 2} = \frac{16}{20}$

And Vinay's marks are : $\frac{15}{20}$

Now since both the deniminators are same, we can compare them and say that Uma's marks are better than Vinay. This means wher ever we need to compare marks obtained out of maximum marks, we would require to equate the fractions.

If these marks are converted in a way that the denominator is 100, then

Uma's marks would be $\frac{8}{10} = \frac{8\times 10}{10\times 10} = \frac{80}{100}$.

Since 8 marks out of 10 is equivalent to 80 marks out of 100, therefore we can say that Uma scored 80 percent marks.

Vinay's marks would be $\frac{15}{20} = \frac{15\times5}{20\times5} = \frac{75}{100}$.

Since 15 marks out of 20 is equivalent to 75 marks out of 100, we can say that Vinay scored 75 percent marks. And thereby, the percentage of Uma's marks is higher.

You find in the above examples that percentage means per 100. It is helpful in comparison of data. 100 is taken as a common base that can assist comparison in every situation when the marks obtained are compared on the basis of 100, then the marks/score obtained out of 100 would be known as per hundred. Hence in percentage, 'per' means 'every' and 'cent' means 'hundred'. Percent is denoted by "%".

ACTIVITY 1

Fill in the given table & compare the marks. Who scored the highest? For this we shall find out whose percentage of marks is the highest?

S. No.	Name	Maximum Marks	Marks obtained	$\frac{\text{M.O.}}{\text{M.M.}}$	Percentage of Marks obtained
1.	Golu	80	60	$\frac{60}{80}$	$\frac{60}{80}\times100 = 79\%$
2.	Salma	100	90	$\frac{90}{100}$	$\frac{90}{100}\times100 = 90\%$
3.	George	150	120	$\frac{120}{150}$	$\frac{120}{150}\times100 = 80\%$

The percentage of marks obtained by Salma is the highest. Think that if we compare the scores of students in any other way, will it be so easy?

Fill in the table below and say which school got a better results? For this again, you'll find out percentages.

Name of the school	Students enrolled in class VI a	No. of students passed b	No. of students out of 100 who passed $\frac{b}{a}\times100$	Percentage result
Govt. High School, Jagdalpur	500	450	$\frac{450}{500}\times100$	90%
Govt. High School, Raipur	300	195	?	?
Govt. High School, Sarguja	200	140	?	?

The above activities indicate that two or more situations can easily be compared with the help of percentage.

If percentage means comparison on the basis of 100, question arises, can the value in percentage exceed 100?

Let us find out!

Example 1.

On a particular day 300 kg of potatoes were bought in the market, 750 kg of potatoes were purchased on the second day, what percentage increase took place in the purchase of potatoes?

Potatoes bought on the first day = 300 kg

Potatoes bought on the second day = 750 kg

The increase on the purchase of potatoes = 750 -300 kg = 450 kilograms

Now, on 300kg of potatoes, the increase in purchase was 450kg

$\therefore$ on 1kg of potatoes $\frac{450}{300}$ kg increase in purchase took place.

So, the percentage of increase in the purchase would be $\frac{450}{300} \times 100 = 150\%$

Can you think about situations from your everyday life where percentage (i) less (ii) equal or (iii) more than 100% are used.

Think about 5 examples of each and tell your friends.

ACTIVITY 2

What percentage of the given picture is shaded?

What is the fractional value for the shaded parts?

For example:

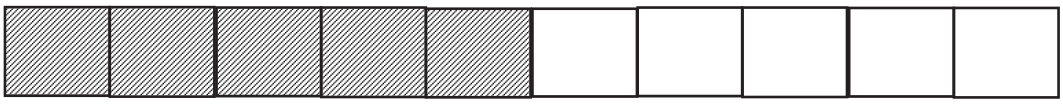

Fig 1

$\frac{5}{10} = \frac{1}{2} = 50\%$

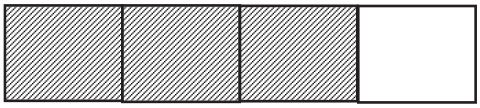

Fig 2

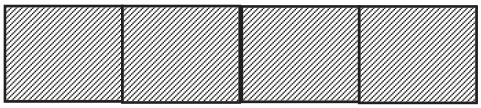

Fig 3

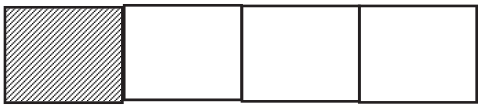

Fig 4

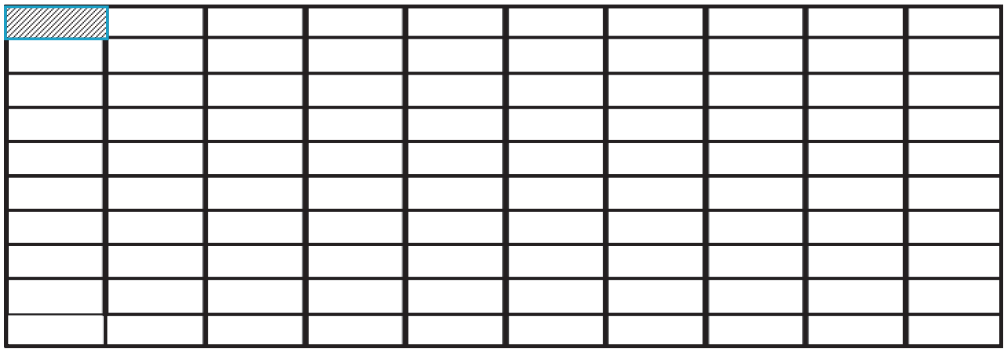

Fig 5

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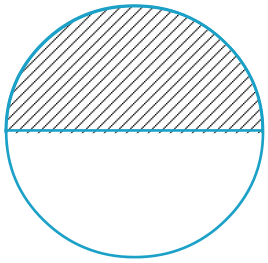

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Fig 6

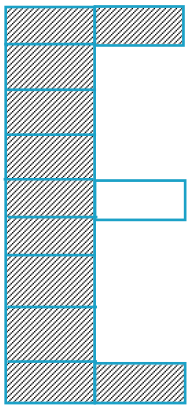

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Fig 7

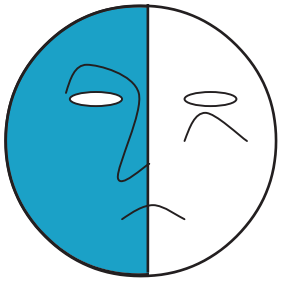

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Fig 8

You have just changed the shaded parts of the figures into percentage & fractions.
Is percentage a different form of fraction?
Let us solve some examples.

ACTIVITY 3

You have learnt that in a fraction, if the denominator is 100, the numerator of that fraction is equal to its percentage. Now change the following fractions into percentages.

S. No.	Fraction	Fraction × $\frac{100}{100}$	Multiple of $\frac{1}{100}$	percentage
1.	$\frac{1}{1}$	$\frac{1}{1} \times \frac{100}{100}$	$\frac{1}{100} \times 100$	100%
2.	$\frac{1}{2}$	$\frac{1}{2} \times \frac{100}{100}$	$\frac{1}{100} \times 50$	50%
3.	$\frac{1}{4}$			
4.	$\frac{3}{4}$			
5.	$\frac{1}{10}$			
6.	$\frac{1}{100}$			

ACTIVITY 4

Below are given some percentage changed into fractions, complete the rest.

S. No.	percentage	Multiple of $\frac{1}{100}$	fraction
(i)	100%	$100 \times \frac{1}{100}$	$\frac{1}{1}$
(ii)	50%	$50 \times \frac{1}{100}$	$\frac{1}{2}$
(iii)	25%		
(iv)	75%		
(v)	10%		
(vi)	1%		

Note for the teacher : (If a student multiplies $\frac{1}{2}$ by 100 directly, to convert it into percent, then let him do so by explaining the basic rule.)

In the above activity, you've seen that the fractional form of 100% is $\frac{1}{1}$.

Similarly, fractional form of 50% is $\frac{1}{2}$.

Therefore, we can say that percentage is a form of fraction.

Example 2.

On 26th January, 200 laddoos were brought to a school. If 90% of the laddoos were distributed to students, find out the number of laddoos that remained ?

Solution. Total no. of laddoos = 200

No.of laddoos distributed = 90 percent of 200

$$\text{No. of laddoos distributed} = 200 \times \frac{90}{100}$$

$$= 180$$

Remaining laddoos = 200 - 180 = 20 laddoos.

Example 3.

The population of a village is 10,000. Out of which 60% are women, 25% are men & the rest are children. Find the number of men, women & children ?

Solution: Population of the village = 10,000

Since 60% are women = 60% of 10,000

$$\text{So, the number of women} = \frac{10{,}000 \times 60}{100}$$

$\therefore$ Number of women = 6000

Given 25% of population are men

= 25% of 10,000

$$\therefore \text{ The number of men} = \frac{10{,}000 \times 25}{100}$$

$\therefore$ The number of men = 2500

The number of children = 10000 - (6000 + 2500)

= 10,000 - 8500

= 1500 children.

Example 4.

Shyamu bought a book for Rs. 50 from a shop. The shopkeeper gave him a discount of 20%. How much did Shyamu pay the shopkeeper?

Solution:

20% discount means

Out of Rs. 100 discount got is of Rs. 20.

$\therefore$ Out of Rs. 1 discount got is of Rs. $\frac{20}{100}$.

Out of Rs. 50 discount got is of Rs. $\frac{20}{100} \times 50$ = Rs. 10

$= 10.$

Therefore, the amount Shyamu had to pay the shopkeeper was 50 - 10 = Rs. 40.

Example 5.

(i) Find out 50% of rupees 650 ?

(ii) Find 5% of 750 kilograms ?

Solution:

(i) 50% of Rs. 650 $= \frac{650 \times 50}{100}$

$=$ Rs. 325

(ii) 5% of 750 kilograms $= \frac{750 \times 5}{100}$

$= 37.5$ kilograms.

Example 6.

Dhawal got 450 marks out of 500 and Yash got 675 out of 900. Whose result is better?

Solution:

According to the question

Dhawal gets 450 out of 500

$\because$ Marks out of 500 $= 450$

Marks out of 1 $= \frac{450}{500}$

Marks out of 100 $= \frac{450}{500} \times \frac{100}{1} = 90 = 90\%$

Yash gets 675 out of 900

$\because$ Marks out of 900 $= 675$

Marks out of 1 $= \frac{675}{900}$

Marks out of 100 $= \frac{675}{900} \times 100 = 75\%$

The solution shows that Dhawal's result is better than that of Yash.

Try to solve the problems by some other methods or a new method. Discuss the method you have used with your teacher.

EXERCISE 13

1. Change the following into percentage:

(i) $\frac{3}{2}$ (ii) $\frac{5}{2}$ (iii) $\frac{1}{5}$ (iv) $\frac{3}{20}$

2. Change the percentages into fractions:

(i) 50% (ii) 15% (iii) 2% (iv) 10%

3. Find out 60% of Rs. 360.
4. How much is 15% of 480 kilograms?
5. Seeta got 250 marks out of 500. Convert her marks into percentage.
6. If Ram gets a maths book priced Rs. 10 at 10% discount. How much will he pay for it?
7. On Independence Day, 300 toffees were brought to a school. 99% toffees were distributed to students. What number of toffees remained?
8. If Rupa gets 390 out of 600 marks in her annual exams, what percentage of marks did she get?
9. If a rubber is stretched to twice its length, find out the percentage increase in length.
10. 40% of the total population of a city are men and 35% are women while the rest are children. If the children number 18,000, find the number of men & women in the city.
11. The population of a village is 3000. It increased by 10% in the first year and after one year the population decreased by 10%. Find the percentage of increase or decrease in the population.
12. A person buys things of Rs. 630. The shopkeeper takes only 567 rupees from him. What is the percentage of discount that the person enjoyed?
13. 75% of a number is 600. Find the number ?
14. A person deposited Rs. 5000 in the bank . After a few years he got Rs. 6000. What the percentage increase his deposit?
15. Out of 40 students enrolled in a class, 36 boys have passed in the examination. Find out the percentage of successful and unsuccessful students ?
16. 90% of the people in a village are literate. If the population of that village is 1600, find out the number of literate & illiterate people ?

What Have We Learnt ?

1. Percentage means per hundred.
2. We can compare quantities through percentage.
3. Percentage can be expressed as fraction, in decimals and as ratio and fraction, decimal and ratio can be converted into or expressed as percentage.