WINNER'S STEPS
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CHAPTER 2

Percentage

Percent: The term 'percent' is derived from the Latin word 'Per centum'. It implies "out of every hundred". The symbol '%' is used to denote percentage. For example, 15%

A given percentage value can be converted to corresponding fraction by dividing by 100.

A percentage is a number or ratio expressed as a fraction of 100. It is a proportion per hundred.

1. When we say 35 percent in mathematical notation we write 35%.
2. When we want to express this in mathematical form, 35% means 35 per 100 or (35/100).

Important: 50% of 20 can be written 20% of 50 as well. You can also express % into decimal, 50% = 0.5

Conversion of fraction into %.

To convert fraction into %, we multiply it by 100. 1/4 = (1/4) × 100 % = 25%.

$1/3 = (1/3) \times 100\ \% = 33(1/3)\ \%$

$1/14 = (1/14) \times 100\ \% = (100/14)\ \% = (50/7)\ \% = 7\ (1/7)\ \%$

Note: Never forget to express % notation in the percentage.

We suggest you that you must learn both tables given below. Try to remember these values at least till 1/25

Fraction	Percentage	Fraction	Percentage	Fraction	Percentage
1	100%	1/7	14(2/7) %	1/13	7 (9/13) %
1/2	50%	1/8	12(1/2) %	1/14	7 (1/7) %
1/3	33(1/3) %	1/9	11(1/9) %	1/15	6 (2/3) %
1/4	25%	1/10	10 %	1/16	6 (1/4) %
1/5	20%	1/11	9 (1/11) %	1/17	5.88%
1/6	16(2/3) %	1/12	8 (1/3) %	1/18	5.55%
				1/19	5.26%
				1/20	5%
				1/21	4.76%
				1/22	4.54%
				1/23	4.35%
				1/24	4.16%
				1/25	4%

Conversion of % into fraction.

To convert % into fraction, we divide it by 100. So, we can express in this way:

100% = (100/100) = 1 1% = (1/100) 2% = (2/100) = (1/50)

50% = 50/100 = ½ 20% = 20/100 = 1/5 10% = 10/100 = 1/10

16(2/3) % = (50/3)% =50/(3 × 100) = 50/300 = 1/6

1% = 1/100	25% =1/4	80% = 4/5
2% = 1/50	33.33% = 1/3	83.33% = 5/6
4% = 1/25	37.50 = 3/8	87.50% = 7/8
5% = 1/20	40% = 2/5	100% = 1
8.33% = 1/12	50% = ½	120% = 6/5
10% = 1/10	60% = 3/5	125% = 5/4
12.50% = 1/8	62.50 = 5/8	133.33% = 4/3
16.67% = 1/6	66.67% = 2/3	150% = 3/2
20% = 1/5	75% = ¾	175% = 7/4

Some important conclusions:

If x is a% more than y, then y is $\left(\frac{a}{100+a}\times 100\right)\%$

If x is a% less than y, then y is $\left(\frac{a}{100-a}\times 100\right)\%$

EXAMPLE 1:

If in an examination, the marks secured by Navin are 20% less than that of Pravin, then marks secured by Pravin are how much percent more than Navin's marks?

Solution: a = 20%

According to the above formula; required percentage = $\left(\frac{a}{100-a}\times 100\right)\% = \frac{20}{80}\times 100 = 25\%$

If a number is first increased by a % and then decreased by a % then the net effect is always a decrease which is equal to a% of a i.e., $\frac{a^2}{100}\%$

EXAMPLE 2:

The salary of a worker is first increased by 5% and then it is decreased by 5%. What is the change in his salary?

Solution: Here a = 5%

There will be a net decrease; Percent decrease = $\frac{a^2}{100}\% = \frac{5^2}{100}\% = 0.25\%$

If a quantity is first changed (increased or decreased) by a % and then changed (increased or decreased) by b%, then

Net change = $\left[\pm a \pm b \pm \frac{(+a)(+b)}{100}\right]$% sign of a and b is positive or negative based on whether there is an increase or decrease

Net change is an increase or a decrease according to the positive or negative sign, respectively of the final result.

EXAMPLE 3:

The price of an article is first increased 20% and then decreased by 25% due to reduction in sales. Find the net percent change in the final price of the article.

Solution: a = 20%, b = 25%

Required percentage change = $\left(20-25+\frac{20\times(-25)}{100}\right)\% = (-5-5)\% = -10\%$

So, there is a net decrease of 10% in the final price of the article as the final result is negative.

If the price of a commodity increases or decreases by a %, then the decrease or increase in consumption, so as not to increase or decrease the expenditure is equal to $\left(\frac{a}{100\pm a}\right)\times 100\%$

If the population of a town is P and it increases (or decreases) at the rate of R% per annum, then

Population after n years = $P\left(1\pm\frac{R}{100}\right)^n$

Population n years ago = $\frac{P}{\left(1\pm\frac{R}{100}\right)^n}$

('+' sign for increment; '-' sign for decrement).

Some tricks to calculate faster:

Splitting the percentage into parts **Example 4:** 51% of 128.

Solution: 51% of 128 = (50+1)% of 128 = 50% of 128+1% of 128 = 64+1.28 = 65.28

EXAMPLE 5:

Find 39% of 12.5

Solution: 39% of 12.5 = 12.5% of 39 = $\frac{1}{8}\times 39$ = 4.875

Notes