



Knowledge Card

Aptitude | Percentage



Formulas for Percentages & Definitions

- In mathematics, a percentage is a number or ratio expressed as a fraction whose denominator (bottom) is 100. Thus, x percent means x hundredths, written as x%.
- We express x% as a fraction as $\frac{x}{100}$
- For example $10\% = \frac{10}{100} = \frac{1}{10}$

Percentages Formulas & Basic Concept

- Successive Percentage Change

If there are successive percentage increases of a % and b%, the effective percentage increase is: $a + b + \frac{ab}{100} \%$

- Successive Discount :

If there are successive discount of a % and b%, the effective discount is: $a + b - \frac{ab}{100} \%$

- Results on population

Let the population of a town be P now and suppose it increases at the rate of R% per annum, then:

- Population after n years = $P(1 + \frac{R}{100})^n$

- Population n years ago = $\frac{P}{(1 + \frac{R}{100})^n}$

- To calculate a % of b = $\frac{a}{100} \times b$

- To find what percentage of a is b = $\frac{b}{a} \times 100$

- To calculate percentage change in value

$$\text{Percentage change} = \frac{\text{Change}}{\text{Initial Value}} \times 100$$

- Percentage Increase or Decrease

- Percentage increase = $\frac{R}{100+R} \times 100 \%$

- Percentage decrease = $\frac{R}{100-R} \times 100 \%$



- Results on Depreciation:

Let the present value of a machine be P. Suppose it depreciates at the rate of R% per annum. Then:

- Value of the machine after n years = $P\left(1 - \frac{R}{100}\right)^n$
- Value of the machine n years ago = $\frac{P}{\left(1 - \frac{R}{100}\right)^n}$
- If A is R% more than B, then B is less than A by $\frac{R}{100+R} \times 100$ %
- If A is R% less than B, then B is more than A by $\frac{R}{100-R} \times 100$ %
- Increase N by S% : $N\left(1 + \frac{S}{100}\right)$.
- Decrease N by S% : $N\left(1 - \frac{S}{100}\right)$

Tips and tricks and shortcuts on Percentage

If the value of an item goes up or down by x%, the percentage reduction or increment to be now made to bring it back to the original point is

- Here, are quick and easy tips and tricks on Preplnsta page for Percentage problems swiftly, easily, and efficiently in competitive exams and other recruitment exams.
- If the value of an item goes up or down by x%, the percentage reduction or increment to be now made to bring it back to the original point is $\frac{x}{100+x} \times 100$ %
- If A is x% more or less than B, then B is $\frac{x}{100+x} \times 100$ % less or more than A.
- If the price of an item goes up/down by x %, then the quantity consumed should be reduced by $\frac{x}{100+x} \times 100$ % so that the total expenditure remains the same.
- Percentage – Ratio Equivalence table

Type 1: Percentage Tips and Tricks and Shortcuts- Based on Mixtures and Alligation

Question 1. A small container has 60l of milk and water mixture. It was made by mixing milk and water in which 80% is milk. Rohan came and added some water in the mixture. Now, find out how much water was added to the mixture that the percentage of milk became 60%?

Options:

A. 20 litre



B. 25 litre

C. 2 litre

D. 10 litre

Given, percentage of milk = 80%

It means, the percentage of water = 20%

In 60L of mixture, water = $\frac{60 \times 20}{100} = \frac{1200}{100} = 12$ litre

Let the water added = x

Now, $\frac{12+x}{60+x} \times 100 = 40$ (it is because in the new mixture milk is 60%, $100 - 60 = 40\%$ water)

$$1200 + 100x = 2400 + 40x$$

$$100x - 40x = 2400 - 1200$$

$$60x = 1200$$

$$x = 20 \text{ litre}$$

Correct option: A

Type 2: Percentage Tips and Tricks – Problems based on Ratios and Fractions

Question 1. If the numerator of a fraction is increased by 50% and the denominator is decreased by 10%, the value of the new fraction becomes $\frac{4}{5}$. Find the original fraction?

Options:

A. 12/21

B. 13/20

C. 12/25

D. 25/12

Solution: Let original numerator be x



Let original denominator be y

Let original fraction be x/y

According to the question,

Numerator of a fraction is increased by 50% = $(150/100x)^*$

Denominator is decreased by 10% = $(90/100x)^*$

$$\text{Now, } \frac{\frac{150}{100}x}{\frac{90}{100}y} = \frac{4}{5}$$

$$\frac{130x}{90y} = \frac{4}{5}$$

$$\frac{x}{y} = \frac{4}{5} \times \frac{90}{130} = \frac{12}{25}$$

Correct option: C

Type 3: Tips and Tricks and Shortcuts for Percentages- Income, Salary, Expenditure

Question 1. Ajay spends 40% of his salary and saves Rs. 480 per month. Find his monthly salary.

Options:

A. 1000

B. 800

C. 600

D. 850

Solution:



Let the salary of Ajay be x

He spends 40% which means he saves 60% of the salary.

$$60\% \text{ of } x = 480$$

$$\frac{60}{100}x = 480$$

$$x = 480 \times \frac{100}{60}$$

$$x = \frac{48000}{60}$$

$$x = 800$$

Therefore, his monthly salary = 800

Correct option: B

Type 4: Percentage Tips and Tricks and Shortcuts- Problems based on Population

Question 1. Delhi has the population of 3000. In the first year, the population decreases by 4%, and in the second year, it increases by 5%. Find the population at the end of two years?

Options:

A. 3024

B. Remains same

C. 3120

D. 2880

Solution:

In the first year, the population decreases by 4% = $3000 \times \frac{96}{100} = 2880$

In the second year it increases by 5% = $2880 \times \frac{105}{100} = 3024$

Correct option: A

Type 5: Problems based on profit and loss



Question 1. The cost price of 20 chairs is the same as the selling price of x tables. If the profit is 25%, then find the value of x?

Options:

A. 15

B. 20

C. 16

D. 18

Solution:

Let the CP of each chair = 1

Therefore, CP of x table = x

$$20 \text{ CP} = X \text{ SP}$$

$$\text{Profit \%} = \text{SP/CP}$$

$$1.25 = 20/X$$

$$X = 16$$

Correct option: C

Type 6: Percentage Tips and Tricks and Shortcuts

Question 1. If 20% of a = b, then b% of 20 is the same as:

Options:

A. 4% of a

B. 5% of a



C. 10% of a

D. 2% of a

Solution:

$$20\% \text{ of } a = b$$

$$\frac{20}{100} a = b$$

$$b\% \text{ of } 20 = \frac{b}{100} \times 20$$

$$\text{Now, } \frac{20}{100} \left[\frac{b}{100} \times 20 \right] = \frac{b}{100} \times 20$$

$$= 4\% \text{ of } a$$

Correct option: A