Toppersnotes
Unleash the topper in you

SSC-CGL

COMBINED GRADUATE LEVEL

QUANTITATIVE APTITUDE - I

(ARITHMETIC MATHS)

SIERRA INNOVATIONS
Private Limited

Contents

PERCENTAGE

Percent word is formed by two words "Per" and "Cent"

Percent

1 — 100

$1\% = \frac{1}{100}$, $x\% = \frac{x}{100}$

One by hundredth part of anything is percent. It is represented by sign '%' and to put the % in the end of any number. We multiply the number by 100.

$16\% = \frac{16}{100}$

$18\% = \frac{18}{100}$

$20\% = \frac{20}{100}$

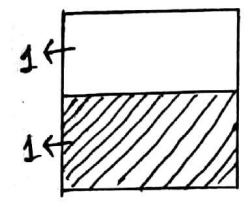
$16 = 16 \times 100\% = 1600\%$

$18 = 18 \times 100\% = 1800\%$

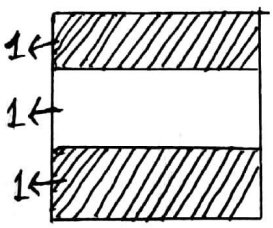
$\frac{2}{5} = \frac{2}{5} \times 100\% = 40\%$

Fraction:

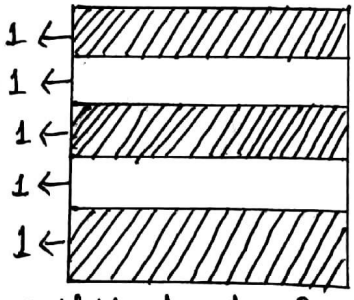
Any small or tiny part or proportion of something is represented in fraction.



White part = $\frac{1}{2}$



White part = $\frac{1}{3}$



White part = $\frac{2}{5}$

All diagram above are divided in equal parts and fraction that white part is what fraction of whole diagram.

$\Rightarrow \frac{\text{Numerator}}{\text{Denominator}} \longrightarrow$ Small part of whole number
$\longrightarrow$ Whole number

$\longrightarrow$ To make our questions easier, we keep remember few converts, percentage to fraction and fraction to percentage.

$1 = 1 \times 100\% = 100\%$

$\frac{1}{2} = \frac{1}{2} \times 100\% = 50\%$

$\frac{1}{3} = 33\frac{1}{3}\%$

$\frac{1}{4} = 25\%$

$\frac{1}{5} = 20\%$

$\frac{1}{6} = 16\frac{2}{3}\%$

$\frac{1}{7} = 14\frac{2}{7}\%$

$\frac{1}{8} = 12.5\%$

$\frac{1}{9} = 11\frac{1}{9}\% = 11.11\%$

$\frac{2}{9} = 22.22\%, \frac{3}{9} = 33.33\%, \frac{5}{9} = 55.55\%$

$\frac{1}{10} = 10\%$

$\frac{1}{11} = 9\frac{1}{11}\% = 9.09\%, \frac{4}{11} = 36.36\%$

$\frac{1}{12} = 8\frac{1}{3}\%$

$\frac{1}{13} = 7\frac{9}{13}\%$

$\frac{1}{14} = 7\frac{1}{7}\% = 7.14\%$

$\frac{1}{15} = 6\frac{2}{3}\%$

$\frac{1}{16} = 6\frac{1}{4}\%$

⟶ Formulas of percentage:

$$\% \text{ Change} = \frac{\text{Final Value} - \text{Initial Value}}{\text{Initial Value}} \times 100$$

$$\text{Increased value / Final value} = \text{Initial value} \times \left\{\frac{100 + \text{Increase}\%}{100}\right\}$$

$$\text{Increased value / Final value} = \text{Initial value} \times \left\{\frac{100 - \text{Decrease}\%}{100}\right\}$$

$$\text{Initial value} = \text{Final value} \times \left(\frac{100}{100 - \text{decrease}\%}\right)$$

$$\text{Resultant percentage change} = \left(x + y + \frac{xy}{100}\right)$$

For increase we take percent "+", for decrease we take percent "−".

PRACTICE EXAMPLES

Q. 1 If a fruit seller sells 40% of his total apples then he is now left with 480 apples. How many apples had he originally?

sol:

Basic: Let total no. of apples are x

Seller Sells = $x \times \frac{40}{100}$ apples

Remaining apples = $x - \frac{x \times 40}{100}$

$\frac{100x - 40x}{100} = 480$ (Given in question)

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

$x = 800$ apples.

Trick:

Everything is 100% in itself so after selling 40% a man is left with only 60%.

60% = 480

1% = 8

100% = 800

Q. 2 A book seller has total 6300 books and he sells 90% of all. How many books are still unsold?

sol:

100% = 6300

1% = 63

He is now left with only (100% - 90%) = 10%

So 10% = 630

Q. 3 If monthly salary of a employee is increased by 8/3%, he gets 72 rupee more. His monthly salary is?

sol:

Basic: Let his salary is x

Salary after increment $x \times \frac{(100 + \frac{8}{3}\%)}{100}$

$= x \times \frac{308}{300}$

Difference = $\left(x \times \frac{308}{300} - x\right) = 72$

$= \frac{8x}{300} = 72.$

$= x = 2700$ ₹

Trick:

% increase is equal to increase in number.

$\frac{8}{3}\% = 72$

1% = 27

100% = 2700

Q. 4 The population of town in 2019 is 2100. In the next year it increases by 21%, what is the increased population of village in 2020?

sol:

$$\text{Increased Value} = \text{initial Value} \times \left(\frac{100 + \text{Increase \%}}{100}\right)$$

$$= 2100 \times \frac{21}{100}$$

$$= 2541$$

Trick:

Initial	Increased Value
100	121
×21 ↓	×21 ↓
2100	2541

Q. 5 If the numerator of the fraction is increased by 20% denominator is decreased by 5%, the value of the new fraction becomes $\frac{5}{2}$. what is the original fraction?

sol: Let the no. is $\frac{x}{y}$

$$\text{so: } \Rightarrow \frac{x \times \left(\frac{100+20}{100}\right)}{y \times \left(\frac{100-5}{100}\right)} = \frac{x \times 120}{y \times 95}$$

$$\Rightarrow \frac{x \times 120}{y \times 95} = \frac{5}{2} \qquad \Rightarrow \frac{x}{y} = \frac{5 \times 95}{2 \times \cancel{120}\ 24} = \frac{95}{48}$$

Q. 6 When a number is increased by 24, it becomes 104% of itself, what is the number?

sol:

Basic: Let number is x

then

$$x + 24 = \frac{104}{100} \times x$$

$$24 = \frac{104}{100}x - x$$

$$24 = \frac{4x}{100}$$

$$x = 600$$

Trick:

Every no. is 100% in itself.

so increase is 4%.

$4\% = 24$

$1\% = 6$

$100\% = 600$

Q. 7 5 is what percent at 25?

sol:

$$= \frac{5}{25} \times 100 = 20\%.$$

Q. 8 A number is increased from 21 to 84. what is the percentage change in the number?

sol: 300 %

Q. 9 if $\frac{1}{5}$th of the soldiers in a battalion are equal to 500 then what is total number of soldiers in the battalion.

sol: 2500

Q. 10 if the number of the fraction is increased by 35% and denominator is also increased by 20%, the value of the new fraction becomes $\frac{9}{6}$. what is the original fraction?

sol: 4/3

Q. 11 when a number is increased by 39, if becomes 113% of itself. what is the number?

sol: 300

Q. 12 when 40 is subtracted from 40% of a number, the is 80. The number is?

sol: 300

INCREASE/DECREASE TO DECREASED/ INCREASED NO:

Q. 13 if A's income is 25% less than B, how much percent B's income more than that of A?

sol: Let B's income x.

So A's income $= \frac{x \times 75}{100}$

So percent increase in B's income

$$= \frac{x - \frac{x \times 75}{100}}{x \times \frac{75}{100}} \times 100$$

$$= \frac{\frac{25x}{100}}{\frac{x \times 75}{100}} \times 100 = 33\frac{1}{3}\%$$

Trick:

A's income → B's income

75 → 100

$$= \frac{25}{75} \times 100$$

$$= 33\frac{1}{3}\%.$$

Q. 14 The price of sugar is increased by $\frac{100}{3}\%$. If the expenditure is not allowed to increase for a housewife, by what percent should she reduce consumption.

Sol:

Price	Quantity/Consumption
$\frac{100}{3}\% = \frac{1}{3}(\uparrow)$	$\frac{1}{4}(\downarrow) = 25\%$

If there is increase or decrease in one side than to equal things, we use short trick;

$\frac{\text{Numerator}}{\text{Denominator}}(\uparrow) \longrightarrow$ then $\longrightarrow \frac{\text{Numerator}}{\text{Numerator + Denominator}}(\downarrow)$

$\frac{\text{Numerator}}{\text{Denominator}}(\downarrow) \longrightarrow$ then $\longrightarrow \frac{\text{Numerator}}{\text{Denominator - Numerator}}(\uparrow)$

Q. 15 If the length of a rectangle is increased by 60% then by what percent should breadth of that be reduced so area remains the same?

Sol:

Length	Breadth
$60\% = \frac{6}{10}\uparrow$	$\frac{6}{10+6} = \frac{6}{16}\downarrow = 37.5\%$

Q. 16 A number is increased by Y%, to get back to the original number, it is to be reduced by?

Sol: $Y\% = \frac{Y}{100}(\uparrow) = \frac{Y}{100+Y}\%(\downarrow)$

Q. 17 If the radius of the cylinder is decreased by 40% then by what percent the height of that should be increased so churned surface area remain the same?

Sol: $66\frac{2}{3}\%$

Q. 18 The price of wine is increased by 25%. If the expenditure is not allowed to increase for a drunkard, by what percent should he reduce consumption?

Sol: 20 %

RESULTANT CHANGE IN:

Q. 19 Salary of a person is first increased by 10%, then it is again increased by 10%, then the percentage change in his salary is?

Sol:

Let salary is 100

Then first increase $= 100 \times \frac{110}{100} = 110$

Second increase $= 110 \times \frac{110}{100} = 121$

% Change $= \left(\frac{121-100}{100}\right) \times 100 = 21\%$

Trick:

Use formula given in the introduction part of percentage

$= x + y + \frac{xy}{100}$

$= 10 + 10 + \frac{10 \times 10}{100}$

$= 21\%$

Q. 20 The price of sugar is increased by 20% and its consumption is decreased by 10% then what is the net affect on the expenditure?

Sol:

$= x + y + \frac{xy}{100}$

$= +20\% - 10\% + \frac{20\% \times -10\%}{100}$

$= 10\% - 2$

$= 8\%$ increase

Q. 21 The price of an article is first decreased by 20% and then increased by 30%. If the resulting price is Rs 416, The original price of the article is?

Sol:

$x + y + \frac{xy}{100}$

$= -20 + 30 + \frac{-20 \times 30}{100}$

$= 10 - 6 = 4\%$ increase

Intial price $\times \left(\frac{100 + \text{increase}}{100}\right) =$ Final result

Intial price $\times \left(\frac{104}{100}\right) = 416$

I. P $= 400$ ₹

Q. 22 A number is first decreased by 60% then 40%. What is the net change in the price of the sugar?

Sol: 76 % DECREASE

Q. 23 The price of an article was increased by R%. Later the new price was decreased by R%. If the latest price was Rs. 1, then the original price was?

Sol: $\frac{10000}{10000-R^2}$

Q. 24 The price of milk is increased by 20% and again by 30%. By what percent should we reduce the new price of milk so as to restore the original price?

Sol: $35\frac{35}{39}\%$

MARKS BASED QUESTIONS

Q. 25 Katrina required 33% marks to pass an examination but she got only 21% marks and was declared fail by 18 marks. Find out the total marks of the examination?

Sol:

Basic:

Let total marks are x

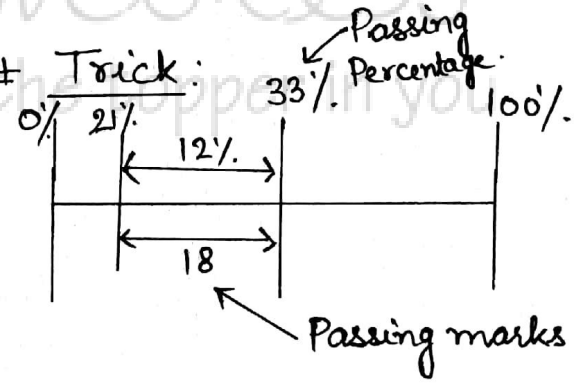
$x \times 21\% + 18 = x \times 33\%$

$x \times 33\% - x \times 21\% = 18$

$x \times 12\% = 18$

$x = \frac{18}{12} \times 100 = 150$

Trick:



$12\% = 18$

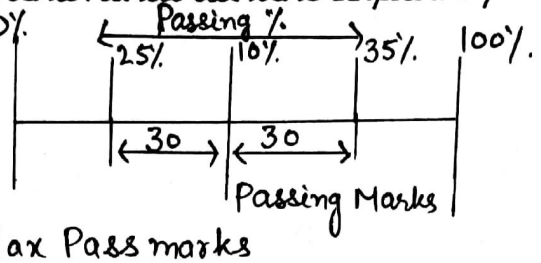
$1\% = \frac{18}{12}$

$100\% = \frac{18}{12} \times 100$

$= 150$ Marks.

Q. 26 In a test a student got 25% marks and failed by 30 marks. In the same test another student got 35% and secured 30 more marks than passing marks. What the maximum pass marks and what is the pass percentage of the exam?

Sol:



$10\% = 60$

$1\% = 6$

$100\% = 600 =$ Max Pass marks

Pass Marks $= 600 \times 25\% + 30$

$= 600 \times \frac{1}{4} + 30$

$= 180$

Pass percentage $= \frac{180}{600} \times 100 = 30\%$

Q. 27 In an examination a candidate must secure 35% marks to pass A candidate, who gets 100 marks, fail by 5 marks. Find the maximum marks for the examination?

Sol: 300

Q. 28 In a test a student got 35% marks and failed by 25 marks. In the same test another student got 48% marks and secured 20% marks more than the essential minimum pass marks. The maximum pass marks for the test were?

Sol: 500

INCREASED OR DECREASED PRICE:

Q. 29 Due to an increase of 20% in the price of apples, a man can buy 5 kg apples less for Rs. 600. Find out the difference between present price and original price?

Sol:

Basic: Present price = 600₹

Increased price for same qty $= \frac{600 \times 120}{100} = 720$₹

5 kg apples rate = 120₹ − 600₹ = 120₹

Present rate = 1 kg apple rate $= \frac{120}{5} = 24$₹

Initial price = 20₹

Difference b/w present price and initial price. = 24 − 20 = 4₹

Trick:

Price	Quantity
$20\% = \frac{1}{5}$	$5 \leftarrow \frac{1}{6}$ change in qty.
	$30 \leftarrow 6$ initial qty.

Present qty = 30 − 5 = 25

Initial price $= \frac{600₹}{30} = 20₹$

Present price $= \frac{600₹}{25} = 24₹$

Difference = 24 − 20 = 4₹