Percentage

1. 56% of Y is 182. What is Y?

   a) 350
   b) 364
   c) 325
   d) 330

   Solution -

   56% of Y means $\frac{56}{100}$ x Y= 182

   $Y = \frac{182 \text{ x } 100}{56} = 325$

2. What per cent is 42kg of 336 kg?

   a) 12.5%
   b) 10.5%
   c) 13%
   d) 26%

   Solution -

   We just need to divide them and multiply by 100 to get per cent

   'of 336kg' implies 336 should be the denominator

   So, $\frac{42}{336}$ x 100 = 12.5%

Tip:

$$\text{Percentage} = \frac{\text{First quantity which is to be expressed in \%}}{\text{2nd quantity (in respect to which we need to find per cent)}} \text{ x } 100$$

3. If 15% of Y is same as 21% of Z, then 12.5% of Y is equal to what per cent of Z?

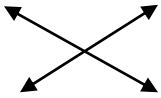
a) 20%
b) 17.5%
c) 13%
d) 9.5%

Solution -

15% of Y = 21% of Z

Then, 12.5% of Y = ? % of Z

15% of Y = 21% Z



12.5% of Y = ? % of Z

$\therefore 15 \text{ x } ? = 21 \text{ x } 12.5$

$\therefore ? = \frac{21 \text{ x } 12.5}{15} = 17.5$

So answer is 17.5% of Z

4. If price of rice is 30% less than that of wheat, then price of wheat is how much per cent more than that of rice?

a) 45%
b) 37.5%
c) 40.65%
d) 42.85%

Solution -

Suppose, 1 Kg Wheat = Rs. 100

So, 1 Kg Rice will be Rs. 100 – (30% of 100) = 100-30 = Rs. 70

Now, how would we express wheat as a percentage of Rice?

$\frac{100}{70}$ x 100 = 142.85%

So, wheat is **142.85%** of Rice => It is (142.85-100) = **42.85% more than that of Rice**.

5. If price of milk is 15% more than that of water, then price of water is how much per cent less than that of milk?

a) 5%
b) 7.50%
c) 13.05%
d) 10.50%

Solution -

Suppose, 1litre water = Rs. 100

So, 1litre milk will be Rs. 100 + (15% of 100) = 100+15 = Rs. 115

Now, how would we express water as a percentage of milk?

$\frac{100}{115}$ x 100 = 86.95%

So, water is **86.95%** of milk => It is (86.95-100) = **13.05% less than that of milk**.

6. The price of apple is first increased by 10% and then decreased by 10%. What is the change in the price of apple?

a) 1.11%
b) 3.5%
c) 5%
d) 1%

Solution -

Let original price be 100

Increase of 10% means the price now = 100 + (10% of 100) = Rs. 110

Now decrease of 10% means price now = Rs. 110 – (10% of 110) = 110-11 = Rs. 99

So change in price = 100-99 = Re. 1

1 is how much percent of 100? It is 1%

So change in price is 1%.

7. The price of milk was first increased by 10% and then decreased by 20%. What is the net percentage change in final price of milk?

a) 12%
b) 15%
c) 10%
d) 7.5%

Solution -

Let original price be 100

Increase of 10% means now price = 100 + (10% of 100) = Rs. 110

Now decrease of 20% means new price = Rs. 110 – (20% of 110) = 110-22 = Rs. 88

Difference in old and new price = 100-88 = 12 (as new price is lower than old price)

12 is what percent of 100? It is 12%.

=> The new price is 12% lesser than the original price.

8. If the price of a sugar is raised by 25%, then by how much per cent should a person reduce his consumption of sugar, so that his expenditure remains same?

a) 25%
b) 50%
c) 20%
d) 12.5%

Solution -

Let us assume his consumption was 1 kg at a sugar price of Rs 100.

Current expense = 1 x 100 = Rs. 100

New price = 125% of Rs. 100 = Rs. 125

What would be new consumption 'C' for expenses to stay same?

C x 125 = 100

C= 0.8kg

So, new consumption is 80% of the old i.e. it is **20% less** than old consumption.

Tip:

For such questions –

Always assume the price of unit quantity (1 kg) as a whole, easy to solve number, preferably 100 (because that is how we talk about percentages – 100%, 85%....so on)

9. Y has to score 40% marks to pass. He gets 20 marks and fails by 40 marks. The maximum marks of the exam are?

a) 100
b) 200
c) 150
d) 250

Solution -

Let maximum marks be M

To pass $= 40\%$ of $M = \frac{40M}{100}$

Y gets 20 marks and fails by 40 marks.

Hence, $20+40 = \frac{40M}{100}$

$\therefore M = 150$ marks.

10. A scores 10% and fails by 30 marks. B scores 40% marks and gets 30 marks more than the minimum marks needed to pass the exam. What are the maximum marks for the exam?

a) 400
b) 200
c) 500
d) 350

Solution -

Maximum marks = M

IMPORTANT - In both cases minimum marks are the same

A gets 10% of M and fails by 30 marks

$\therefore \frac{10M}{100} + 30 =$ minimum marks

B gets 40% of M and gets 30 marks more than minimum marks

$\therefore \frac{40M}{100} - 30 =$ minimum marks

$\therefore \frac{10M}{100} + 30 = \frac{40M}{100} - 30$

$\therefore 30 + 30 = \frac{40M}{100} - \frac{10M}{100}$

$\therefore \frac{30M}{100} = 60$

$\therefore M = 200$

11. In a class, 15% of total number of students failed in Science, 25% of total number of students failed in Maths and 10% of total number of students failed in both. How much percentage of students passed in both Maths and Science?

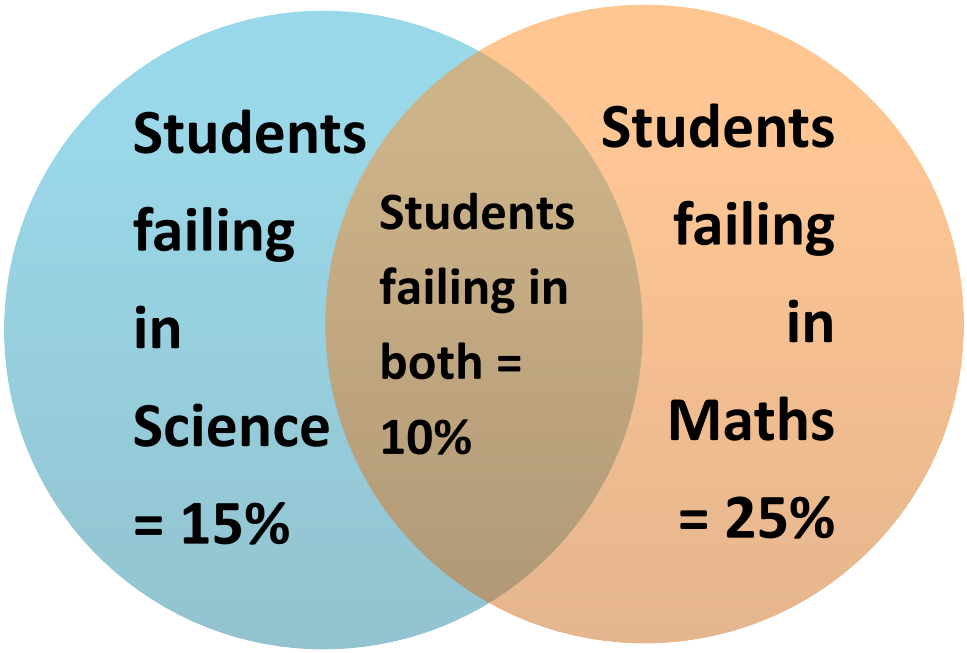
a) 70%

b) 80%
c) 60%
d) 90%

Solution -

Usual Mistake: Percentage of Students failing in both subjects = 25% + 15% = 40%

But as shown in the below diagram, the students who failed both subjects (10%) are counted twice - Once in 15% (blue circle) and once again in 25% (orange circle).



We need to subtract this double counting.

So students who failed subjects would be = 25% + 15% -10% = 30%

Remember:

Subtract only once and not twice!

Percentage of students who passed in both subjects = (100 – 30) % = 70%

Thus, 70% passed in both subjects.

12. By 20% decrease in the price of rice, people can buy 10 kg more rice in Rs.100. What is the original price of 1kg of rice?

a) Rs. 1.5
b) Rs. 2.5
c) Rs. 5
d) Rs. 4.5

Solution -

20% decrease in price means new price = 0.8P

Let us assume that people buy A kg rice in Rs. 100.

With 20% decrease in price, people will buy (A+10) kg rice in Rs. 100.

Expense = Rs. 100 = Price of rice x Quantity of rice

Since, **expense is same, we can say that**

A x P = (A+10) x 0.8P

∴ A = 0.8A + 8 (Cancelling 'P' on both sides)

∴ A = 40

Price of rice = $\frac{100}{40}$ = Rs. 2.5 per kg.

13. In an election which contested was contested by 2 candidates, one candidate got 40% of total votes and yet lost by 1000 votes. What is the total number of votes casted in the election?

a) 10000

b) 6000
c) 8000
d) 5000

Solution -

Total votes = a.

This means that, Votes of candidate 1 + Votes of candidate 2 = a

We know that, Votes of candidate 1 = 40% of a = $\frac{40a}{100}$

Hence, Votes of candidate 2 = (100%-40%) of a = 60% of a = $\frac{60a}{100}$

1st candidate lost by 1000 votes = difference of votes between both candidates

$\therefore \frac{60a}{100} - \frac{40a}{100} = 1000$

$\therefore a = 5000$

14. The population of a city is 50,000 at present. It increases at the rate of 10% per annum. What will be its population 3 yr from now?

a) 67,250
b) 65,550
c) 60,500
d) 66,550

Solution -

Tip:

Remember this formula. It is similar to formula for **COMPOUND INTEREST.**

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

P= Population; R = Rate of increase or decrease; n= number of years;

'+' = during increase; '-'= during decrease

Using formula given above -

$$\text{Population after 3 years} = 50{,}000\left(1 + \frac{10}{100}\right)^3$$

$$= \frac{50{,}000 \text{ x } 11 \text{ x } 11 \text{ x } 11}{10 \text{ x } 10 \text{ x } 10} = \mathbf{66{,}550}$$

15. The population of a city is 50,000 at present. It increases at the rate of 10% per annum. What was its population 4 years ago from present?

a) 36, 561
b) 35, 450
c) 34,151
d) 33,333

Solution -

Tip:

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

Using formula given above -

Present population = 50,000

Rate of increase = 10%

Number of years= 4

Population 4 years ago $= \frac{50{,}000}{(1+\frac{10}{100})^4}$

= 34,150.67 so it is approximately **34,151**

16. A town has population of 50,000 in 1988. In one year i.e. by 1989 it increased by 25%. Next year i.e. in 1990, it decreased by 30%. The next year in 1991 there was an increase of 40%. What is the population at end of 1991?

a) 60250
b) 62250
c) 66550
d) 61250

Solution –

Tip:

Remember this formula. It is similar to formula for **COMPOUND INTEREST.**

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

P= Present Population; R = Rate of increase or decrease; n= number of years;

'+' = during increase; '-'= during decrease

Using formula given above -

Rate 1 = R1 = 25% (increase);

Rate 2 = R2 = 30% (decrease);

Rate 3 = R3 = 40% (increase)

$$\text{Population after 3 years} = 50{,}000\left(1+\frac{25}{100}\right)\left(1-\frac{30}{100}\right)\left(1+\frac{40}{100}\right)$$

$$= 50{,}000\left(\frac{125}{100}\right)\left(\frac{70}{100}\right)\left(\frac{140}{100}\right)$$

$$= \mathbf{61{,}250}$$