

Percentage

The word defines itself Per means 1 upon something and Cent Is like Paise. In India we have 1 rupee = 100 paise

So per cent = $1/100$ Part of something or % [This sign even means $1/100$] So if i say 20% of something Just multiply that something by $20/100$ or 0.2

Like wise if is say 30% then it simply means i want to know $30/100$ th or $3/10$ th part value of something.

Why Do we Use percentage ?

Basically It is used for comparison.

Like If i say i got 400 marks in 10th and the other guy says that he got 600 marks in 10th. So Numerically He has got more marks than me But does his score is relatively better than me ?

For that purpose we must know that He got 600 marks out of how many marks. Let's say he got 600 out of 1000. So his percentage marks will be 60%

And I got 400 out of 500. So my % marks will be 80%.

Now you can easily say that My marks are better because i am getting 80% and he is getting 60%.

How to calculate Percentage [You all know it but just say I am telling it to myself :P]

Well the simple formula is $[\text{Value}/\text{total value}] * 100$

For example A Ring Contains 63 gm of Gold and total weight of ring is 70 gm. Find the percentage of Gold in the ring ?

So By the Formula $[\text{Value}/\text{Total Value}] * 100$

$[63/70] * 100$

$[9/10] * 100$

90%.

% to Decimal Conversion or Fraction Conversion.

Just remember in Fraction Conversion we leave the fraction as it is without Converting Into Decimal. While in Decimal Conversion we first convert into fraction then Write the Decimal Value of that fraction.

Very easy You just have to dive by 100 nothing else.

For example $30\% = 30/100 = 0.3$

$21\% = 21/100 = 0.21$

$99\% = 99/100 = 0.99$

$60\% = 60/100$ or $3/5 = 0.6$

Case 1 [Percentage of Quantity]

Find the no. of male Students i.e boys, If there are 47% male students in the school and Total no. of students in the school is 1000.

As i said If you See anywhere % of something. Just convert the no. into it decimal value and multiply by that Something.

So in the above Question Boys are 47% [Convert this into Decimal and you will get 0.47] of 1000 [Something]

So what we gonna do friends we will just multiply it by 0.47

So the no. of Boys will be $0.47 * 1000 = 470$.

Lets See another Example.

A student scored 85% marks. Total marks are 400. How much marks did he score.

So a student got 85% marks out of 400

So again 85% [Convert 85% in decimal i.e 0.85] of 400 [something]

So the answer will be $0.85 * 400 = 340$

so 340 is our answer.

Well they can also Change the Final Question.

Like in First Example they asked Find the no. of male students. They could have asked the no. of students that are not male.

So what we should do in that case. Nothing to worry my friend just do the usual job 47% are male that means that the rest 53% are not male now calculate 53% of 1000 that will be your answer i.e 530

Case 2 [Inverse Case]

Now in the case 1 we were just asked to Find the % value something. But What if % value of something is given and we have to find the Total Value. ?

Now to worry below example will make it clear.

30% of a Number is 150. What is the number.

So after examining the question we can say that 30% of Some number is 150 [But we don't know yet what is the original number]

When we don't know about something Just Assign a variable to that value.

So we say that the Original Number is x

So as mentioned in the question 30% of x = 150

[Convert 30% into decimal] $0.3 * x = 150$

$$0.3x = 150$$

$$x = 150 / 0.3$$

$$x = 500$$

So you see it's Quite easy.

Likewise Many Different Question can be formed on the same logic. Lets discuss 1

There are 200 girls in the class and girls and girls make up 25% of the class. Find the total No. of students in the class.

We don't know the No. of students so assume that no. of students is x

So what is given in the Question.

25% of Total Students in the class are Girls and Total Girls in the class is 200

lets just try convert above [English] Statement into mathematical Form

$$25\% \text{ of } x = 200$$

$$0.25 * x = 200x = 200/0.25$$

$$x = 800$$

So total no. of students in the class = 800.

Case 3 - Percentage Change.[Very Important For DI]

The simple Way to put that is $[(\text{Change in Quantity} / \text{Original Quantity}) * 100]$ Also $[\text{change in quantity} = \text{Final Quantity} - \text{Initial Quantity}]$

Note- The quantity in whose respect % change is asked is considered as the base By base i mean the original value in the above formula.

Let me make it clear to you with the help of Some Example.

The height of Nikhil some times ago was 160cm. Now his height is 200cm. Find the % change in his height?

So if we analyse the above question We can say that all we have to calculate is the % change in the height of Nikhil with respect to his Earlier Height.

So now lets apply the formula here $[(\text{Change in quantity} / \text{Original Quantity}) * 100]$

Which will be $[(200-160)/160] * 100]$

$[(40/160)*100]$

$[(1/4)*100]$

25%

So the % change in height = 25%.

Case 4- Use of Base Value and With Respect To Cases[Very very Important For DI]

Suppose Salary of Raman is 80,000 and Salary of Ved is 1,00,000. The questions are What per cent is the salary of Ved to that of Raman?

It's a very simple Question If you just know in whose respect you have to find the %.

Now in the above Question we have to find the % of ved salary with respect to ELF's Salary [remember jiske respect me % nikalna hota hai Wohi base hota hai]

So here we have to find Ved's Salary with respect to Raman So we use the formula $[(\text{Value} / \text{In whose respect it is asked}) * 100]$

So ved's salary in respect to Raman's salary will be $[(1,00,00/80,000) * 100] = 125\%$

So VED's Salary is 125% of Raman's Salary.

If the question was just opposite.

Like **What percent is the salary of Raman to that of Ved. (In this Question the Base will be Ved's Salary)**

So lets just apply the formula $[\text{Value} / \text{In whose respect it is asked}) * 100]$

$(80,000/1,00,000) * 100 = 80\%$

So elf's salary is 80% of VED's Salary.

Case 5 - Product Constancy [Most Important Because With it's Application You can also solve Questions related to Time and Work, Speed Time Distance, Average etc. This Concept has a very huge application]

i - **Speed*Time = Distance**

ii- **efficiency*time = work**

ii- $\text{Length} \times \text{breadth} = \text{area}$

iv- $\text{Average} \times \text{No. of elements} = \text{Total value}$

v - $\text{rate} \times \text{quantity} = \text{Expenditure}$

let me make you clear with an example.

The price of sugar is increased by 25% then by how much per cent should a customer reduce the consumption (i.e quantity used) Of sugar so that he has not increase his expense on Sugar. Just remember If one factor of product constancy is increased by P% then the other factor will be decreased by $[(p)/(100+p) * 100]$ To maintain the Product Constancy.

Now in the above Question The rate of sugar is increased by 25% So by how much % we should reduce the quantity to maintain the same expenditure

Just apply the above formula $[(p)/(100+p)*100] = (25/125)*100 = 20\%$

Now It sound Simple but It is difficult to remind these formulas at the time of Solving Question So let me Give you simple method of learning this Formula.

Just Imagine In Your mind that the Quantity is 100. Ok

if the value is increased by 25 % how much should the consumption be reduced.

Now all you have to remember is $[(\text{How much \% value is Increased/ What it becomes after increase}) * 100]$

No as i said In your mind the Quantity is 100. How much the value is increased in the above Question yeah 25%

And how much it will become after 25% increase if the Quantity was 100 yeah That will be 125.

So the answer will be

$(25/125)*100 = 20\%$

lets try again If the price of petrol is increased by 50%. By how much % the consumption be reduced so the expenditure remains same.

Just apply the formula How much increased = 50

What it will become after 50% increase = 150

% redcuton required = $(50/150)* 100 = 33.33\%$

In the same way you can also use the same formula for calculating just the opposite.

For Example If the price of Sugar is reduced by 20% by how much should the family increase it's consumption So the expenditure remains same?

How much % decrease ? = yeah it is 20%

What it will become after 20% decrease = Yeah 80

So Increase required = $(20/80)*100 = 25\%$

lets do one more question.

The price of petrol is reduced by 33.33% but how much % should a person increase his consumption so that His expenditure remains constant.

How much decrease = 33.33

What it will become after 33.33% decrease = 66.66
So % increase required = $(33.33/66.66) * 100 = 50\%$

The Length of Rectangle is Increased by 25% By what % the breadth be reduced so that area remains Constant?

Try Again How much Increase 25

What it becomes 125

% to be reduced = $(25/125) * 100 = 20\%$

Same way the Question of Time Speed Distance can also be solved But i will teach that when i will Explain Time Speed And Distance.

Case 6 - Increase or decrease In value to Get Back the Original Value.

Remember if a value P is increase by x % then we have to decrease the resultant value by $\left\{ \frac{x}{x+100} \right\} * 100\%$ to get back the original value.

For Example Rocky's Salary is 1000rs and it Increased by 10%. How much % His salary must be Decreased So that he Gets His original Salary.

Apply the above Formula $\left\{ \frac{x}{x+100} \right\} * 100 = \left[\frac{10}{100+10} \right] * 100 = 100/11$ or 9.09090%

In case of Decrease.

The formula will be $\left[\frac{x}{100-x} \right] * 100\%$

Rocky Salary is 1000 and it is decreased by 10%. By how much % his salary must be increased so that he gets His Original Salary.

Apply the formula here $\left[\frac{10}{100-10} \right] * 100\% = 100/9 \%$ or 11.11%

But Instead of Doing All this BS you can Also Apply My previous formula here.

Like Salary Increased 10. what it will become 110.

How much it should be reduced = $(10/110) * 100 = 100/11 = 9.09\%$

Again Salary decreased = 10, What it will become 90.

So how much it should be increased to get the original salary = $(10/90) * 100 = 100/9 = 11.11\%$

CASE - 7 Concept of "by" and "to"

Please note that there is very Big Difference between by and to.

Eg . The income is reduced BY 40% it means the New Income 60% of the original value.

And If income is to 40% it means The new Income is 40% of the Original Value.

Case 8 - Consecutive Increase in Percentage.

Suppose the Salary of Sumit is first increase by 20% and Then again it's Increased by 20%.

What is the Total Percentage Increase in His Salary.

Now don't try to be smart here and just add 20% and 30% And say That it's 50% Increase-- THAT WILL BE TOTALLY WRONG.

Actual let me make the Picture a Little bit Clear. What actually Happens in the case of Consecutive Increase and Decrease.

Now Just Suppose that The Salary of Sumit was 1000 Rs. it gets Increased by 20% so What it will become ? Yeah you are right 1200rs.

Now When it is Again Increased by 30% Then we are Calculating that 30% increase on 1200RS ans not on 1000 So the Increase will be 30% of 1200 which will be 360. So increased salary will be $1200 + 360 = 1560$.

Now are two Shortcut Methods Here.

1st Simple Multiplication.

When I say Something is increased by 20% It means It's Value Is increased by 20 % or It's Total value is 120% of the original Value Ok ?

Like 100 is increased by 20% That means it's final value will be $100 + 20\% \text{ of } 100 = 100 + 20 = 120$.

So if Sumit Salary is Increased By 20% that the Value will be $100 * 1.2$.

And If it's Again increased by 30% then the value will be $100 * 1.2 * 1.3 = 100 * 1.56 = 156$.

Total increase = 56.

Percentage Increase = 56%

2nd Method Formula Approach.

Well the formula is $[x + y + (xy)/100]\%$ [Note this formula works only when there is 2 increases]

Now apply the formula in above Question you will get $20 + 30 + (20*30)/100 = 50 + 60/100 = 50 + 6 = 56\%$

Same Sumit's Salary is 1000rs and if it's asked the Salary of Sumit is Increased First by 20% then 30% and then again by 40% then what will be Total Increase and Final Salary.

It's Pretty simple now $1000 * 1.2 * 1.3 * 1.4 = 2184$

That's the final Salary and % increase = $[(2184-1000)/1000] * 100 = (1184/1000) * 100 = 118.4\%$

Some Similar Questions Are like.

The Side of Square is Increased by 10% what will be the increase in Area.

So Just Let The Value of Each side is x, If it's Increased by 10% Then it will become 1.1x

As You know area = Side*side

So Initially The Area without Increase Would Have been $x * x = x^2$

After Increase the Area will be $1.1x * 1.1x = 1.21x^2$

So total % increase in area will be 21%.

Case -9 Consecutive Increase and Decrease Simultaneously

In the last case we saw the case of % increase but now we will learn how to solve when there is a consecutive Increase and as well As decrease.

It's same as the last example.

Sumit's Salary is 1000rs Suppose the salary of Megamind was first Increased by 30% and Then decreased by 20%. What will be final Increase or Decrease in His Salary.

Just do The same Thing 30% increase means $1000 * 1.3$

And then 20% Decrease mean 0.8times [remember we have to decrease here and 20% decrease means 0.2 Point decrease]

So total decrease = $1000 * 1.3 * 0.8 = 1040$.

Final Increase = 40RS

% Increase will be 4%.

With Formula.

Remember the formula $x + y + (xy)/1000$

Same formula can be used here But remember Increase means +ve Sign and decrease means -ve sign,

So apply here now $30 - 20 + (30)(-20)/100 = 10 - 600/100 = 10 - 6 = 4\%$.