

PERCENTAGE

A percentage is a ratio expressed in terms of a unit being 100. A percentage is usually denoted by the symbol “%”.

To express $a\%$ as a fraction, divide it by 100 $\Rightarrow a\% = a/100$

To express a fraction as %, multiply it by 100 $\Rightarrow a/b = [(a/b) \times 100] \%$

$x\%$ of y is given by $(y \times x/100)$

Point to remember for faster Calculation

$1 = 100\%$	$1/2 = 50\%$
$1/3 = 33.33\%$	$1/4 = 25\%$
$1/5 = 20\%$	$1/6 = 16.66\%$
$1/7 = 14.28\%$	$1/8 = 12.5\%$
$1/9 = 11.11\%$	$1/10 = 10\%$
$1/11 = 9.09\%$	$1/12 = 8.33\%$

Some Short tricks based on Condition

If A's income is $r\%$ more than B's income, the B's income is less than A's income by

$$[r / (100+r)] * 100\%$$

If A's income is $r\%$ less than B's income, the B's income is more than A's income by

$$[r / (100-r)] * 100\%$$

If 'A' is $x\%$ of 'C' and 'B' is $y\%$ of 'C' then 'A' is $(x/y) * 100\%$ of 'B'.

If the sides of the triangle, rectangle, square, circle, rhombus etc is

(i) Increased by $x\%$. Then its area is increased by $2x + (x^2 / 100)$

(ii) If decreased by $x\%$. Then its area is decreased by, $-2x + (x^2 / 100)$

If a number x is successively changed by $a\%$, $b\%$, $c\%$. then final value

$$x (1+a/100) (1+b/100) (1+c/100)$$

The net change after two successive changes of $a\%$ and $b\%$ is

$$(a + b + ab/100) \%$$

The population of a town is 'P'. It increased by $x\%$ during 1st year, increased by $y\%$ during 2nd year and again increased by $z\%$ during 3rd year. Then the population after 3 years will be,

$$P * [(100+x)/100] * [(100+y)/100] * [(100+z)/100]$$

Mixture problems

If $x\%$ of a quantity is taken by the first person, $y\%$ of the remaining quantity is taken by the second person, and $z\%$ of the remaining is taken by the third person and if A is left, then initial quantity was

$$A / (1-x\%)(1-y\%)(1-z\%)$$

The same concept we can use, if we add something, then the initial quantity was

$$A / (1+x\%)(1+y\%)(1+z\%)$$

CLASWORK PROBLEMS

1. 33.33% of a value is 41. What is 60% of the same number?
(a) 73.8
(b) 72.6
(c) 75.4
(d) None of these
 2. Find the value 12.66% of 600.
(a) 76
(b) 66
(c) 77
(d) 67
 3. Manish saves $\frac{3}{11}$ th of his salary and spends 28% on food grains. He invests the remaining amount in mutual funds and stocks in the ratio 7:5 respectively. What is his monthly salary, if he has invested Rs.22176 in mutual funds?
(a) Rs.82995.11
(b) Rs.87995.13
(c) Rs.84995.12
(d) Rs.83995.13
 4. Ayesha's income is Rs.12,000 per month. She pays 20% tax on her monthly income and spends 30% for her living expenses. How much does she save annually?
(a) Rs.70,000
(b) Rs.72,000
(c) Rs.74,000
(d) Rs.76,000
 5. Neha scored 1.2 times as many marks in Maths as in History. In Biology, she scored 20 more marks than in Maths. If she secured an aggregate 85.5% out of a total of 600, what was her score in Biology?
(a) 174
(b) 194
(c) 170
(d) 185
 6. The turnover of a company increased by 10%, when the price of the product sold increased by 10%. Find the change in the quantity sold.
(a) 11%
(b) 10%
(c) 20%
(d) No change
 7. A, B, C and D wrote an exam for a total of 500 marks. A scored 25% more marks than B, B scored 40% more marks than C and C scored 60% more marks than D. If A got 320 marks, what percentage of marks did D score?
(a) 22.8
(b) 21.7
(c) 15.6
(d) 23
 8. If the area of a rectangle is increased by 32% and its breadth increased by 20%, what is the percentage increase in its length?
(a) 32%
(b) 10%
(c) 12%
(d) 15%
 9. The population of a town at the end of the year 2015 was 2,45,000. It increased by 15% in the year 2016 and 12% in the year 2017. What is the current population of the town in the beginning of the year 2018?
(a) 315590
(b) 315560
(c) 316650
(d) 320000
 10. Ruby scored 32% marks in History and failed by 16 marks. Robin scored 48% marks and scores 16 marks more than the pass mark. Find the maximum marks in the subject.
(a) 160
(b) 200
(c) 320
(d) 400
 11. A businessman purchased 600 ICs and 400 Arduinos. He discovered 15% of the ICs and 8% of Arduinos were defective. Find the percentage of instruments that are in working condition.
(a) 87.8%
(b) 85%
(c) 82.8%
(d) 80.5%
 12. A number is reduced by 10%. Its present value is 270. What was its original value?
(a) 300
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- (b) 253
(c) 297
(d) 303
13. The weight of a cow is 25 % more than that of the calf. By what percentage is the weight of the calf less than that of the cow?
(a) 75%
(b) 50%
(c) 30%
(d) 20%
14. A mineral contains 26 % copper. What quantity of the mineral is required to extract 260 g of copper?
(a) 260g
(b) 500g
(c) 1000g
(d) 1500g
15. The price of a pair of sweaters was decreased by 22% and was sold at \$30. What was the original price of the pair of sweaters?
(a) \$35
(b) \$36.5
(c) \$38.5
(d) \$40
16. What percentages of numbers between 1 and 90 both inclusive have 2 or 9 in the unit digit?
(a) 10%
(b) 50%
(c) 17%
(d) 20%
17. If $A = 11.11\%$ of 72 and $B = 8.33\%$ of 84, then which of the following is true?
(a) A is greater than B
(b) B is greater than A
(c) $A = B$
(d) Cannot be determined
18. Two numbers A and B are such that the sum of 7% of A and 6% of B is three-fourth of the sum of 5% of A and 11% of B. Find the ratio of A: B.
(a) 9:13
(b) 2:3
(c) 5:12
(d) 7:11
19. Rajesh bought a pair of headphones costing Rs.1848 including the sales tax of 12%. He asked the shopkeeper to reduce the price of the headphones so that he could save the amount now equal to the tax. Find the reduction in the price of the headphones.
(a) Rs.190
(b) Rs.195
(c) Rs.198
(d) Rs.203
20. Initially, Swetha has Rs.600 in her Paytm wallet. She initially increases the amount by 30% and the next day it is further increased by 15%. Find the percentage by which her wallet grows.
(a) 42.5%
(b) 45.5%
(c) 49.5%
(d) 52.5%
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