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## PERCENTAGE

What is Percentage: A fraction with its denominator as ' 100 ' is called a percentage. Percentage means per hundred. So it is a fraction of the form 6/100, $37 / 100,151 / 100$, and these fractions can be expressed as $6 \%, 37 \%$, and $151 \%$ respectively. By a certain percent, we mean that many hundredths.

Thus x percent means x hundredths, written as $\mathrm{x} \%$.

To express $\mathrm{x} \%$ as a fraction: We have, $\mathrm{x} \%=\mathrm{x} / 100$.

Thus, $20 \%=20 / 100=1 / 5 ; 48 \%=48 / 100=12 / 25$, etc.

To express $\mathbf{a} / \mathbf{b}$ as a percent:We have, $a / b=((a / b) * 100) \%$

Thus, $1 / 4=[(1 / 4) * 100]=25 \% ; 0.6=6 / 10=3 / 5=[(3 / 5) * 100] \%=60 \%$

Why Percentage: Percentage is a concept evolved so that there can be a uniform platform for comparison of various things. (Since each value is taken to a common platform of 100)

Example: To compare three different students depending on the marks they scored we cannot directly compare their marks until we know the maximum marks for which they took the test. But by calculating percentages they can directly be compared with one another.

## Important Points to Remember:

a) If the price of a commodity increase by $\mathrm{R} \%$, then the reduction in consumption so as not to increase the expenditure is
[R/(100+R))*100] \%
b) If the price of the commodity decreases by $R \%$, then the increase in consumption so as to decrease the expenditure is
$[(\mathrm{R} /(100-\mathrm{R}) * 100] \%$
c)If $A$ is $R \%$ more than $B$, then $B$ is less than $A$ by
$[(\mathrm{R} /(100+\mathrm{R})) * 100] \%$

1. d) If $A$ is $R \%$ less than $B$, then $B$ is more than $A$ by
$[(\mathrm{R} /(100-\mathrm{R})) * 100] \%$

Results on Population: Let the population of the town be $P$ now and suppose it increases at the rate of R\% per annum, then:

1. Population after $n$ years $=P[1+(R / 100)] n$
2. Population $n$ years ago $=P /[1+(R / 100)] n$

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

1. Value of the machine after $n$ years $=P[1-(R / 100)] n$
2. Value of the machine $n$ years ago $=P /[1-(R / 100)] n$

## Practice Percentages Mock Test Here

## Solved Examples:

1. A batsman scored 110 runs which included 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets?

## Solution:

Number of runs made by running $=110-(3 \times 4+8 \times 6)=110-60=50$
Therefore, required percentage $=50 / 110 \times 100=500 / 11=455 / 11 \%$
2. 8 is $4 \%$ of $a$, and 4 is $8 \%$ of $b$. c equals to $b / a$. What is the value of $c$ ?

Solution:
$4 \%$ of $a=8=>a=8 \times 100 / 4=200 ; 8 \%$ of $b=4=>b=4 \times 100 / 8=50$
$c=b / a=50 / 200=1 / 4$
3. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was $56 \%$ of the sum of their marks. The marks obtained by them are:

## Solution:

Let the marks be $(x+9)$ and $x$.

Then, $(x+9)=(56 / 100) x(x+9+x)$
$=>25(x+9)=14(2 x+9)=>x=33$

So there marks are 42 and 33
4. In an election between two candidates, one got $55 \%$ of the total valid votes, $20 \%$ of the votes were invalid. If the total number of votes was 7500 , the number of valid votes that the other candidate got, was:

## Solution:

Number of valid votes $=80 \%$ of $7500=6000$

Valid votes polled by other candidate $=45 \%$ of $6000=2700$
5. Teacher took exam for English, average for the entire class was 80 marks. If we say that $10 \%$ of the students scored 95 marks and $20 \%$ scored 90 marks then calculate average marks of the remaining students of the class

## Solution:

Let's assume that total number of students in class is 100 and required average be $x$. Then from the given statement we can calculate $=(10 * 95)+(20 * 90)+(70 * x)=(100 * 80)$
$=>70 x=8000-(950+1800)=5250=>x=75$.
6. In a hotel, $60 \%$ had vegetarian lunch while $30 \%$ had non-vegetarian lunch and $15 \%$ had both types of lunch. If 96 people were present, how many did not eat either type of lunch?

Solution:

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So People who do not have either lunch were $=96-72=24$
7. Due to a $25 \%$ increase in the price of rice per kilogram, a person is able to purchase 20 kg less for Rs. 400. What is the increased price of rice per kilogram?

Solution:
$20 \mathrm{~kg}=25 \%$ of $400=$ Rs. $100=>1 \mathrm{~kg}=$ Rs. 5
8. Wheat is now being sold at Rs. 27 per kg. During last month, its cost was Rs. 24 per kg. Find by how much percent a family reduces its consumption, so as to keep the expenditure fixed.

Solution:

Percentage increase in cost $=(27-24) \times 100 / 24=12.5$

Required decrease $=(12.5 \%) \times 100 /(100+12.5)=11.11$
9. In a competitive examination in State A, 6\% of candidates got selected from the total appeared candidates. State $B$ had an equal number of candidates appear and $7 \%$ of candidates got selected with 80 more candidates got selected than $A$. What was the number of candidates appearing from each State?

Solution:

State A and State B had an equal number of candidates appear.

In-state A, 6\% of candidates got selected from the total appeared candidates

In-state B, 7\% candidates got selected from the total appeared candidates

But in State B, 80 more candidates got selected than State A

From there, it is clear that $1 \%$ of the total appeared candidates in State B $=80$
$=>$ total appeared candidates in State $B=80 \times 100=8000$
$=>$ total appeared candidates in State $A=$ total appeared candidates in State $B=8000$
10. In a certain school, $20 \%$ of students are below 8 years of age. The number of students above 8 years of age is $2 / 3$ of the number of students of 8 years of age which is 48 . What is the total number of students in the school?

## Solution:

Let the total number of students $=x$

20\% of students are below 8 years of age
=> number of students whose age $\geq 8$ years $=80 \%$ of $x$ $\qquad$ (i) number of students whose age is 8 years $=48$ $\qquad$ (ii)
number of students whose age is greater than 8 years $=48 \times 2 / 3=32$ $\qquad$ (iii) From (i), (ii), (iii)
$80 \%$ of $x=42+32=80$
$\Rightarrow 100 \%$ of $x=80 \times 100 / 80=100=>x=100$

## Get Quantitative Aptitude Practice Questions

11. The price of a car is Rs. $3,25,000$. It was insured to $85 \%$ of its price. The car was damaged completely in an accident and the insurance company paid $90 \%$ of the insurance. What was the difference between the price of the car and the amount received?

## Solution:

Price of the car = Rs.3,25,000
Car was insured to $85 \%$ of its price
Insured price $=325000 \times 85 / 100$
Insurance company paid $90 \%$ of the insurance.
Amount paid by insurance company $=325000 \times 85 / 100 \times 90 / 100=325 \times 85 \times 9=248625$ Difference between the price of the car and the amount received $=325000-248625=$ Rs. 76375
$12.30 \%$ of the men are more than 25 years old and $80 \%$ of the men are less than or equal to 50 years old. $20 \%$ of all men play football. If $20 \%$ of the men above the age of 50 play football, what percentage of the football players are less than or equal to 50 years?

## Solution:

Let total number of $\mathrm{men}=100$

Then, 20 men play football. 80 men are less than or equal to 50 years old. The remaining 20 men are above 50 years old.

Number of football players above 50 years old $=20 \times 20 / 100=4$

Number of football players less than or equal to 50 years old $=20-4=16$
Required percentage $=16 / 20 \times 100=80 \%$
13. A candidate who gets $20 \%$ marks fails by 10 marks but another candidate who gets $42 \%$ marks gets $12 \%$ more than the passing marks. Find the maximum marks.

## Solution:

From the given statement pass percentage $=42 \%-12 \%=30 \%$
By this $30 \%$ of $x-20 \%$ of $x=10$ marks $=>10 \%$ of $x=10$ marks $=>100 \%=100$ marks
14. A mixture of 20 liters of milk and water contains $20 \%$ of water. The new mixture is formed by adding 5 lit of water. What is the percentage of milk in the new mixture?

## Solution:

$20 \mathrm{li}=4 \mathrm{li}$ water 16 li milk

By adding 5 li water
Total $=9$ li water 16 li milk (new)
$16 / 25 \times 100=64 \%$
15. From the salary of Roja, $20 \%$ is deducted as house rent, $10 \%$ of the rest she spends on children's education, and $20 \%$ of the balance she spends on watching movies. If her savings are Rs.5760/- then her total salary is:

## Solution:

First value $=$ last value $\times[100 /(100-p 1)] \times[100 /(100-p 2)]$
$=5760 \times[100 /(100-20)] \times[100 /(100-10)] \times[100 /(100-20)]=5760 \times 100 / 80 \times 100 / 90 \times$ $100 / 80=10000 /-$

## Practice Problems:

1. In an election, $70 \%$ of males were registered voters, and $40 \%$ of females were registered voters, but only $65 \%$ of registered females cast their votes. If there were only 2 candidates in the election and they have received the votes in the ratio of 9: 8 how much percent (both men and women) cast their votes to the winner?
2. One liter of water is evaporated from 10 liters of a solution containing $4 \%$ of sugar. What is the percentage of sugar in the remaining solution?
3. Two cubes of bronze have their total weight equivalent to 60 kg . The first piece contains 10 kg of pure zinc and the second piece contains 8 kg of pure zinc. What is the percentage of zinc in the first piece of bronze if the second piece contains 15 percent more zinc than the first?
4. One student secured 14 marks more than the other and his marks were $60 \%$ of the sum of their marks. Find the marks obtained by them?
5. The weights of two friends $A \& B$ are in the ratio 4:5. A's weight increases by $10 \%$ and the total weight of A \& B together becomes 82.5 Kg , with an increase of $15 \%$. By what \% did the weight of $B$ increase?
6. A man saves $331 / 3 \%$ \% from his salary of Rs. 7500 every month. In how many months will he be able to save an amount equal to his monthly salary?
7. A survey shows that $74 \%$ of students like apples whereas $68 \%$ of the students like orange. So what percent of students like both apple and orange?
8. The pressure of a definite mass of a gas is directly proportional to the temperature and inversely proportional to the volume under the given conditions. If the temperature is increased by $40 \%$ and the volume is decreased by $20 \%$ then the new pressure will:

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9. In an election, three candidates $A, B$, and $C$ contested. A got $42 \%$ of the votes polled, B got $28 \%$ of the votes polled and C got the rest. A got 3096 more votes than C. How many votes were polled in total?
10. The population of a village is 5500. If the number of males increases by $11 \%$ and females by $20 \%$, then the population becomes 6330 . Find the population of females in the town.

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