# Percentage

# Concept of Percentage

By a certain percent we mean that many hundredths. Thus x percent means x hundredths, written as x%

**To express x% as a fraction:** $x\% = \frac{x}{100}$

**To express** $\frac{a}{b}$ **as a percent:**

$$\frac{a}{b} = \left(\frac{a}{b} \times 100\right)\%$$

**1. Express the following as a fraction: 56%, 0.08%, 4%**

Solution:

1. $$56\% = \frac{56}{100} = \frac{14}{25}$$

2. $$0.08\% = \frac{0.08}{100} = \frac{8}{10000} = \frac{1}{1250}$$

3. $$4\% = \frac{4}{100} = \frac{1}{25}$$

**2. Express the following as percent:** $6\frac{3}{4}$ **, 0.004,** $\frac{3}{5}$

1. $6\frac{3}{4}=\frac{27}{4}=\frac{27}{4}\times 100\%=675\%$

2. $0.004=\frac{4}{1000}=\frac{4}{1000}\times 100\%=0.4\%$

3. $\frac{3}{5}=\frac{3}{5}\times 100\%=60\%$

**3. 2 is what percent of 50.**

Required percentage = $\frac{2}{50} \times 100\% = 4\%$

**4. What is 30% of 80?**

30% of 80 = $\frac{30}{100} \times 80 = 24$

5. **Evaluate 28% of 450**

28% of 450 = $\frac{28}{100} \times 450 = 126$

6. **Evaluate $16\frac{2}{3}\%$ of 600**

$$16\frac{2}{3}\% \text{ of } 600 = \frac{50}{3}\% \text{ of } 600$$

$$= \frac{50}{3} \times \frac{1}{100} \times 600 = 100$$

7. **What percent of 7 is 84?**

$$\text{Required percentage} = \frac{84}{7} \times 100\% = 1200\%$$

**8. Find the missing figures:**

**(i) 9% of ? = 6.3, (ii) 0.25% of ? = 0.04**

(i) Let 9% of x = 6.3

then $\frac{9}{100}x = 6.3 \Leftrightarrow x = \frac{6.3 \times 100}{9} = 70$

(ii) Let 0.25% of x = 0.04

then

$$\frac{0.25}{100}x = 0.04 \Leftrightarrow x = \frac{0.04 \times 100}{0.25} = 16$$

**9. If the sales tax be reduced from $3\frac{1}{2}\%$ to $3\frac{1}{3}\%$, then what difference does it make to a person who purchase an article with market price of Rs. 8400?**

Difference in percent = $3\frac{1}{2}\% - 3\frac{1}{3}\% = \frac{1}{6}\%$

Difference in amount =

$$\frac{1}{6}\% \text{ of Rs.8400}$$

$$= \frac{1}{6} \times \frac{1}{100} \times 8400 = 14$$

Difference in amount = Rs.14

**10. An inspector rejected 0.08% of the motors as defective. How many motors he had to examine to reject 2 motors?**

Let the number of motors to be examined be x.

Then

0.08% of x = 2

$$\frac{8}{100}\times\frac{1}{100}\times x = 2 \Leftrightarrow x = \frac{2\times100\times100}{8} = 2500$$

**11. Sixty five percent of a number is 21 less than four fifth of that number. What is the number?**

Let the number be x.

Then

$$\frac{4}{5}x-(65\%\ \text{ of }\ x)=21$$

$$\Leftrightarrow \frac{4}{5}x-\frac{65}{100}x=21$$

$$\Leftrightarrow \frac{80}{100}x-\frac{65}{100}x=\frac{15x}{100}=21$$

$$15x=2100 \Leftrightarrow x=140$$

**12. Difference of two numbers is 1660. If 7.5% of one number is 12.5% of the other number, find the two numbers.**

Let the numbers be x and y.

Then, 7.5% of x = 12.5% of y

Now x – y = 1660,

$$x = \frac{12.5}{7.5} y = \frac{125}{75} y = \frac{5}{3} y$$

$$\frac{5}{3} y - y = 1660 \Rightarrow \frac{2}{3} y = 1660 \Rightarrow y = \frac{1660 \times 3}{2} = 2490$$

One number = 2490, Second number =4150

**13. In an election between two candidates, 75% of the voters cast their votes, out of which 2% of the votes were declared invalid. A candidate got 9261 votes which were 75% of the total valid votes. Find the total number of votes enrolled in that election.**

Let the total number of votes enrolled be x. Then

Number of votes cast = 75% of x,

Valid votes = 98% ( 75% of x)

75%[98%(75% of x)] = 9261

$$\Leftrightarrow \left(\frac{75}{100}\times\frac{98}{100}\times\frac{75}{100}\times x\right)=9261$$

$$\Leftrightarrow x=\left(\frac{9261\times100\times100\times100}{75\times98\times75}\right)$$

x = 16800

**14. Raman's salary was decreased by 50% and subsequently increased by 50%. How much percent does he lose?**

Let the original salary = Rs.100

New final salary = 150% of (50% of Rs. 100)

$$= \text{Rs. } \frac{150}{100} \times \frac{50}{100} \times 100 = Rs.75$$

Decrease = 25%

15. **If the numerator of a fraction be increased by 15% and its denominator be diminished by 8%, the value of the fraction is $\frac{15}{16}$ . Find the original fraction.**

Let the original fraction be $\frac{x}{y}$ .

Then,

$$\frac{115\% \text{ of } x}{92\% \text{ of } y} = \frac{15}{16}$$

$$\frac{115x}{92y} = \frac{15}{16} \Rightarrow \frac{x}{y} = \left(\frac{15}{16} \times \frac{92}{115}\right) = \frac{3}{4}$$

# Population

If population of a town is $p$ and it increases at the rate of $r\%$ per annum, then,

population after $n$ years

$$= p\left(1 + \frac{r}{100}\right)^n$$

population before $n$ years

$$= \frac{p}{\left(1 + \frac{r}{100}\right)^n}$$

**16. The population of a town is 1,76,400. If it increases at the rate of 5% per annum, what will be its population 2years hence ? What was it 2 years ago?**

Sol.

Population after 2years

$$= (176400) \times \left(1 + \frac{5}{100}\right)^2$$

$$= \left(176400 \times \frac{21}{20} \times \frac{21}{20}\right)$$

$$= 194481$$

Population 2years ago

$$= \frac{176400}{\left(1 + \frac{5}{100}\right)^2}$$

$$= \left(176400 \times \frac{21}{20} \times \frac{21}{20}\right)$$

$$= 160000$$

**17. Luaa spends her monthly salary in the following manner: 20% on house rent, 20% on food, 5 % on transportation, 10% on the education, and 20% on other household expenses. She saves the remaining amount of Rs. 5000 at the end of the month. Find out her monthly salary?**

Let the Monthly Salary = 100%

Monthly Expenditure = 20% + 20% + 5% + 10% + 20% = 75%

Monthly Savings = 100% – 75% = 25%

Now, 25% of salary saved = 5000

Let's take 100% salary as x

25% of x = 5000

$$x = 5000 \times \frac{100}{25}$$

$$x = \frac{500000}{25}$$

x = 20000

Therefore, her monthly salary = Rs. 20000

## 18. In an examination, 40% are passing percentage. If a person gets 41 marks and fails by 3 marks, what are the maximum marks?

Total passing marks = 41 + 3 = 44

Let maximum marks be m

Then, 40% of m = 44

= 40m/100 = 44

40m = 4400

m = 110

## 19. Reema saves 51% of his total income of Rs. 15000 per month. Calculate his total spending.

Money spent = (100 – 51) of 15000

= 49% of 15000

= 49/100*15000 = 7350

## 20. If a girl's height is 15% less than a boy, how much percent of Boy's height is more than a girl?

Excess of boy's height over girl = 15/ (100-15) *100

= 15/85*100

= 17.64%

## 21. If 40% of a number is equal to 2/3rd of another number, what is the ratio of first number to the second number?

Let the two numbers be x and y

40% of x = $\frac{2}{3}$y

Then, $\frac{40x}{100} = \frac{2}{3}$y

$\frac{2}{5}$ x = $\frac{2}{3}$y

$\frac{x}{y} = \frac{2}{3} \times \frac{5}{2} = \frac{5}{3}$

Therefore the ratio = 5: 3