



# Percentage

## Percentage

Percentage means per hundred or for every hundred.

Or

The value which is considered for every hundred is termed as percentage and the numerator of such fraction (having denominator 100) is called as the rate of percentage. Percentage is represented by % sign.

## Basic Rules Related to Percentage

### Per cent as a Fraction

To convert a per cent into a fraction, we divide it by 100 and remove the per cent sign %.

$$5\% = \frac{5}{100} = \frac{1}{20}$$

$$0.3\% = \frac{0.3}{100} = \frac{3}{1000}$$

$$0.006\% = \frac{0.006}{100} = \frac{6}{100000} = \frac{3}{50000}$$

**Example 1** What is the fraction form of

$$12\frac{3}{4}\%$$

$$(a) \frac{51}{400} \quad (b) \frac{53}{400} \quad (c) \frac{49}{500} \quad (d) \frac{48}{299}$$

$$\text{Sol. (a)} \quad 12\frac{3}{4}\% = \frac{51}{4}\% = \frac{51}{400}$$

### Fraction as a Per cent

To convert a fraction into a per cent, we multiply it by 100 and apply the per cent sign %.

$$\frac{3}{4} = \left[ \frac{3}{4} \times 100 \right] \% = 75\%$$

$$0.4 = [0.4 \times 100]\% = 40\%$$

$$0.08 = [0.08 \times 100]\% = 8\%$$

**Example 2** What is the percentage form of 0.15?

- (a) 11%      (b) 14%      (c) 15%      (d) 16%

**Sol. (c)**  $0.15 = 0.15 \times 100\%$

$$= \frac{15}{100} \times 100\% = 15\%$$

### Finding a Percentage of a Number

To find the per cent of a given number, we proceed as follows

- (i) Obtain the number, say x.
- (ii) Obtain the required per cent, say p%.
- (iii) Multiply x by p and divide by 100 to obtain the required p% of x.

$$\text{i.e. } p\% \text{ of } x = \frac{p}{100} \times x$$

**Example 3** 12% of 1200 is

- (a) 121                      (b) 144  
(c) 145                      (d) 125

$$\text{Sol. (b)} \quad \frac{12}{100} \times 1200 = 144$$

## Important Formulae

- Rate percentage =  $\frac{\text{Result}}{\text{Original number}} \times 100$
- Increased percentage =  $\left( \frac{\text{Increment}}{\text{Original number}} \times 100 \right) \%$
- Decreased percentage =  $\left( \frac{\text{Decrement}}{\text{Original number}} \times 100 \right) \%$

**Example 4** What per cent of 120 is 90?

- (a) 78.5% (b) 76%  
(c) 77% (d) 75%

**Sol.** (d)  $\therefore$  Required percentage =  $\left( \frac{90}{120} \times 100 \right) = 75\%$

**Example 5** The price of an article is ₹ 120 after increment it becomes ₹ 150. Find the increased percentage.

- (a) 35% (b) 30% (c) 25% (d) 21%

**Sol.** (c) Original price = ₹ 120

Price after increment = ₹ 150

Increment = ₹ 150 – ₹ 120 = ₹ 30

Increased percentage =  $\left( \frac{30}{120} \times 100 \right) = 25\%$

**Example 6** The price of sugar is ₹ 15 per kg.

Due to excess of sugar, price gets reduced and it becomes ₹ 12 per kg. Find the decreased percentage.

- (a) 30% (b) 25% (c) 35% (d) 20%

**Sol.** (d) Original price = ₹ 15

Price after decrement = ₹ 12

Decrement = ₹ 15 – ₹ 12 = ₹ 3

Decreased percentage =  $\left( \frac{3}{15} \times 100 \right) = 20\%$

## Showing Fraction Percentage Equivalence

$$1 = 100\% \quad 1/2 = 50\% \quad 1/3 = 33\frac{1}{3}\%$$

$$1/4 = 25\% \quad 1/5 = 20\% \quad 1/6 = 16\frac{2}{3}\%$$

$$1/7 = 14\frac{2}{7}\% \quad 1/8 = 12\frac{1}{2}\% \quad 1/9 = 11\frac{1}{9}\%$$

$$1/10 = 10\% \quad 1/11 = 9\frac{1}{11}\% \quad 1/12 = 8\frac{1}{3}\%$$



## Practice Exercise

- What is the percentage form of 0.4?  
(a) 50% (b) 40% (c) 0.4% (d) 0.04%
- What is the fraction form of  $22\frac{1}{2}\%$ ?  
(a) 9/40 (b) 40/9 (c) 16/9 (d) 45/2
- Find the value of  $\frac{7}{2}\%$  of 80.  
(a)  $\frac{12}{5}$  (b) 15 (c)  $\frac{14}{5}$  (d)  $\frac{13}{4}$
- Find 125% of 64.  
(a) 70 (b) 50 (c) 60 (d) 80
- 36 is what per cent of 144?  
(a) 25% (b) 28% (c) 30% (d) 20%
- What per cent of 80 is 16?  
(a) 23% (b) 20%  
(c) 30% (d) 40%

7. If 23% of A is 46, then find A.

- (a) 300 (b) 400  
(c) 200 (d) 150

8. Simplify 35% of  $x = \frac{3}{4}$  of 48 + 62.

- (a) 280 (b) 250  
(c) 260 (d) 275

9. Simplify  $5\frac{1}{2}$  of 240 = 150% of x.

- (a) 625 (b) 600  
(c) 800 (d) 880

10. In school there are 1200 students. If the percentage of boys in a school is 60%, then find the number of girls.

- (a) 500 (b) 480  
(c) 280 (d) 300

11. A garden has 2000 trees. 12% of these are mango trees, 18% lemon and the rest are orange trees. Find the number of orange trees.  
(a) 1400 (b) 1500 (c) 1200 (d) 1300
12. Radha earns 22% of her investment. If she earns ₹ 187, then how much did she invest?  
(a) ₹ 900 (b) ₹ 750 (c) ₹ 850 (d) ₹ 800
13. India's Army is 40% more than Pakistan's army. If Pakistan have 150000 soldiers, then find the number of Indian soldiers.  
(a) 150000 (b) 210000 (c) 155000 (d) 165000
14. A town population is 200000. In which 40% males, 30% females and rest are children, then find the number of children.  
(a) 45000 (b) 65000  
(c) 50000 (d) 60000
15. The price of rice is ₹ 20 per kg price. Due to shortage of rice, price of rice increased to ₹ 25. Find the increased percentage of price.  
(a) 25% (b) 30%  
(c) 35% (d) 20%

## Answers

1	(b)	2	(a)	3	(c)	4	(d)	5	(a)	6	(b)	7	(c)	8	(a)	9	(d)	10	(b)
11	(a)	12	(c)	13	(b)	14	(d)	15	(a)										

## Hints & Solutions

1.  $0.4 = (0.4 \times 100)\% = 40\%$
2.  $22\frac{1}{2}\% = \frac{22\frac{1}{2}}{100} = \frac{45}{2 \times 100} = \frac{9}{40}$
3.  $\frac{7}{2}\% \text{ of } 80 = 80 \times \frac{7}{2 \times 100} = \frac{14}{5}$
4.  $125\% \text{ of } 64 = 64 \times \frac{125}{100} = 80$
5. Value of percentage =  $\frac{\text{Result}}{\text{Original Number}} \times 100$   
 $= \left( \frac{36}{144} \times 100 \right) = 25\%$
6.  $\therefore \text{Percentage} = \left( \frac{16}{80} \times 100 \right) = 20\%$
7.  $\frac{23}{100} \times A = 46$   
 $\Rightarrow A = \frac{46 \times 100}{23}$   
 $\Rightarrow A = 200$
8.  $\frac{35}{100} \times x = \frac{3}{4} \text{ of } 48 + 62$   
 $\Rightarrow \frac{35}{100} \times x = 36 + 62$   
 $\Rightarrow \frac{35}{100} \times x = 98$   
 $\Rightarrow x = \frac{98 \times 100}{35} \Rightarrow x = 280$
9.  $\frac{11}{2} \times 240 = \frac{150}{100} \times x$   
 $\Rightarrow \frac{11 \times 120 \times 100}{150} = x$   
 $\Rightarrow x = 880$
10. Total number of students = 1200  
 Percentage of boys = 60%  
 Percentage of girls =  $100 - 60 = 40\%$   
 Number of girls in a school =  $\frac{40}{100} \times 1200$   
 $= 480$
11. Total trees in a garden = 2000  
 Percentage of mango trees = 12%  
 Percentage of lemon trees = 18%  
 Percentage of orange trees  
 $= 100 - (12 + 18) = 100 - 30 = 70\%$   
 $\therefore \text{Number of orange trees} = \frac{70}{100} \times 2000$   
 $= 1400$
12. Let Radha invests = ₹ x.  
 $\therefore 22\% \text{ of } ₹ x = ₹ 187.$   
 $\therefore \frac{22}{100} \times x = 187$   
 $\Rightarrow x = \frac{187 \times 100}{22}$   
 $x = ₹ 850$   
 $\therefore \text{Radha invests} = ₹ 850.$

13. Total number of Pakistan soldiers = 150000

$$\Rightarrow 40\% \text{ of } 150000 = \frac{40}{100} \times 150000 = 60000$$

$\therefore$  Total number of Indian soldiers

$$= 150000 + 60000 = 210000$$

14. Total population of a town = 200000

Percentage of male in a town = 40%

Percentage of female in a town = 30%

$\therefore$  Percentage of children in a town

$$= 100 - (40 + 30) = 100 - 70 = 30\%$$

$\therefore$  Number of children in a town

$$= \frac{30}{100} \times 200000 = 60000$$

15. Original price of rice = ₹ 20 per kg.

Price after increment = ₹ 25 per kg.

Increment = 25 - 20 = ₹ 5

$$\therefore \text{Increased percentage} = \left( \frac{5}{20} \times 100 \right) = 25\%$$



## Try Yourself

1) Convert  $5/3$  into percentage.

- (a) 168.68% (b) 166.67%  
(c) 165.55% (d) 168.67%

2) Convert  $\frac{2}{7}\%$  into fraction.

- (a)  $\frac{1}{340}$  (b)  $\frac{1}{220}$   
(c)  $\frac{1}{400}$  (d)  $\frac{1}{350}$

3) Find 0.02% of 6500.

- (a) 13/10 (b) 17/10  
(c) 11/10 (d) 19/10

4) Find 10% of 5% of 320.

- (a) 7/5 (b) 9/5 (c) 8/5 (d) 6/5

5) 2.5 is 5% of what?

- (a) 45 (b) 50 (c) 52 (d) 57

6)  $\sqrt{x} + 625 = 80\%$  of  $1200 - 310$ . Find the value of  $x$ .

- (a) 615 (b) 600  
(c) 629 (d) 625

7)  $\frac{3}{5}$  of  $1450 + x = 200\%$  of 450. Find the value of  $x$ .

- (a) 32 (b) 40 (c) 30 (d) 35

8) In a school there are 500 students. Out of which 40% are girls. So, find the numbers of boys and girls studying in a school.

- (a) 300, 250 (b) 300, 200  
(c) 200, 350 (d) 250, 350

9) Population of a town is 2000. If 45% are male, 35% are female and rest are children. Find the numbers of male, female and children.

- (a) 910, 700, 420 (b) 950, 700, 450  
(c) 700, 900, 500 (d) 900, 700, 400

10) Malvika gets 98 marks in her exams. This amount to 56% of the total marks. What are the maximum marks?

- (a) 175 (b) 195 (c) 165 (d) 170

## Answers

- |   |     |   |     |   |     |   |     |    |     |
|---|-----|---|-----|---|-----|---|-----|----|-----|
| 1 | (b) | 2 | (d) | 3 | (a) | 4 | (c) | 5  | (b) |
| 6 | (d) | 7 | (c) | 8 | (b) | 9 | (d) | 10 | (a) |