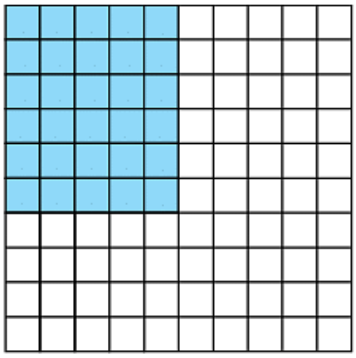
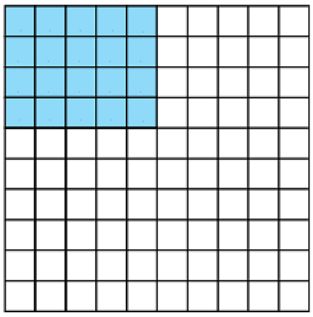
Percentages

Introduction

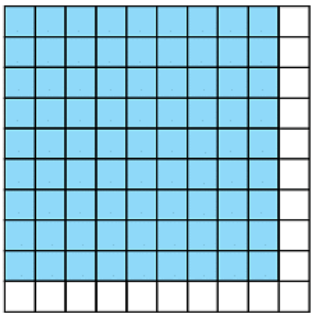
Per cent means out of hundred. Per means out of and cent means 1 hundred.
Therefore, **per cent means out of 1 hundred.**
In the figure, a square is divided into 100 equal parts. Out of the 100 small squares, 30 squares are shaded. The shaded part comprises 30 out of 100 or 30 per cent of the whole.
The unshaded part comprises 70 per cent of the whole.



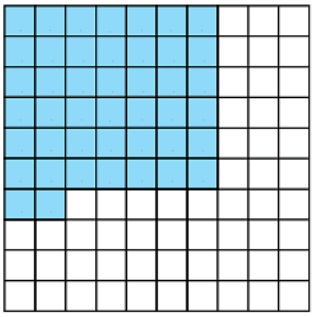
30 per cent is shaded.
70 per cent is unshaded.



20 per cent is shaded.
80 per cent is unshaded.



81 per cent is shaded.
19 per cent is unshaded.



44 per cent is shaded.
56 per cent is unshaded.

The symbol of per cent is %.
So, 7% means 7 out of 1 hundred = 7 / 100.
20% means 20 out of 1 hundred = 20 / 100.
80% means, 80 out of 1 hundred = 80 / 100.
We note that a fraction with 100 as denominator can be considered as a per cent.
For example, 15 / 100 means 15%, 60 / 100 means, 60%.

Consider the following example:

In an examination Priya secured 72% marks. What does it mean?
It means she obtained 72 marks out of 100 marks.

Converting a Per cent into a Fraction or a Decimal

To convert a per cent into a fraction, drop the per cent sign and divide the remaining number by 100. Express the fraction so obtained in its lowest terms.
To convert a per cent into a decimal, first change it into a fraction with denominator as 100 and then shift the decimal point to the left by two places.

Example 1: Express each of the following per cents as a fraction:
(a) 15%
(b) 64%
(c) 95%
(a) $15\% = 15 / 100 = 3 / 20\%$.
(b) $64\% = 64 / 100 = 16 / 25\%$.
(c) $95\% = 95 / 100 = 19 / 20\%$.

Example 2: Express each of the following per cents as a decimal.
(a) 11%
(b) 72%
(c) 85%
(a) $11\% = 11 / 100 = 0.11$.
(b) $72\% = 72 / 100 = 0.72$.
(c) $85\% = 85 / 100 = 0.85$.

Tips: By a certain per cent we mean that many hundredths.

Converting a Fraction and a Decimal into a Per cent

- To convert a fraction into a per cent, multiply the given fraction by 100 and write the symbol %.
- To convert a decimal into a per cent, multiply the given decimal by 100 and write the symbol %.

Example 3: Express each of the following as a per cent:
(a) 11 / 20
(b) 14 / 25
(c) 27 / 50

(a)

$$\frac{11}{20} = \left(\frac{11}{20} \times 100\right)\% = 55\%$$

(b)

$$\frac{14}{25} = \left(\frac{14}{25} \times 100\right)\% = 56\%$$

(c)

$$\frac{27}{50} = \left(\frac{27}{50} \times 100\right)\% = 54\%$$

Example 4: Express each of the following as a per cent:
(a) 0.14
(b) 0.35
(c) 0.75
(a) $0.14 = (0.14 \times 100)\% = 14\%$.
(b) $0.35 = (0.35 \times 100)\% = 35\%$.
(c) $0.75 = (0.75 \times 100)\% = 75\%$.

Money and Metric Measures as Percentages

1. We know that, 100 paise = 1 rupee.
   So, 1 paisa = 1 / 100 of a rupee. 1 paisa = 1% of a rupee.
   Similarly, 2 paise = 2% of a rupee.
   10 paise = 10% of a rupee. 75 paise = 75% of a rupee.
2. We know that, 100 cm = 1 metre
   So, 1 cm = 1 / 100 of a metre. 1 cm = 1% of a metre.
   2 cm = 2% of a metre. 20 cm = 20% of a metre.
   50 cm = 50% of a metre.
3. We know that, 1,000 g = 1 kg

   $$\text{So, 1 g} = \frac{1}{1000} \text{ of a kg} = \frac{1}{10 \times 100} \text{of a kg} = \frac{0.1}{100} \text{ of a kg}$$

   1 g = 0.1% of a kg. 2 g = 0.2% of a kg.
   10 g = 1% of a kg. 15 g = 1.5% of a kg
   100 g = 10% of a kg. 500 g = 50% of a kg.
4. We know that, 1,000 ml = 1l

   $$\text{So, 1 ml} = \frac{1}{1000} \text{ of a } l = \frac{1}{10 \times 100} \text{ of a } l = \frac{0.1}{100} \text{ of a } l$$

   1 ml = 0.1% of a l. 3 ml = 0.3% of a l.
   10 ml = 1% of a l. 250 ml = 25% of a l.

Finding Percentage of a Number

The following examples would help you to understand the required procedure.

Example 5: Find:
(a) 20% of 80
(b) 32% of 75
(c) 45% of 80 days

(a) 20% of 80

$$= \frac{20}{100} \text{ of } 80 = \frac{20}{100} \times 80 = \frac{80 \times 20}{100} = 16$$

Hence, 20% of 80 = 16.

(b) 32% of 75

$$= \frac{32}{100} \times 75 = \frac{32 \times 75}{100} = 24$$

Hence, 32% of 75 = 24

(c) 45% of 80 days

$$= \frac{45}{100} \times 80 \text{ days} = \frac{45 \times 80}{100} = 36 \text{ days.}$$

Hence, 45% of 80 days = 36 days.

Example 6: What per cent of 80 is 60?

60 out of 80 is equivalent to the fraction 60 / 80.

$$\text{So, } \frac{60}{80} = \left(\frac{60}{80} \times 100\right)\% = 75\%.$$

Hence, 75% of 80 is 60.

To Find the Number hose Percentage is Given
Example 7: Find the number whose:
(a) 15% is 24
(b) 36% is 117

(a) We have, 15% of the required number = 24

$$\text{So, } \frac{15}{100} \times (\text{the required number}) = 24$$

Thus, the required number

$$= 24 \div \frac{15}{100} = 24 \times \frac{100}{15} = 160.$$

Hence, 160 is the required number whose 15% is 24.

(b) We have 36% of the required number = 117

$$\text{So, } \frac{36}{100} \times (\text{the required number}) = 117$$

Thus, the required number

$$= 117 \div \frac{36}{100} = 117 \times \frac{100}{36} = 325.$$

Hence, 325 is the required number whose 36% is 117.