# DECIMAL AND PERCENTAGE

## Decimals

### The Concept of Decimals

*Explain the concept of decimals*

A decimal- is defined as a number which consist of two parts separated by a point.The parts are whole number part and fractional part

**Example 1**

$5.6$ ; $5 =$ whole number part and

$0.6 =$ fractional part i. e it can be written as $\frac{6}{10}$

Therefore $5.6 = 5\frac{6}{10}$

**Example 2**

(i) $13.35 = 13\frac{35}{100}$

(ii) $0.123 = \frac{123}{1000}$

(iii) $2.08 = 2\frac{8}{100}$

## Conversion of Fractions to Terminating Decimals and Vice Versa

*Convert fractions to terminating decimals and vice versa*

The first place after the decimal point is called tenths.The second place after the decimal point is called hundredths e.t.c

**Consider the decimal number 8.152**

The place value of $1-$ is tenths $\left(\text{i. e } \frac{1}{10}\right)$, $5-$ is hundredths $\left(\text{i. e } \frac{5}{100}\right)$ and $2-$ is thousandths $\left(\text{i. e } \frac{2}{1000}\right)$

**NOTE**

- To convert a fraction into decimal, divide the numerator by denominator
- To convert a decimal into fraction, write the digits after the decimal point as tenths, or hundredths or thousandths depending on the number of decimal places.

**Example 3**

Convert the following fractions into decimals

(a) $\frac{1}{10}$ (b) $\frac{27}{100}$ (c) $8\frac{2}{5}$ (d) $\frac{37}{125}$ (e) $\frac{53}{250}$

**Solution**

Divide the numerator by denominator

(a)

$$
\begin{array}{r}
0.1 \\
10\overline{)\,1} \\
-0 \\
\hline
10 \\
-10 \\
\hline
\end{array}
$$

$\therefore \frac{1}{10} = 0.1$

(b)

$$
\begin{array}{r}
0.27 \\
100\overline{)\,27} \\
-0 \\
\hline
270 \\
-200 \\
\hline
700 \\
-700 \\
\hline
\end{array}
$$

$\therefore \frac{27}{100} = 0.27$

# Operations and Decimals

## Addition of Decimals

*Add decimals*

**Example 4**

Evaluate

(a) $28.3 + 4.96 + 110.9$

(b) $23.4 + 67.98$

**Solution**

(a)
$$\begin{array}{r} 28.30 \\ 4.96 \\ + \quad 110.90 \\ \hline 144.16 \end{array}$$

(b)
$$\begin{array}{r} 23.40 \\ + \quad 67.98 \\ \hline 91.38 \end{array}$$

## Subtraction of Decimals

*Subtract decimals*

**Example 5**

(a) $7.4 - 3.9$

(b) $12.8 - 17.2$

**Solution**

(a)
$$\begin{array}{r} 7.4 \\ - \quad 3.9 \\ \hline 3.3 \end{array}$$

(b)
$$\begin{array}{r} 120.8 \\ - \quad 17.2 \\ \hline 103.6 \end{array}$$

## Multiplication of Decimals

*Multiply decimals*

**Example 6**

(a) $23.1 \ x \ 6.7$

(b) $4.8 \ x \ 67.98$

**Solution**

(a) $23.1 \ x \ 6.7$

$231 \ x \ 67 = 15477$

$\therefore \quad 23.1 \ x \ 6.7 = 154.77$

(b) $4.8 \ x \ 67.98$

$48 \ x \ 6798 = 326304$

$\therefore \ 4.8 \ x \ 67.98 = 326.304$

## Mixed Operations with Decimals

*Perform mixed operations with decimals*

**Example 7**

(a) $4.5 \div 0.2$

(b) $732 \div 1.28$

**Solution**

(a) $4.5 \div 0.2 = \frac{4.5}{0.2} = \frac{4.5 \ x \ 10}{0.2 \ x \ 10} = \frac{45}{2} = 22.5$

(b) $732 \div 1.28 = \frac{732}{1.28} = \frac{732 \ x \ 100}{1.28 \ x \ 100} = \frac{73200}{128} = 571.875$

## Word Problems Involving Decimals

*Solve word problems involving decimals*

**Example 8**

If 58 out of 100 students in a school are boys, then write a decimal for the part of the school that consists of boys.

**Solution**

We can write a fraction and a decimal for the part of the school that consists of boys.

| **Fraction** | **decimal** |
|---|---|
| 58/100 | 0.58 |

# Percentages

## Expressing a Quantity as a Percentage

*Express a quantity as a percentage*

The percentage of a quantity is found by converting the percentage to a fraction or decimal and then multiply it by the quantity.

**Example 9**

Find (a) 25 % of Tsh 60,000

(b) $12\frac{1}{2}$ % of 80 $cm^2$

(c) 1.2 % of 120 minutes

**Solution**

(a) 25 % of Tsh 60,000 $= \frac{25}{100} \times 60{,}000 = \frac{25 \times 60{,}000}{100} = \frac{1\,500\,000}{100} =$ Tsh 15 000

(b) $12\frac{1}{2}$ % of 80 $cm^2 = \frac{25}{2}$ % $\times$ 80 $cm^2 = \frac{25}{200} \times 80\ cm^2 = \frac{25 \times 80\ cm^2}{200} = \frac{2000}{200}\ cm^2 =$ 100 $cm^2$

(c) 1.2 % of 120 minutes $= \frac{1.2}{100} \times 120$ minutes $= \frac{1.2 \times 120}{100} = \frac{144}{100} = 1.44$ minutes

**NOTE:**The concept of percentage of a quantity can be used to solve the problems involving percentage increase and decrease as shown in the below examples:-

## A Fractions into Percentage and Vice Versa

*Convert a fraction into percentage and vice versa*

To change a fraction or a decimal into a percentage, multiply it by 100%

**Example 10**

Convert the following fractions into percentages

(a) $\frac{9}{40}$

(b) $\frac{1}{12}$

(c) $2\frac{1}{2}$

(d) $\frac{7}{8}$

**Solution**

(a) $\frac{9}{40}\ x\ 100\% = \frac{9\ x\ 100}{40}\% = \frac{900}{40}\ \% = 22.5\ \%$

(b) $\frac{1}{12}\ x\ 100\% = \frac{1\ x\ 100}{12}\% = \frac{100}{12}\ \% = 8.3\ \%$

(c) $2\frac{1}{2}\ x\ 100\% = \frac{5}{2}\ x\ 100\ \% = \frac{5\ x\ 100}{2}\% = \frac{500}{2}\ \% = 225\ \%$

(d) $\frac{7}{8}\ x\ 100\% = \frac{7\ x\ 100}{8}\ \% = \frac{700}{8}\ \% = 87.5\ \%$

## A Decimal into Percentage and Vice Versa

*Convert a decimal into percentage and vice versa*

To change a percentage into a fraction or a decimal, divide it by 100%

**Example 11**

Convert the following percentages into decimals

(a) $66\frac{2}{3}\ \%$

(b) $48.5\ \%$

(c) $12\frac{1}{2}\ \%$

(d) $150\ \%$

**Solution**

(a) $66\frac{1}{2}\ \% = \frac{133}{2}\ \% = \frac{133}{2} \div 100 = \frac{133}{2}\ x\ \frac{1}{100} = \frac{133}{200}$

(b) $48.5\ \% = \frac{48.5}{100} = \frac{485}{1000} = \frac{97}{200}$

(c) $12\frac{1}{2}\ \% = \frac{25}{2}\ \% = \frac{25}{2} \div 100 = \frac{25}{2}\ x\ \frac{1}{100} = \frac{25}{200} = \frac{1}{8}$

(d) $150\ \% = \frac{150}{100} = \frac{3}{2}$

## Percentages in Daily Life

*Apply percentages in daily life*

**Example 12**

In an assignment, Regina scored 9 marks out of 12. Express this as a percentage

**Solution**

$$9\ \text{out of}\ 12 = \frac{9}{12}$$

$$\text{Percentage} = \frac{9}{12}\ x\ \ 100\ \% = \frac{9\ x\ 100}{12}\ \% = \frac{900}{12}\ \% = 75\ \%$$

**Example 13**

A school has 400 students of which 250 are girls. What percentage of the students are not girls?

**Solution**

$$\text{Percentage of girls} = \frac{250}{400} \; x \; 100\,\% = \frac{250 \; x \; 100}{400}\,\% = \frac{25000}{400}\,\% = 62.5\,\%$$

$$\text{Percentage which are not girls} = 100\,\% - 62.5\,\% = 37.5\,\%$$