



# Percentages (part 1)

## Theory and examples

### Learning Skills

### Introduction:

A percentage is a number out of 100. To understand percentages you first need to understand fractions and decimals which can be found in our [fraction](#) and [decimal](#) document. An understanding of percentages and how they are used is a foundation for work in primary mathematics. Explanations of some of the terms that have been used in this document can be found in the [glossary](#) on our website. [Part 2](#) of this document contains exercises to practise

### This sheet will teach you to:

- Convert percentages to fraction 2
- Convert percentages to decimals 2
- Convert fractions and decimals to percentages 2
- Recognise common Percentages 3
- Apply fractions 3
- Find percentages of amounts 5

## 1. Explanation of Percentages

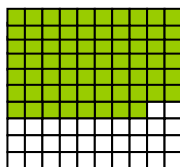
Percent means out of 100.

### Examples

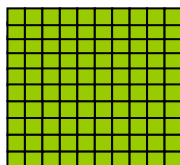
a) 10% means 10 out of 100 or  $\frac{10}{100}$ .



b) 68% means  $\frac{68}{100}$



c) 100% means 1 whole



## 2. Converting percentages to fraction

Express the percentage as a fraction then simplify if possible.

### Examples

a) 17%

$$\frac{17}{100} \quad (\text{there is no common factor})$$

b) 15%

$$\frac{15}{100} = \frac{15 \div 5}{100 \div 5} = \frac{3}{20}$$

c) 16.5%

$$\frac{16.5}{100} = \frac{33}{100}$$

### Note

to remove the decimal from the numerator, double the top and bottom

or multiply the top and bottom by 10

$$\frac{16.5 \times 10}{100 \times 10} = \frac{165}{1000} \text{ then simplify down}$$

## 3. Converting percentages to decimals

Express the percentage as a fraction first (do not simplify) then divide by 100 by moving the decimal point 2 places to the left.

### Examples

a) 59%

$$\frac{59}{100} = 59 \div 100 = 0.59$$

b) 40%

$$\frac{40}{100} = 40 \div 100 = 0.40 \quad \text{or} \quad 0.4$$

c) 25.5%

$$\frac{25.5}{100} = 25.5 \div 100 = 0.255$$

## 4. Converting fractions and decimals to percentages

Multiply by 100%

### Examples

a)  $\frac{3}{20}$

$$\begin{aligned} \frac{3}{20} \times \frac{100\%}{1} &= \frac{300}{20}\% \\ &= \frac{30}{2}\% \\ &= 15\% \end{aligned}$$

### Note

You can multiply any fraction by the equivalent of 1 and the value of the fraction is unchanged.

As  $100\% = 1$ , then  $\frac{100\%}{1}$  is the same as multiplying by  $\frac{1}{1}$

b)  $\frac{5}{8}$

$$\frac{5}{8} \times \frac{100\%}{1} = \frac{500}{8} \% = 8 \overline{)50^2 0.^4 0} = 62.5\%$$

c) 0.58

$$0.58 \times 100\% = 58\%$$

d) 0.7225

$$0.7225 \times 100\% = 72.25\%$$

**Note**

When you multiply a decimal by 100 you move the decimal place 2 places to the right

## 5. Common Percentages

$$50\% = \frac{1}{2} = 0.5$$

$$25\% = \frac{1}{4} = 0.25$$

$$75\% = \frac{3}{4} = 0.75$$

$$20\% = \frac{1}{5} = 0.2$$

$$33\frac{1}{3}\% = \frac{1}{3} = 0.\dot{3} = 0.33$$

$$66\frac{2}{3}\% = \frac{2}{3} = 0.\dot{6} = 0.67$$

(2 decimal places)

(2 decimal places)

## 6. Applications

### Examples

- a) A student scores 19 marks out of 25 for an assignment. What is the mark as a percentage?

$$\frac{19}{25} \times \frac{100\%}{1} = \frac{1900}{25} \% = 76\%$$

Using a calculator  $19 \div 25 \times 100 =$

**Note**

Express the marks as a fraction then multiply by  $\frac{100\%}{1}$

- b) David has still to pay \$6 000 on a car that he bought for \$15 000. What percentage of the total has he still to pay?

Amount to pay = \$6 000

Total = \$15 000

$$\text{percentage} = \frac{6000}{15000} \times \frac{100\%}{1} = \frac{600000}{15000} = \frac{600000}{15000} = \frac{600}{15} = 40\%$$

Using a calculator  $6 \div 15 \times 100 =$



## 7. Finding percentages of amounts

Express the percentage as a fraction then multiply by the amount.

### Examples

- a) Find 8% of \$1400.

$$\begin{aligned}\text{amount} &= \frac{8}{100} \text{ of } \$1400 \\ &= \frac{8}{100} \times \frac{1400}{1} \\ &= \frac{8 \times 1400}{100} \\ &= \$120\end{aligned}$$

Using a calculator  $8 \div 100 \times 1400 =$

- b) Find 62% of 2500 litres.

$$\begin{aligned}\text{amount} &= \frac{62}{100} \text{ of } 2500 \text{ litres} \\ &= \frac{62}{100} \times \frac{2500}{1} \\ &= \frac{62 \times 2500}{100} \\ &= 1550 \text{ litres}\end{aligned}$$

Using a calculator  $62 \div 100 \times 2500 =$

- c) Find 20% of 1.5 metres.

$$\begin{aligned}\text{amount} &= \frac{20}{100} \text{ of } 150 \text{ cm} \\ &= \frac{20}{100} \times \frac{150}{1} \\ &= \frac{20 \times 150}{100} \\ &= 30 \text{ cm}\end{aligned}$$

Using a calculator  $20 \div 100 \times 150 =$

### Note

For small quantities such as 1.5 m where the answer will be a fraction of a metre we can convert to 150 centimetres first

## 8. For more information

Visit our Learning Skills website at <http://www.csu.edu.au/division/studserv/maths/teachered.htm>

Part 2 of this document for exercises relating to this topic can be found at <http://www.csu.edu.au/division/studserv/maths/teachered.htm>

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