

## SESSION 2: MEASURING

### Key Focus

- Identify the principles of measurement
- Recall units used for measuring length, mass, volume, temperature, time and speed
- Identify appropriate units for measuring different things
- Convert units of measurement for the metric and imperial units
- Measure time using different units

### Xplanation

#### Why do we measure?

People take measurement to make accurate comparisons between different objects or events or conditions. In everyday life we measure the size of objects by using a ruler or tape measure, we measure the distance we travel to school. People use scales to measure mass (weight) and measuring jugs to measure the volume of liquid we need when baking. We use a thermometer to measure temperature, a clock or stopwatch to measure time and a speedometer in a car to measure how fast we are travelling.

#### Units of measurements

When we measure we need to make sure that the measurement will be the same even if different people do the measuring. For this reason we have systems of measurement. We use the metric system. People have agreed on a standard amount and we compare everything to that standard. The standard is given a unit to identify it. Sometimes the standard is too big or too small and we need a bigger or smaller unit to do the measuring. In the metric system, the conversion between the units of a standard (base units) and smaller or bigger units are all in multiples of 10.

#### Common Units

Length	- metres, centimetres, millimeters
Distance	- Metric system: metres, kilometres
Mass	- kilograms, grams, milligrams, metric tonne
Volume (Capacity)	- litres, millilitres, centimetres cubed
Temperature	- Degrees Celsius or Degrees Fahrenheit
Time	- Years, months, weeks, days, hours, minutes, seconds
Speed	- metres per second, kilometres per hour

## Converting units of measurement

### Metric System Conversions

This table shows you how different units in the metric system relate to one another.

Unit	Weight	Length	Capacity
Thousands	kilogram (kg) 1 000 g = 1 kg	kilometre (km) 1 000 m = 1 km	kilolitre (kl) 1 000 ℓ = 1 kl
Base unit	gram (g)	metre (m)	litre (ℓ)
Hundredths		centimetre (cm) 100 cm = 1 m	
Thousandths	milligram (mg) 1 000 mg = 1 g	millimetre (mm) 1 000 mm = 1 m	millilitre (ml) 1 000 ml = 1 ℓ

### Imperial measurements

Not everyone in the world uses the metric system. There is an old system of measurement, called the Imperial system that is still used in the USA and the UK.

Distance: inches, feet, yards, miles

Mass: ounces, pounds, tons

Capacity: gallons, pints

### Non-metric conversions

When converting between units of Imperial measurements and metric units, you need to refer to a table of conversion like the one below. We do a ratio calculation to do the conversions

#### Distance

1 mile	1,609 km	1 km	0,6215 miles
1 yard	91,44 cm	1 m	3,2808 feet
1 foot	30,48 cm	1 cm	0,3937 inches
1 inch	2,54 cm		

#### Mass

1 ton	0,907 tonnes	1 tonne	1,102 ton
1 pound	0,4536 kg	1 kg	2,204 pounds
1 ounce	28,4 g	1 g	0,035 ounces

#### Capacity (Volume)

1 gallon	4,5461 ℓ	1 litre	0,22 gallons
1 pint	0,5682 ℓ	1 litre	1,76 pints

## Temperature

To convert from °Celsius to °Fahrenheit:  $^{\circ}\text{F} = (1,8 \times ^{\circ}\text{C}) + 32$

To convert from °Fahrenheit to °Celsius:  $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \div 1,8$

## Time

There are:

- 60 seconds in 1 minute
- 60 minutes in 1 hour
- 24 hours in 1 day
- 7 days in 1 week
- 12 months in 1 year
- 52 Weeks in a year
- $\pm 4$  weeks in 1 month
- $\pm 30$  days in 1 month.

## Speed

The formula for calculating speed is:

**Speed = Distance  $\div$  time**

## X-amples

### Question 1

How would you measure the following and what unit would you use?

- a.) Mass of a small child
- b.) the length of a cellphone
- c.) the temperature of an oven
- d.) the distance between Cape Town and Durban
- e.) the mass of a tablet
- f.) the breadth of a single hair
- g.) the time it takes for water to boil on a stove
- h.) mass of a construction truck
- i.) the amount of cold drink in a glass
- j.) the time it takes to fly from Durban to Johannesburg

### Question 2

Convert each of the following:

- a.) 241mm to m
- b.) 5,24kg to g
- c.) 250ml to  $\ell$
- d.) 575kg to tonnes

**Question 3**

Use the table of conversion to complete the following conversions:

- a.) 6 inches to centimetre
- b.) 9lbs 5oz to kilograms
- c.) 5,25 gal to litres
- d.) 250 km to miles
- e.) 36 inches to feet

**Question 4**

Use the formula given to complete the following temperature conversions:

- a.)  $78^{\circ}\text{F}$
- b.)  $-40^{\circ}\text{C}$

**Question 5**

- a.) How many seconds are there in 2,5hrs?
- b.) How many minutes are there between 08:52 and 16:24?

**X-ercises**

**Question 1**

Convert the following:

- a.) 43mm into m
- b.) 5260g into kg
- c.) 4,25 l to ml
- d.) 542 days into in years, months, weeks and days
- e.) 350C to 0F

**Question 2**

Pretty and Precious enter a fun run. Pretty finishes first. Her stopwatch shows 1:43:57. When Precious finishes the stop watch shows 2:03:12. How long does Pretty have to wait before Precious finishes the race?