

Introduction to Science.



Target: I can accurately
measure distance

Distance

Real scientists need to be able to **measure** things properly. One of the things we have to measure is **distance**:

- **What** does 'distance' mean?
- **How** would you measure distance?
- What **apparatus** would you use?
- **What units** would you use?
- **Why** do we have to use units?



Measuring Distance

- To measure distance there are a variety of different measuring instruments:



Trundle wheel



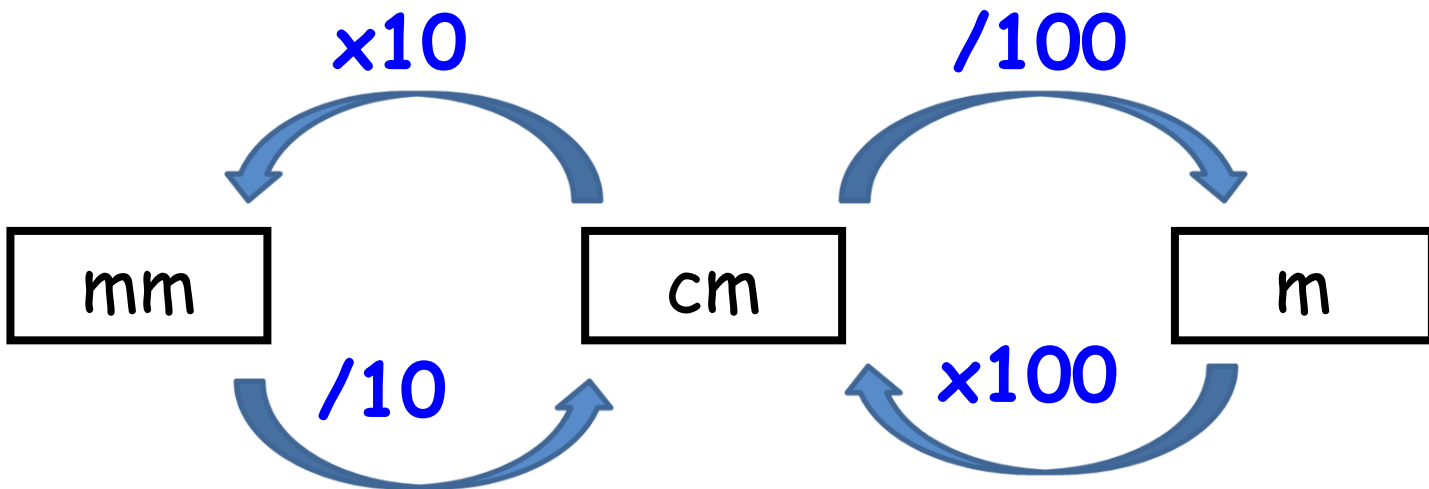
Metre stick



Ruler

Units for Distance

Units	Conversion
Metre (m)	$1\text{m} = 100\text{cm} = 1000\text{mm}$
Centimetre (cm)	$1\text{cm} = 1/100$ of a metre
Millimetre (mm)	$1\text{mm} = 1/1000$ of a metre



Measuring Distance

Quantity	Answer	Units
Length of Science Corridor		
My height		
Height of stool		
Width of jotter		
Length of paper clip		
Width of door		

Converting units of distance

Millimetres (mm)	Centimetres (cm)	Metres (m)
	27	
		1.50
1800		
	500	
		0.75

Converting units of distance

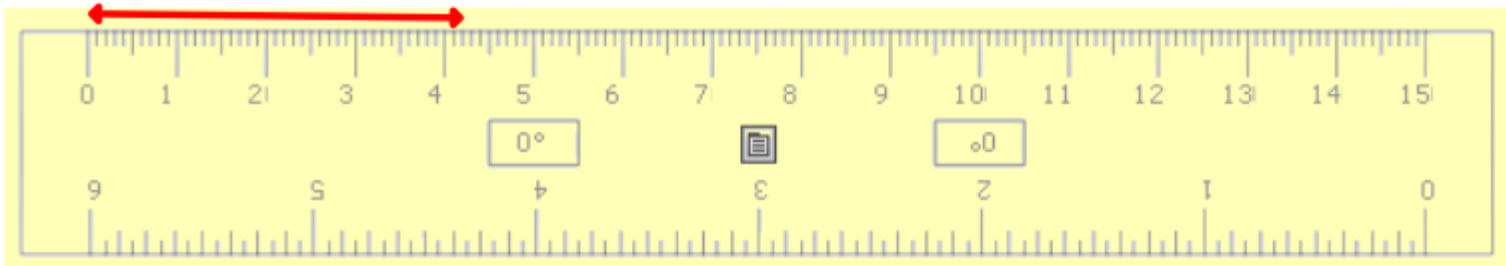
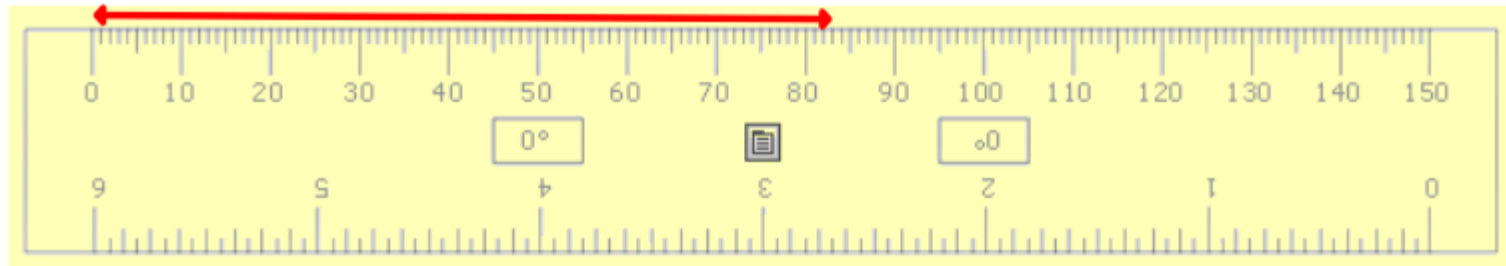
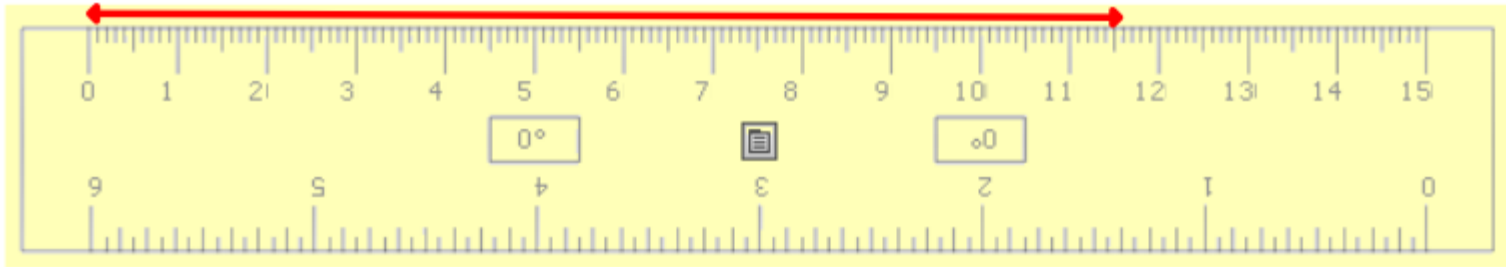
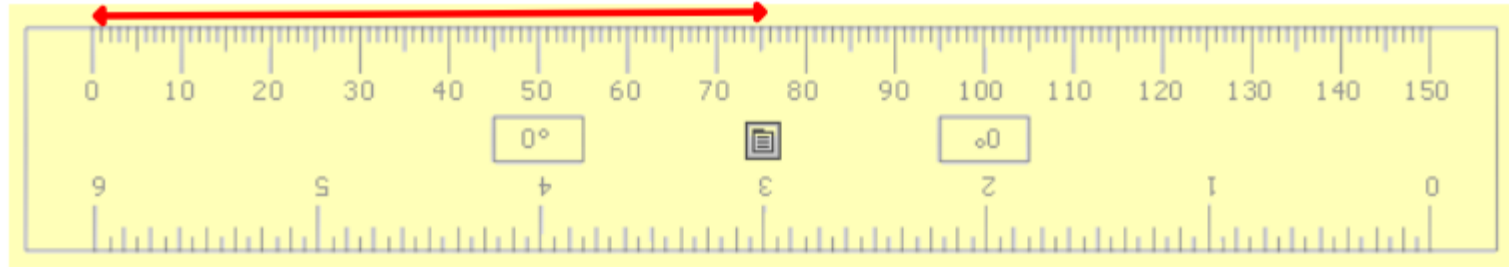
Millimetres (mm)	Centimetres (cm)	Metres (m)
270	27	0.27
1500	150	1.50
1800	180	1.8
5000	500	5.0
750	75	0.75

Match the following measurements, measuring instruments and units in a table in your jotter.

Object	instrument	units
length of pen		
	meter stick	
width of textbook		
	trundle wheel	
height of desk		m/cm
	meter stick	m

teacher's height	ruler	cm
length of playing field	ruler	m/cm
length of classroom	meter stick	m
		cm

What are the readings on the rulers below:



Target: I can accurately
measure mass and volume

Mass

- 'Mass' means **how much there is** of something. The more mass something has, the **heavier** it is.

- What **units** do we use to measure mass?
- What **equipment** do we use to measure mass?

Measuring Mass

- An electronic balance measures in grams (g) which is the unit of mass.
- Heavier objects may be measured in kilograms (kg).

1 kilogram is made up of 1000 grams



Measuring Mass

Quantity	Mass (g)
Science jotter	
Pencil	
Mobile phone	
3 sheets of paper	
Block of wood	

Converting units of mass

Mass (g)	Mass (kg)
2	
	4
350	
	0.0255
2452	

Converting units of mass

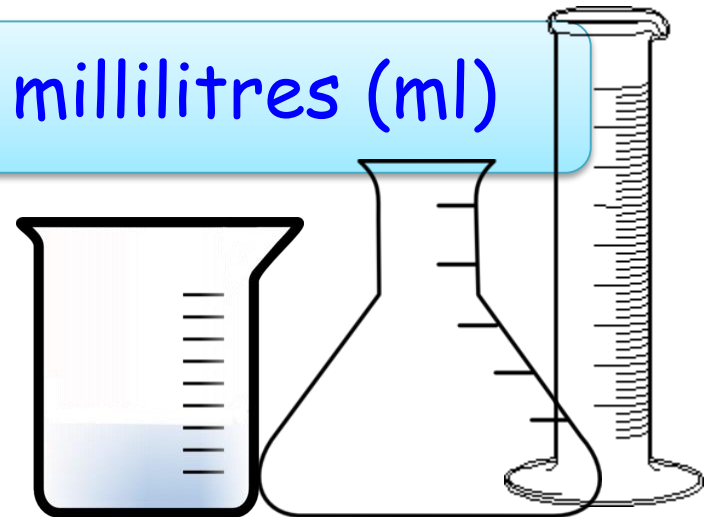
Mass (g)	Mass (kg)
2	0.002
4000	4
350	0.350
25.5	0.0255
2452	2.452

Target: I can accurately measure volume

Volume

- 'Volume' is a measure of the **space that something takes up.**
- The volume of a liquid is measured in **litres (l)** or **millilitres (ml)**. You may also see it written as **cm³**.(cubic centimetres)

1 litre (l) is made up of 1000 millilitres (ml)

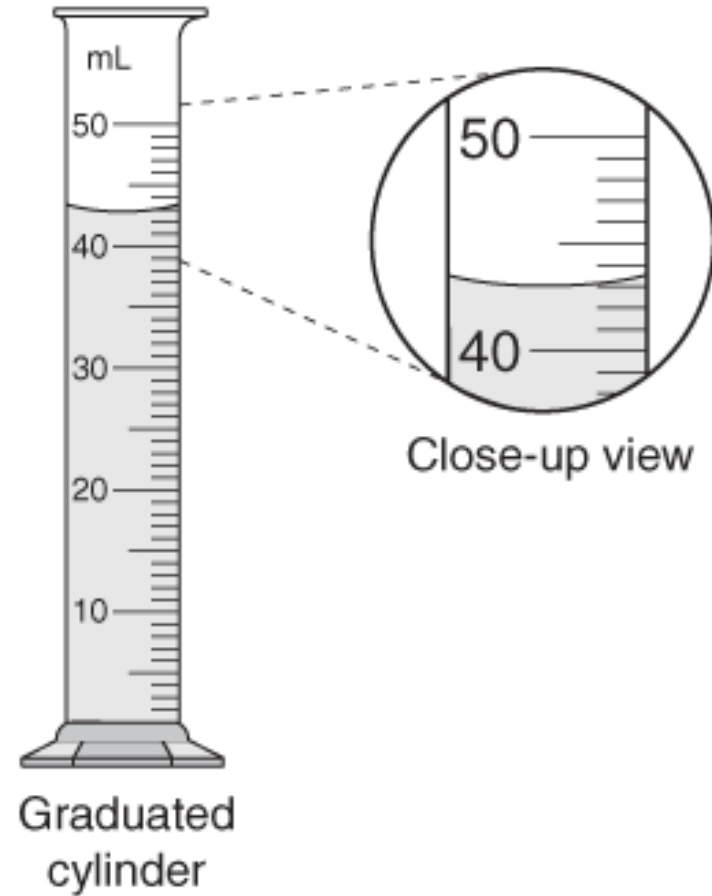


Measuring Volume of Liquids

- The piece of equipment used for measuring volume of liquids is a measuring cylinder or beaker.

Using a measuring cylinder:

- If you look closely, you will see that the liquid in a measuring cylinder does not lie in a straight line, instead it makes a slight dip. This is called the '**meniscus**'.
- When you read the scale on a measuring cylinder, you record where the **lowest point** of the meniscus is.



Volume of liquids

Quantity	Volume (ml)
Test tube	
Boiling tube	
400ml beaker	
Small beaker	
Small measuring cylinder	

Target: I can accurately
measure time

Measuring Time

- A **stop clock** (or digital timer) is used to measure time accurately.
- The units are **minutes (min)** and **seconds (s)**.



This would be written as
59 min 59s.

Measuring Time

How long	Time 1 (s)	Time 2 (s)	Average Time (s)
Can hold your breathe			
Can whistle without a breath			
Wind up toy to stop			
Spinner to fall to ground			
Write your name five times			
It takes to clip five paper clips together			

Calculating averages

- To calculate an **average** you simply **add up** all the **numbers** and **divide** by the number of **samples/values** given.

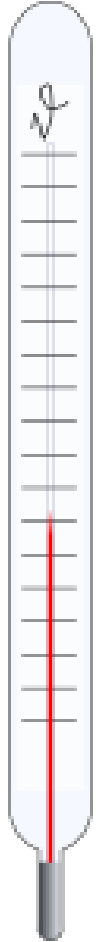
E.g. 14, 12, 16

$$\begin{array}{r} 14 \\ 12 \\ \hline +16 \\ \hline 42 \end{array}$$

$$42/3 = \underline{14}$$

Target: Measure temperature
accurately

Temperature



- Temperature is measured with a thermometer.
- It is measured in degrees celsius ($^{\circ}\text{C}$).
- A simple thermometer is a glass tube filled with coloured alcohol, and a scale going up the side.
- When the liquid heats up, it expands, and the liquid level moves up the scale.

Measuring Temperature

What I measured	Estimated temp (°C)	Actual temp (°C)
Iced water		
Tap water		
Water hot tap		
Room temperature		
Boiled water		

Target: I can identify signs
of a chemical reaction

Signs of a chemical reaction

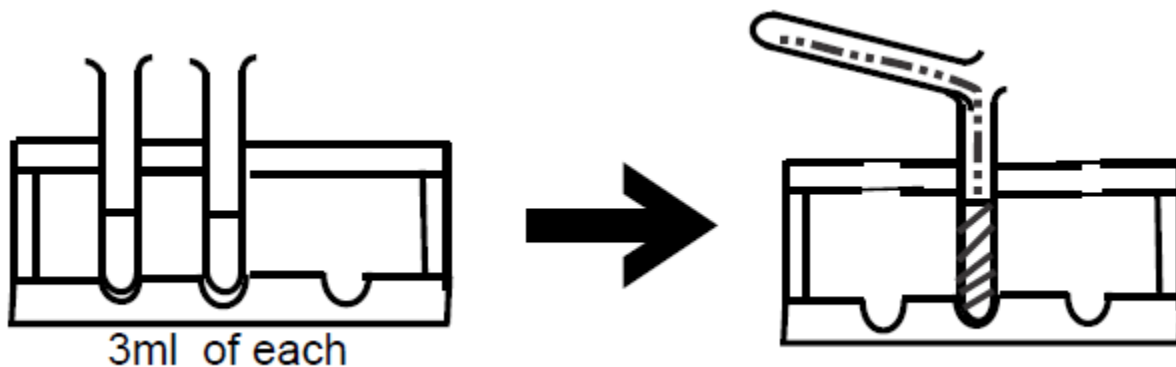
Aim: To identify signs of a chemical reaction.

Additional Info:

You are going to **observe and report on changes which take place** when you mix different chemicals together. Each member of your group needs to practise measuring, mixing and reporting.

Method:

1. Choose 2 different chemicals
2. Measure 3 ml of each into a clean test tube
3. Mix the two chemicals
4. One member of the group tells the rest of the group what changes are taking place
5. Record the names of the chemical and your observations in the table below in your jotter.



Results:

Chemical 1	Chemical 2	Observations
Magnesium	Hydrochloric acid	
Magnesium	Copper sulphate	
Sodium carbonate	Lead nitrate	
Copper sulphate	Sodium carbonate	

Results:

Chemical 1	Chemical 2	Observations
Magnesium	Hydrochloric acid	Bubbles of gas, magnesium dissolved
Magnesium	Copper sulphate	Bubbles of gas, magnesium dissolved, red solid
Sodium carbonate	Lead nitrate	Colour change (white), bubbles of gas, white solid formed.
Copper sulphate	Sodium carbonate	Colour change (milky blue), bubbles of gas, temperature change (colder).

Conclusion:

The signs of a chemical reaction can be detected by our senses:

- hear (crackling etc)
- see (bubbles of gas, colour change)
- feel (temperature change)
- smell (gas production)

Target: I can identify
chemicals burned in the
flame

Flame tests

- Different **metals** burn with different coloured flames.
- If metals are mixed into solutions they can be tested in a bunsen burner.



Method:

- Burn 4 different metals in the bunsen flame and record the colours of the flame.
- Test 4 unknown samples, and identify what metal may be present in the sample



Results:

Metal	Flame Colour
Copper	
Barium	
Strontium	
Sodium	

Metal	Flame Colour
A	
B	
C	
D	

Results:

Metal	Flame Colour
Copper	Blue/Green
Barium	Yellow/Green
Strontium	Red
Sodium	Orange/Yellow

Metal	Flame Colour
A	Orange/ Yellow (sodium)
B	Yellow/Green (barium)
C	Blue/Green (copper)
D	Red (strontium)

Target: I can complete a
formatives assessment

Formative Task

Experiment	Substances	Sign(s) of Reaction
1	vinegar and baking soda	
2	calcium and water	
3	heat copper carbonate	
4	zinc into copper sulphate	
5	sodium carbonate and nickel sulphate	