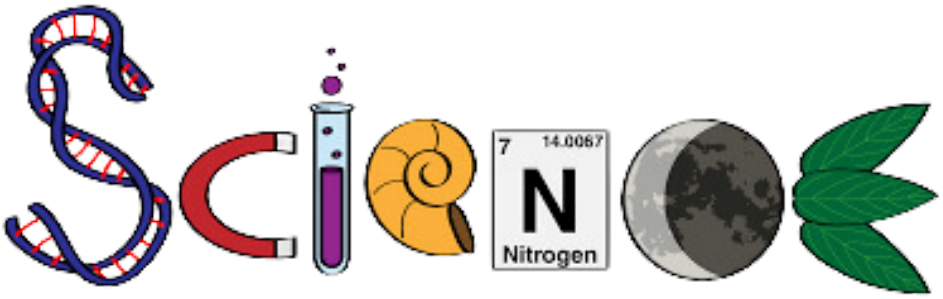
Meopham School



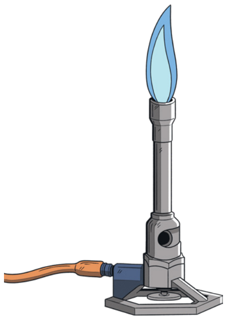
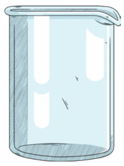
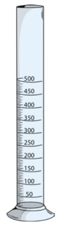
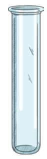
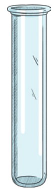
HOMEWORK BOOKLET

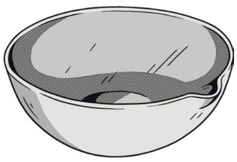
Year 8 Term 1

Naming Scientific Equipment

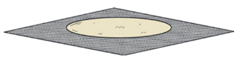
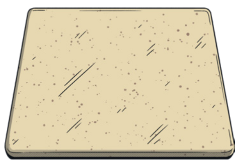
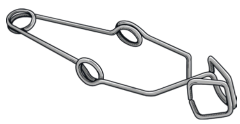
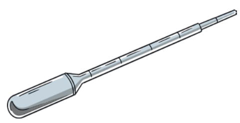
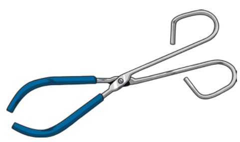
Homework 1

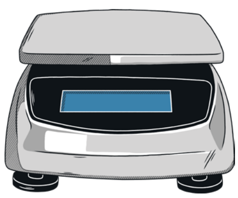
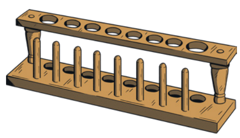
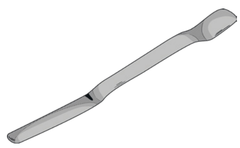
Give the name of each piece of scientific equipment.





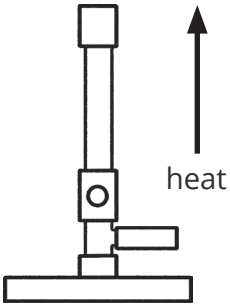






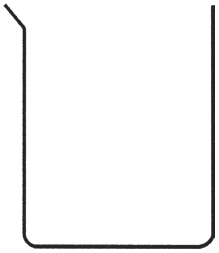




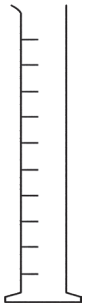

Naming Scientific Diagrams

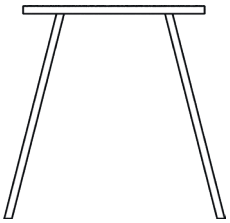
Homework 1

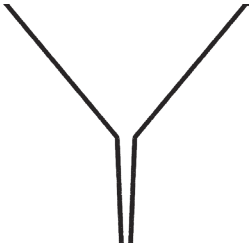
Give the name of each piece of equipment from the scientific drawing.

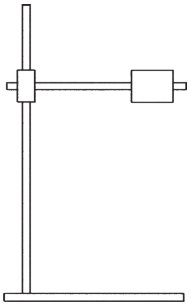


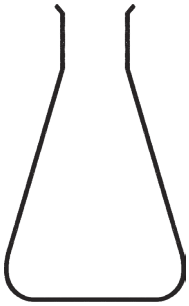












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Homework 1

Using Measuring Cylinders with Accuracy
Walkthrough Worksheet

During your science studies, you will undertake practical activities and experiments that require you to use pieces of scientific equipment. It is important to not only select the most suitable equipment for the task, but also ensure that you are using it correctly to achieve accurate and precise data.

Measuring Cylinders:

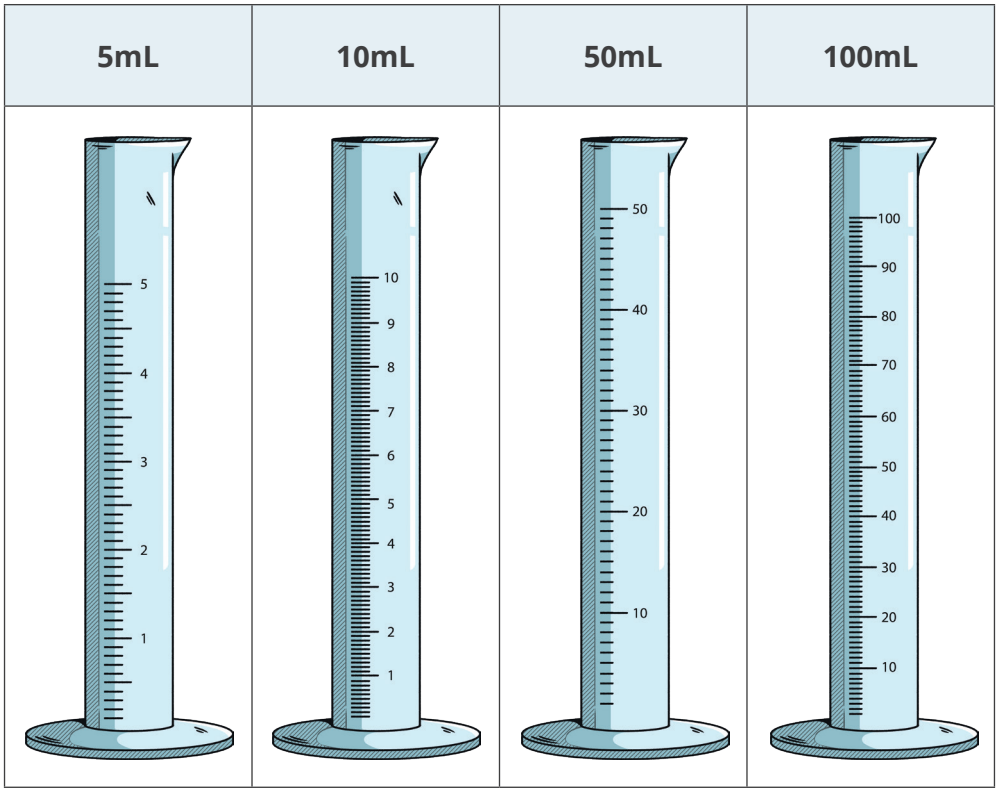
Quite often you will be required to measure out a quantity of liquid.

Firstly… and I want you to say it with me here - measuring cylinders are for measuring!

Beakers are for holding substances and objects, transporting them, mixing and pouring. Beakers are not used for measuring. While they do have measurements written along the side, these are to be used as a rough guide. They are not precise enough when running experiments.

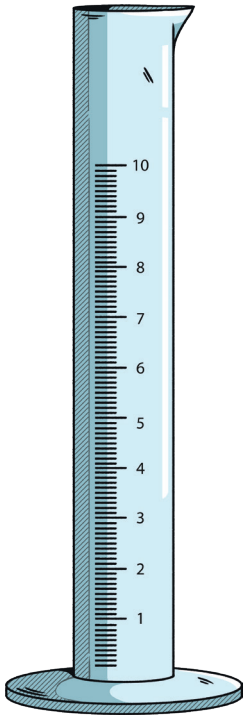
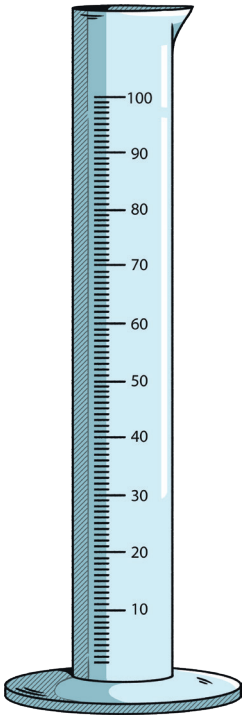
Secondly, you must select the best measuring cylinder for the task at hand.

For example:



While these measuring cylinders might all look the same in these images, in real life, they are of different sizes and they have different increments on the side. With your teacher's permission, go and have a look at some real life measuring cylinders available in your science classroom.

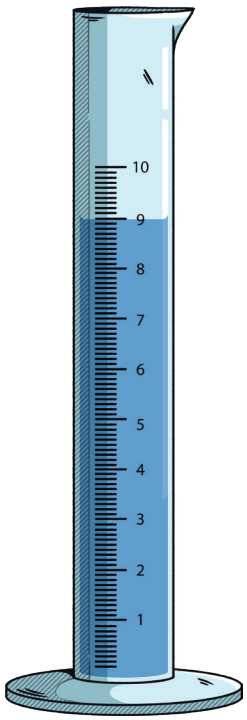
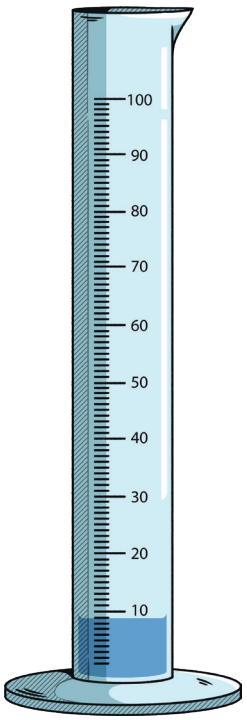
Compare the 10mL measuring cylinder with the 100mL illustrated below.

10mL	100mL
	

Notice that both are written in 1mL increments.

If I were to try and measure 9mL - which do you think would be easier to use?

Let's take a look:

10mL	100mL
	

9mL is much easier and more accurately measured in the 10mL cylinder.

You may also have noticed that on the real measuring cylinders there were some additional markings.

Can you see one that looks similar to ±0.02 or ±0.01?

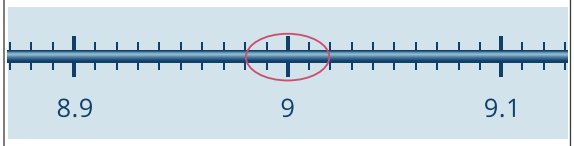
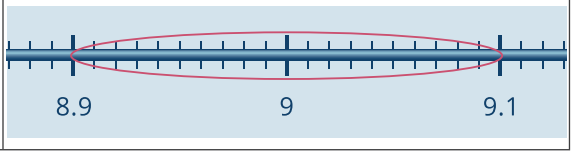
±0.02 means that this piece of equipment has an error margin of 0.02mL. Or in other words, when you measure 9mL, your measurement is within the range of 8.98 - 9.02mL.

Notice that the larger measuring cylinders have larger error margins.

For example, they might say ±0.1.

In this instance, when you are trying to measure 9mL, your measurement is within the range of 8.9 - 9.1mL

Let's compare the two:

Measuring 9mL in each cylinder	
10mL ±0.02	8.98 - 9.02mL 
100mL ±0.1	8.9 - 9.1mL 

It might not seem like a lot, but when you are conducting an experiment, you want to make sure that your data is as close to the 'true value' as possible.

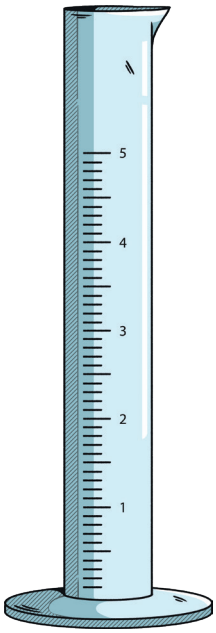
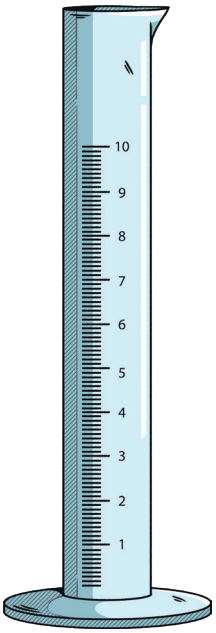
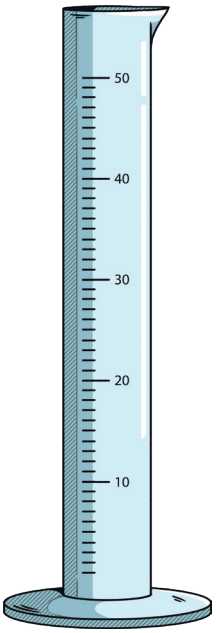
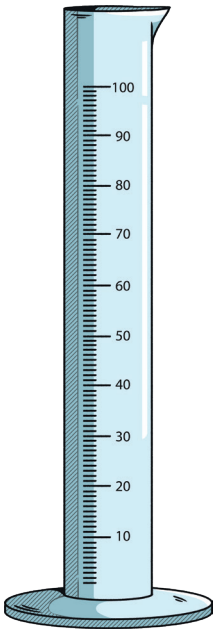
Margins of error matter.

Selecting the best piece of equipment for the task matters as well.

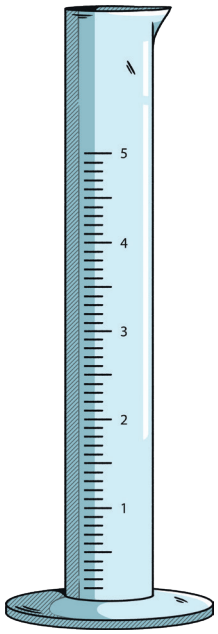
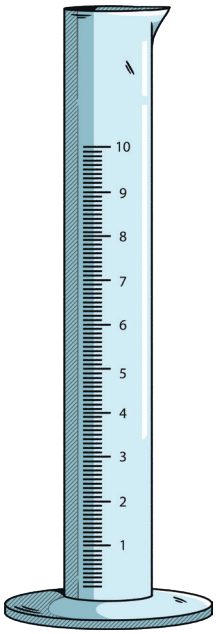
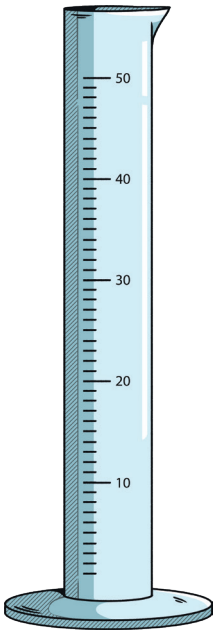
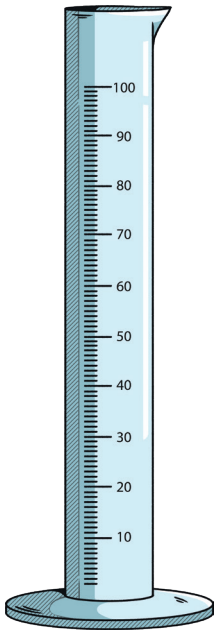
Your turn:

Let's practise selecting the most appropriate cylinder to measure the given amount.

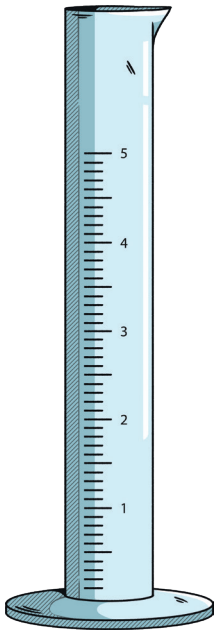
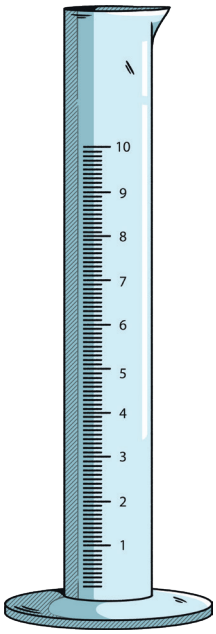
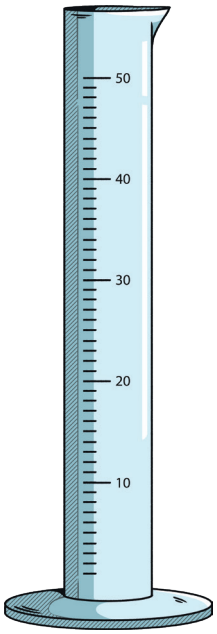
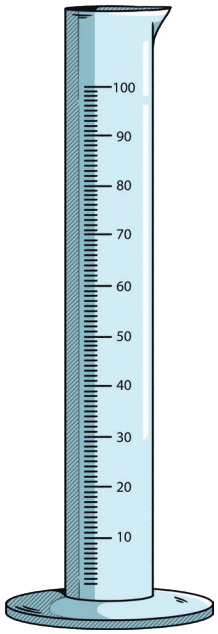
1. Which measuring cylinder would be the most suitable for measuring 22mL?

5mL	10mL	50mL	100mL
			

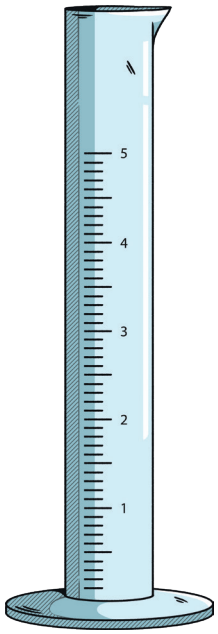
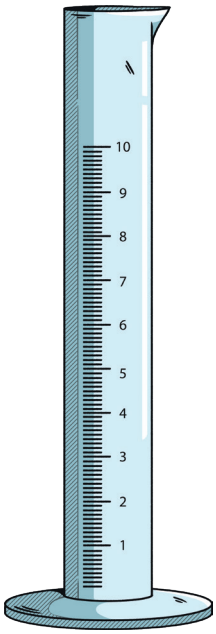
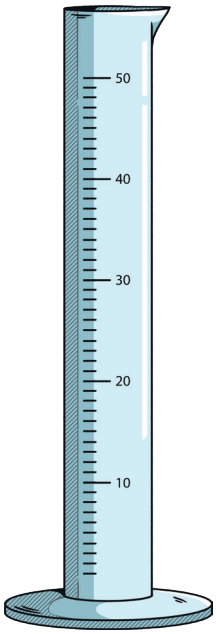
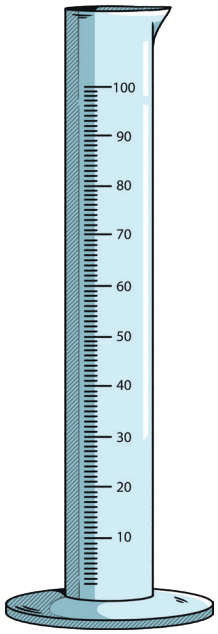
2. Which measuring cylinder would be the most suitable for measuring 2.5mL?

5mL	10mL	50mL	100mL
			

3. Which measuring cylinder would be the most suitable for measuring 4mL?

5mL	10mL	50mL	100mL
			

4. Which measuring cylinder would be the most suitable for measuring 40mL?

5mL	10mL	50mL	100mL
			

Taking Measurements:

In addition to selecting the best piece of equipment for the task, we also need to ensure that we are using the right techniques.

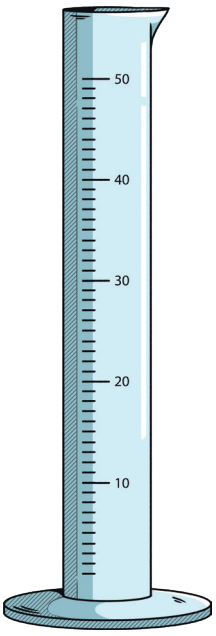
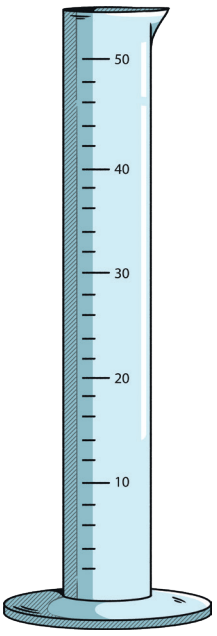
The first thing you want to do when reading measurements from a cylinder is to ensure that you have taken note of the increments used.

The measuring cylinders to the right are both 50mL.

However, one has increments of 1mL while the other has increments of 2mL.

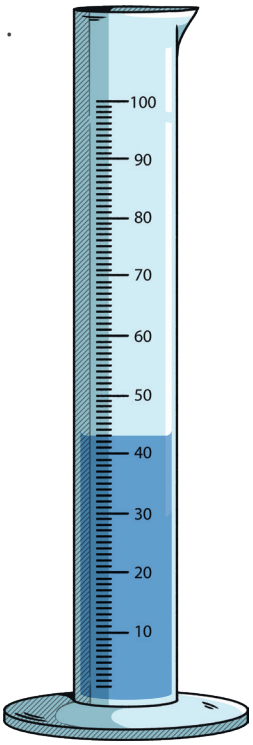
Although both are correct, you wouldn't be able to accurately measure an odd number of millilitres using the one on the right.

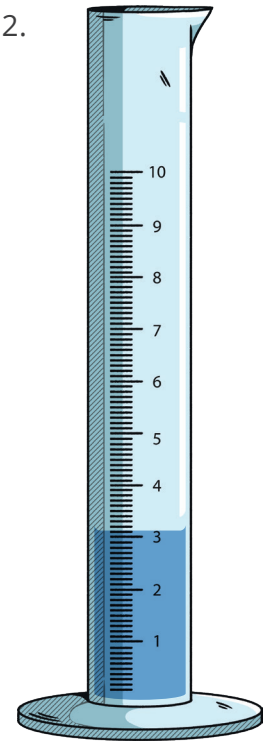
Importantly, take note of what increments are on the measuring cylinder that you are using so that you don't make an error when recording volume.

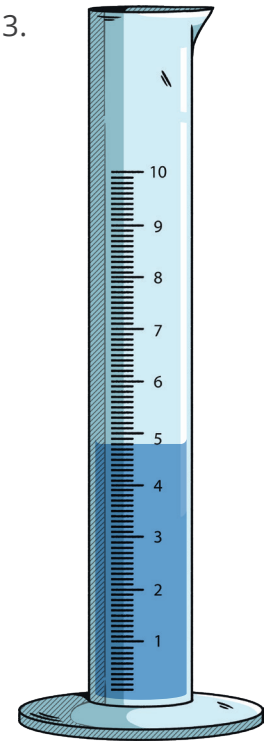
50mL Cylinder - 1mL increments	50mL Cylinder - 2mL increments
	

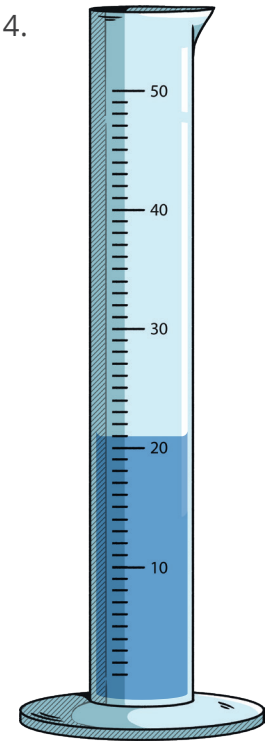
Your turn:

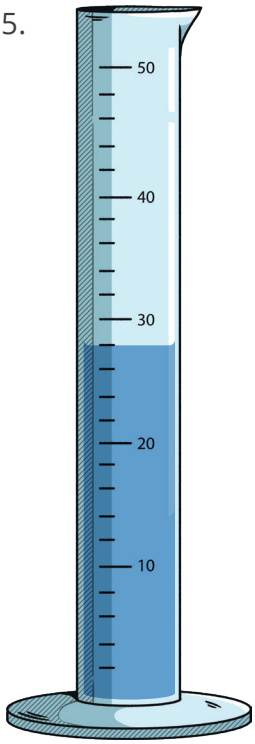
Let's practise reading some measurements from measuring cylinders. For each of the questions below, write down the measurement in the space provided. Remember to add the units.

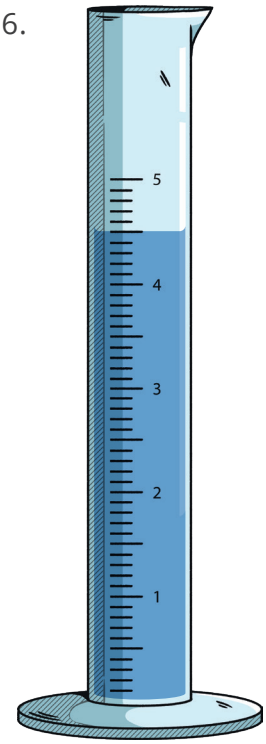
1. 

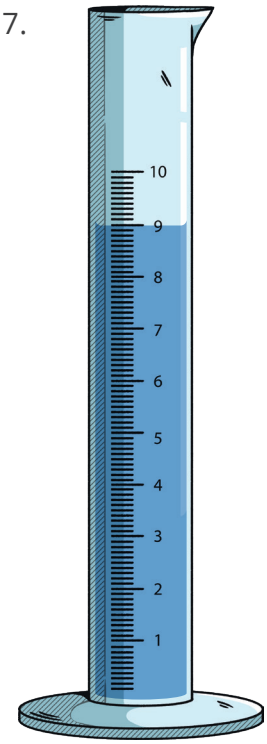
2. 

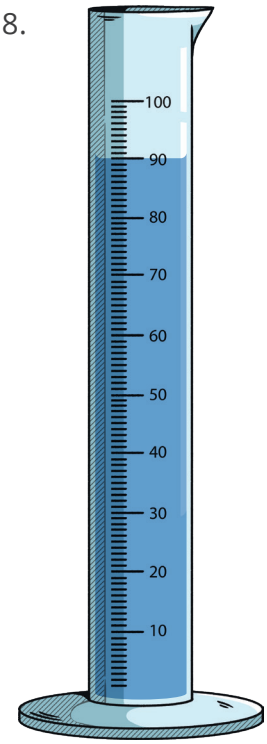
3. 

4. 

5. 

6. 

7. 

8. 

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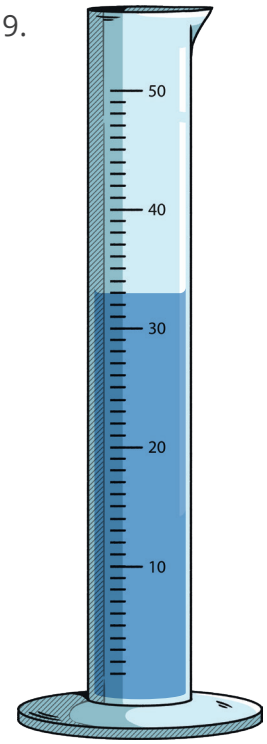
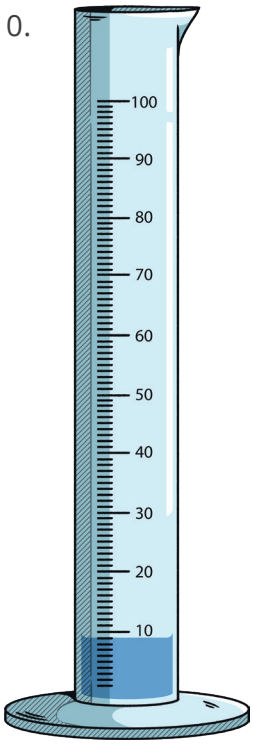
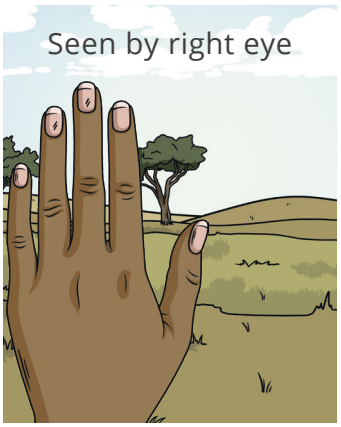


10.



Measurement Errors:

Now that you are adept at reading measurements, let's take a look at a type of measurement error that occurs in real life known as parallax error.

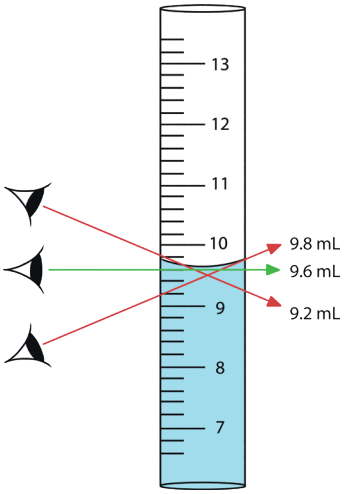


A parallax error is when an object's position appears to be different based on the angle at which you are viewing the object.

In science and maths, parallax error can occur when we are taking measurements.

For example, if I was to view the image of the measuring cylinder to the right from a higher angle, I might incorrectly read the volume as 9.2mL. If I was too low and looking up at the meniscus (curved surface of the liquid), I might think that the reading is 9.8mL.

The correct measurement is 9.6mL.



Make sure that when you are reading the volume in real life that you are using a good technique and avoiding a parallax error.

Identifying Variables

Homework 2

The **independent variable** is the variable that you change or select the values for.
The **dependent variable** is the variable that is measured for each change of the independent variable.

Identify the independent variable and the dependent variable in each of the following investigations. For each dependent variable, suggest a piece of equipment that could be used to measure it and the units of measurement that are most appropriate.

1. A student investigated how the number of bulbs in a series circuit affected the current.

   independent variable _____

   dependent variable _____

   equipment _____ units _____

2. A student investigated whether the time it takes for a chemical reaction to finish is affected by the volume of a reactant.

   independent variable _____

   dependent variable _____

   equipment _____ units _____

3. A student investigated how the force applied to a spring affects how much the spring stretches.

   independent variable _____

   dependent variable _____

   equipment _____ units _____

4. A student investigated how the temperature of a greenhouse is affected by the material it is made from.

   independent variable _____

   dependent variable _____

   equipment _____ units _____

5. A student investigated how the speed of a ball is affected by its mass.

   independent variable _____

   dependent variable _____

   equipment _____ units _____

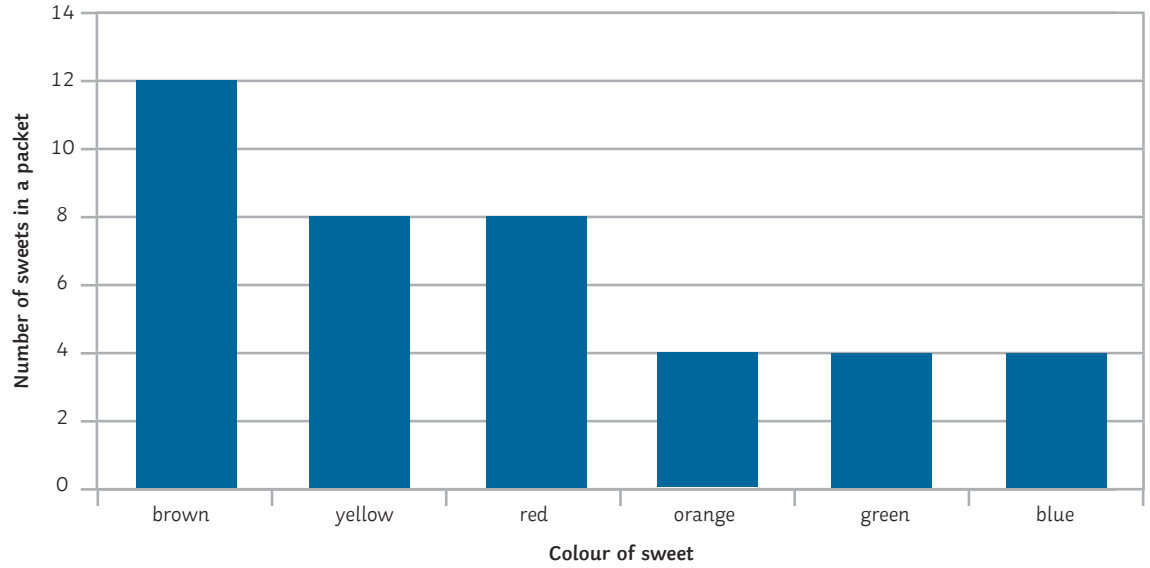
Analysing Graphs

Homework 2

Questions

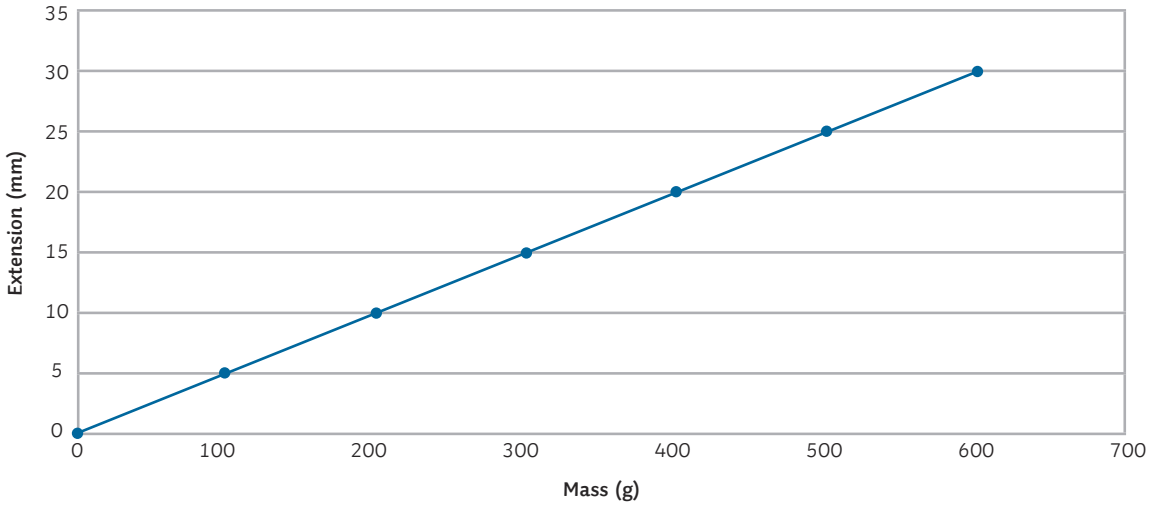
For the graph below:

1. What is the independent variable?
2. What is the dependent variable?
3. Why was a bar chart used?
4. Which colour of sweet was there the most of?
5. How do you know?
6. How many were there?
7. What was the total number of sweets in the packet?



Questions

8. What is the a) independent variable b) dependent variable?
9. What is the relationship between the independent and dependent variables?
10. What are the units of the independent variable?
11. What mass caused an extension of 7.5mm?



Drawing Lines and Curves of Best Fit

Homework 3

Drawing a line or curve of best fit for the data on your graph allows you to identify any relationships or patterns in your results.

A line or curve of best fit also allows you to predict further data, based on the pattern you identify.

How to Draw a Line of Best Fit

Start by looking at the data points and asking yourself the following questions:

- Can you see a trend or pattern easily?
- Is there any obvious correlation in the data?
- Do the points seem to make a line or are they spread out over in a big area?
- Are there any anomalous results?

If you can see a pattern in the data points and the pattern appears to be **linear** (straight), then you can draw a **line of best fit**.

a. Use a sharp pencil and a ruler to draw a **straight line**.

b. The line should not join the data points together, but instead aim to have an equal amount on either side of the line or pass through as many points as possible.

c. Ignore any anomalous results when positioning the line of best fit.

d. The line does not have to pass through the origin.

How to Draw a Curve of Best Fit

If you can see a pattern in the data but it is **not linear**, then you should draw a **curve of best fit**.

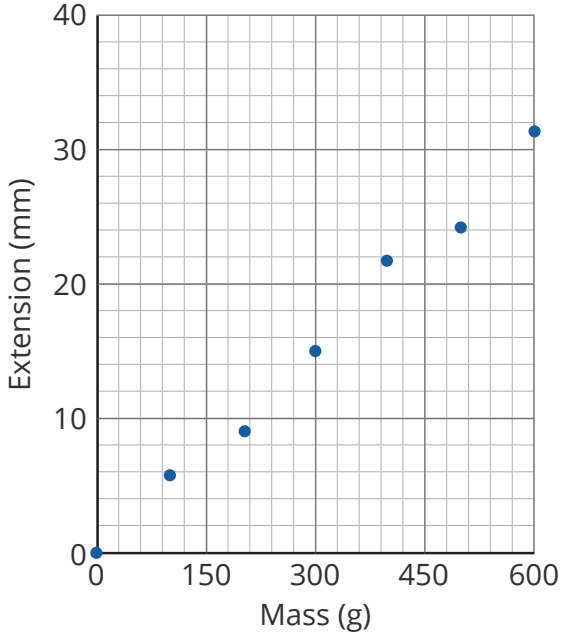
a. Use a sharp pencil to draw a **smooth curve**.

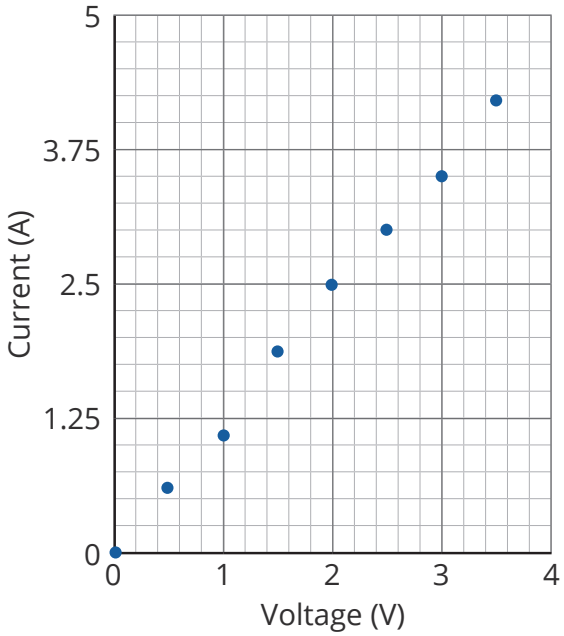
b. The curve does not need to join the data points together perfectly but should pass through as many points as possible.

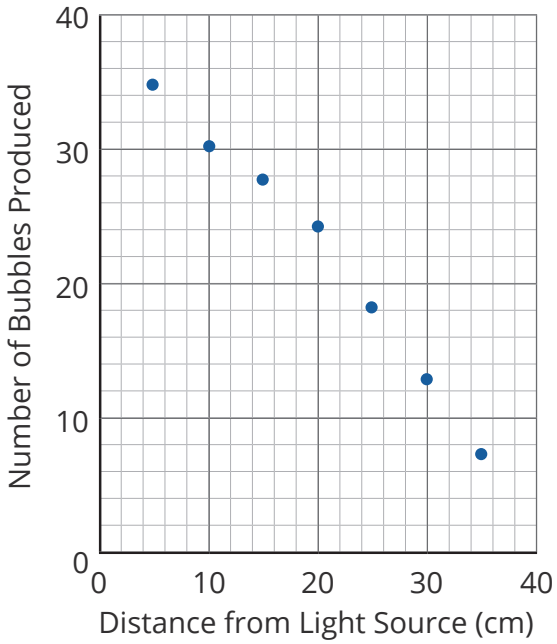
c. Ignore any anomalous results when positioning the line of best fit.

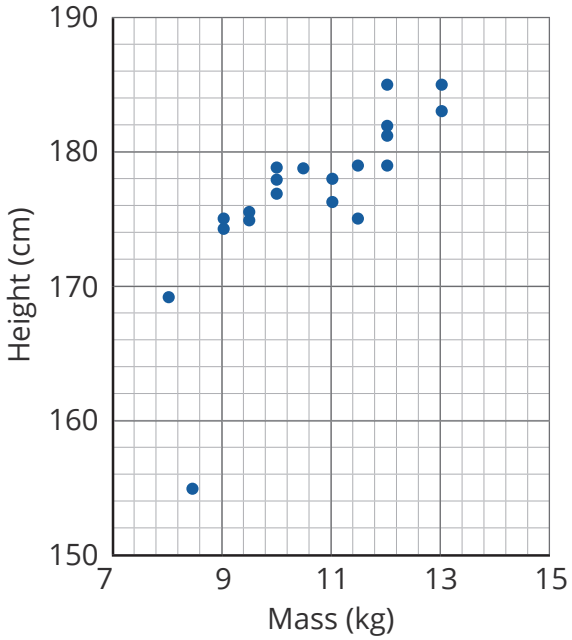
d. The curve does not have to pass through the origin.

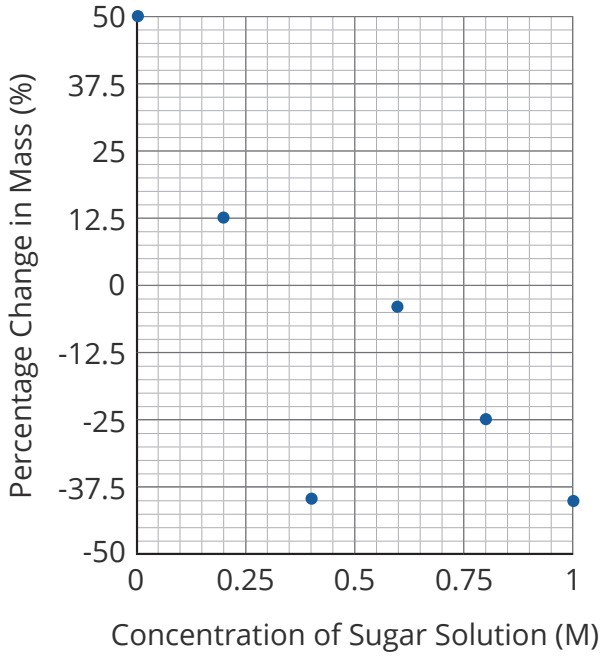
For each graph, draw a line of best fit.

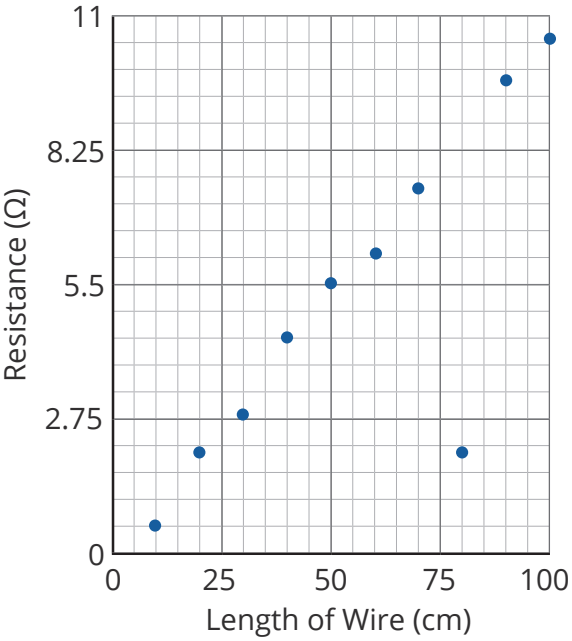




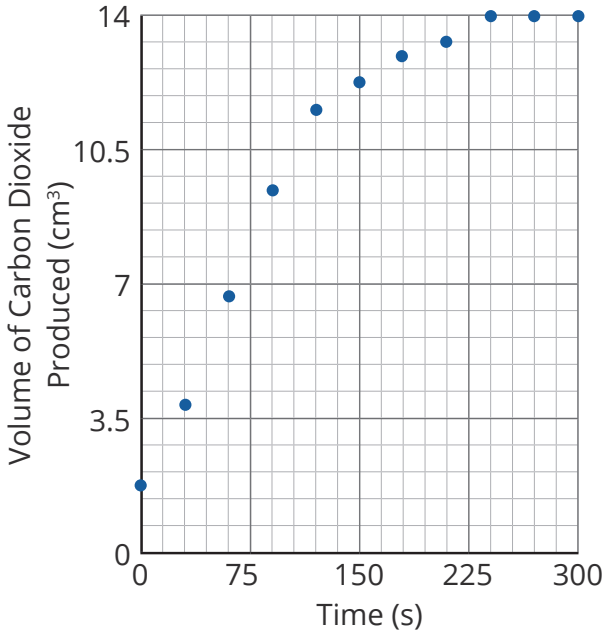


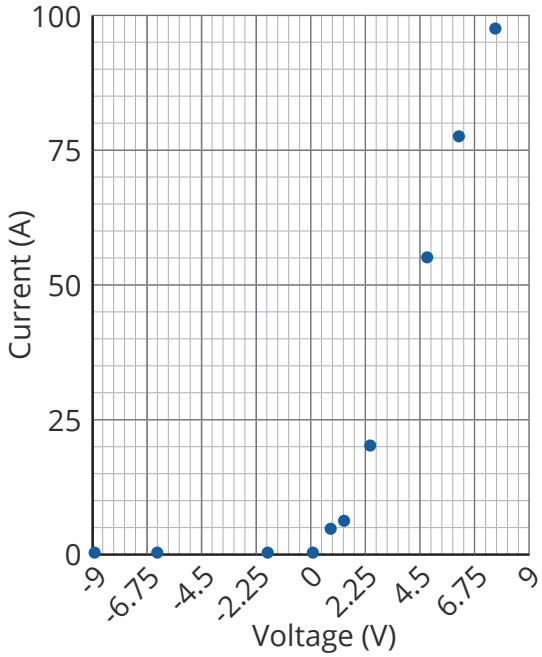


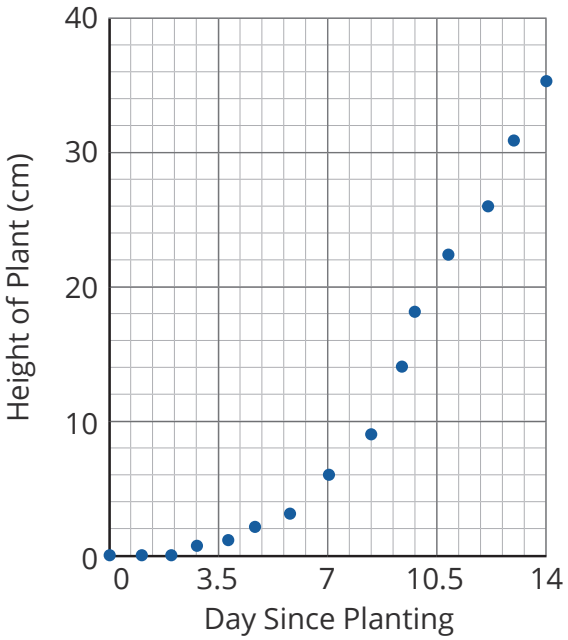


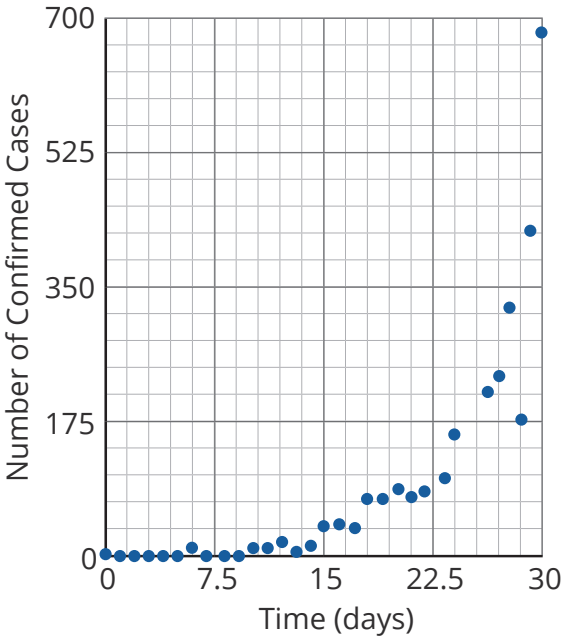


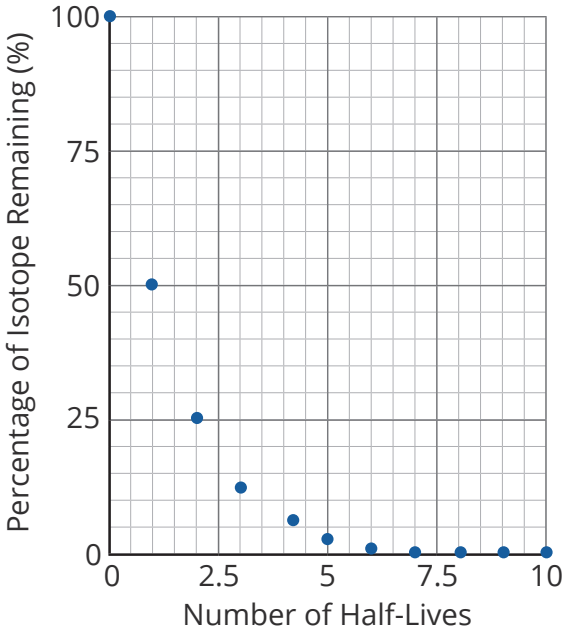
For each graph, draw a curve of best fit.

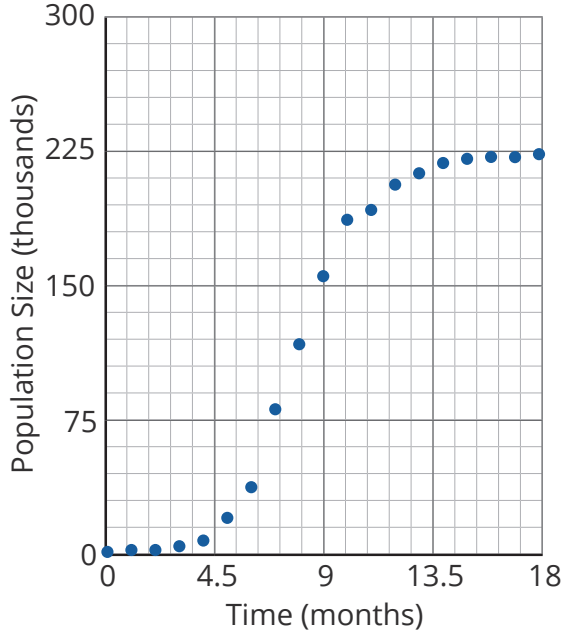






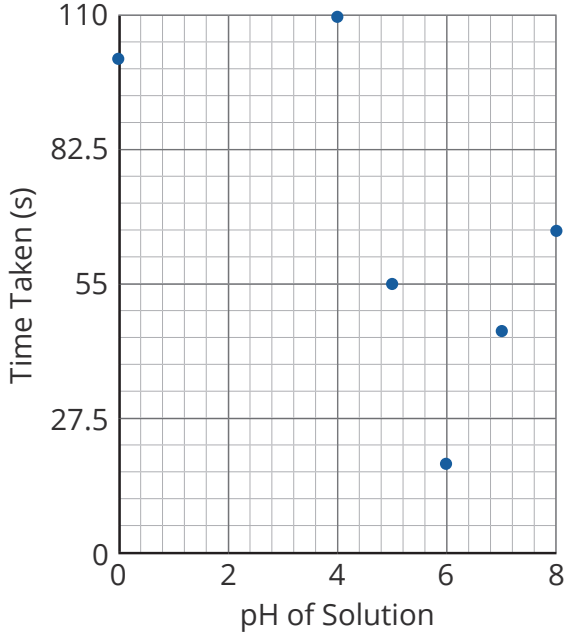


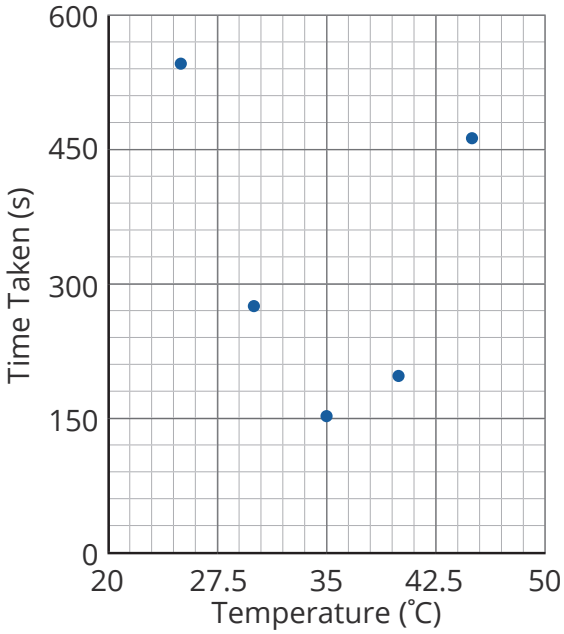


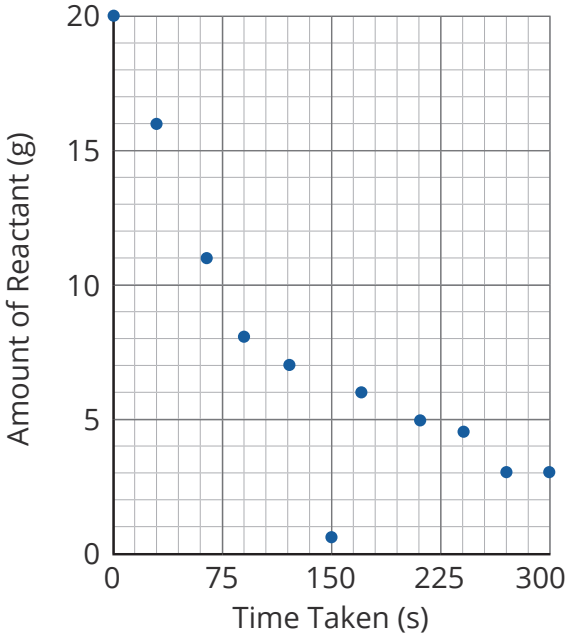


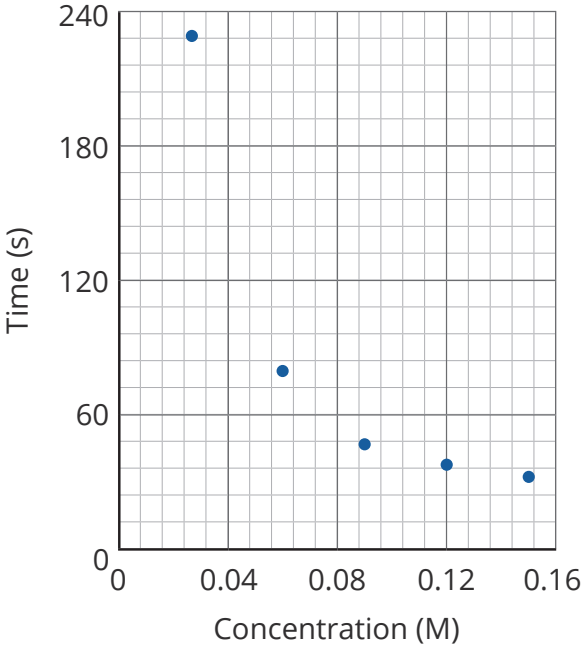
Homework 3

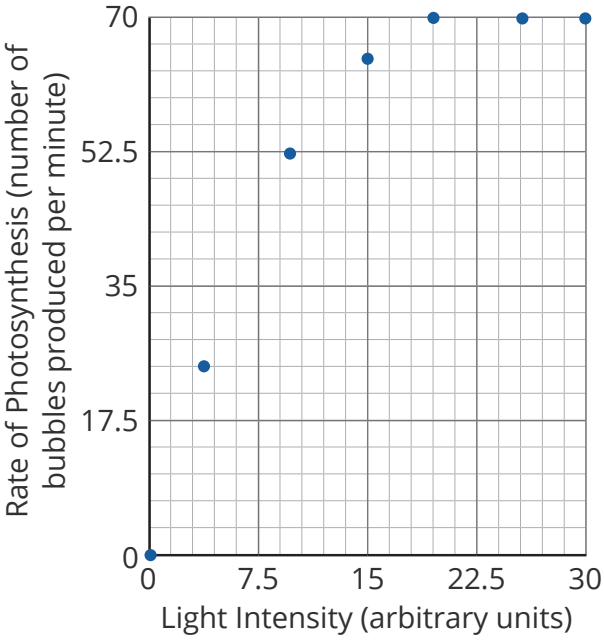
For each graph, decide whether to draw either a line or a curve of best fit.

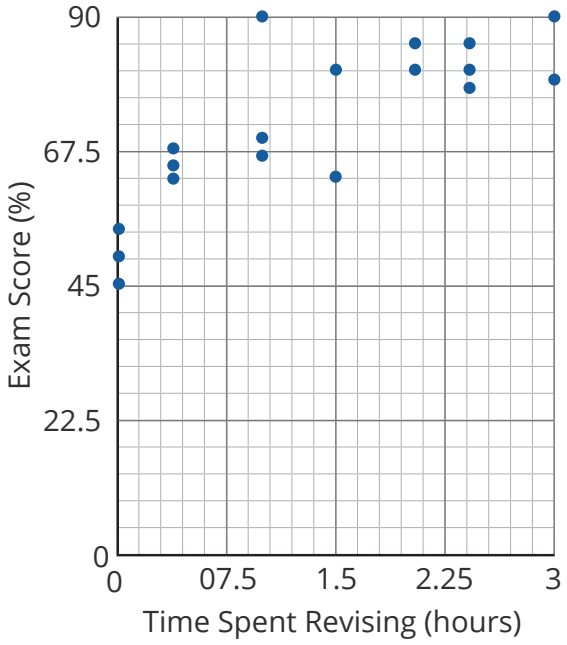












Drawing Conclusions

Homework 3

An investigation to find out how the volume of gas produced changes over time.

Magnesium was added to hydrochloric acid. The volume of gas was measured every 30 seconds.

Put the statements in the correct place on the graph. Justify your decision.

Statements

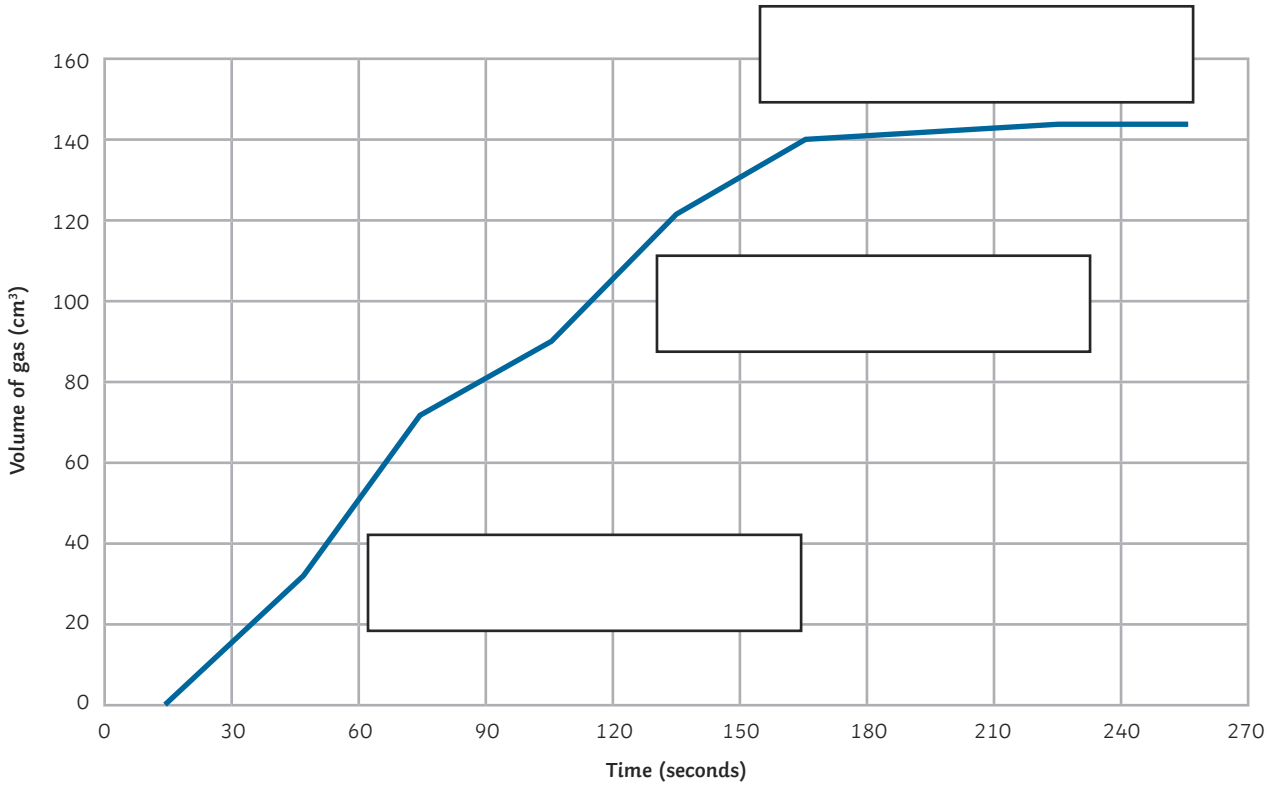
As the time increases, the volume of gas goes up rapidly.

As the time increases, the volume of gas goes up steadily.

As time increases, the volume of gas produced starts to plateau.

Now justify your reasons.

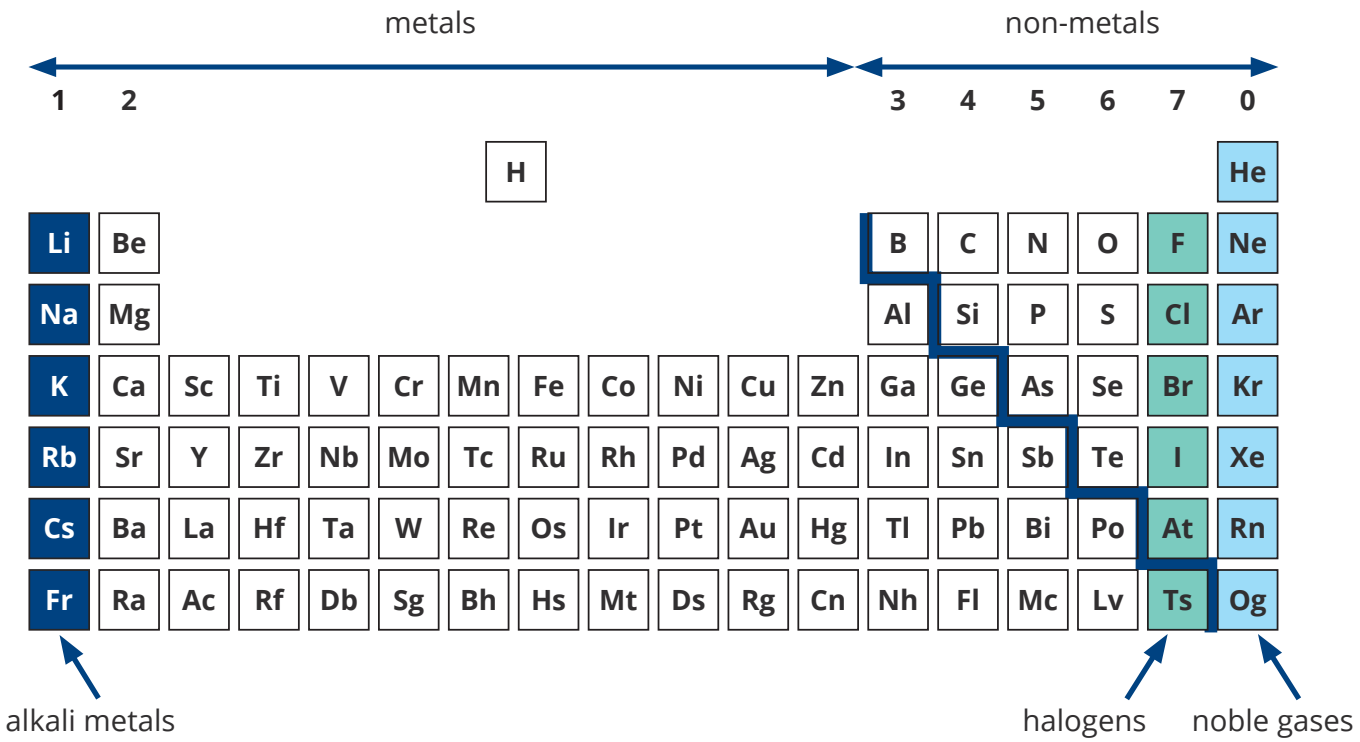
Start your sentence like this 'I know this because ....'



Structure of the Periodic Table

Homework 4

Elements on the periodic table are arranged into groups based on their properties.



1. Give the name of an element in Group 6. _____

2. Give the chemical symbol of an element in Group 2. _____

3. Give the name of an alkali metal. _____

4. Give the name of a halogen. _____

5. Give the name of a noble gas. _____

6. In which group will you find boron (B)? _____

7. In which group will you find caesium (Cs)? _____

8. In which group will you find krypton (Kr)? _____

9. What type of element is bromine (Br)? _____

10. What type of element is potassium (K)? _____

11. What type of element is neon (Ne)? _____

12. Is manganese (Mn) a metal or non-metal? _____

13. Is selenium (Se) a metal or non-metal? _____

14. Is radium (Ra) a metal or non-metal? _____

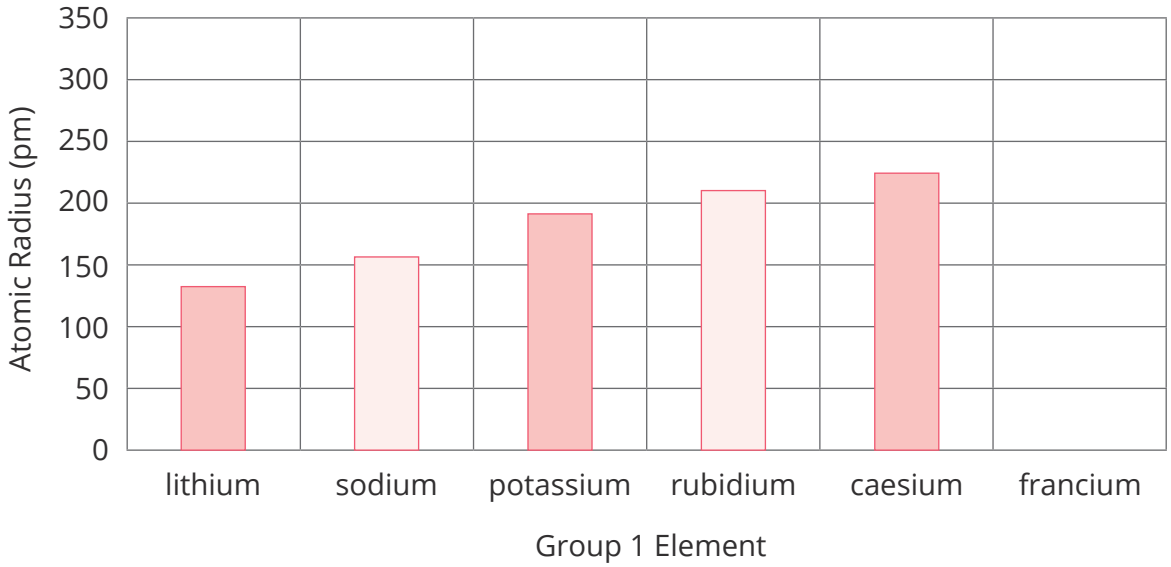
Trends in Group 1 Elements

Homework 4

The alkali metals are found in Group 1 of the periodic table.

1	2											3	4	5	6	7	0
							H										He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og

The graph shows the radius of an atom of each alkali metal. The bar for francium is missing.



1. Complete the sentence to describe the trend in the size of the atoms of the alkali metals.

   As you move down Group 1 the radius of the atoms _____.

2. Draw a bar on the graph to predict the radius of a francium atom.

Homework 4

The table shows the melting and boiling points for the alkali metals.

Element	Melting Point (°C)	Boiling Point (°C)
lithium	180	1342
sodium	98	883
potassium	64	759
rubidium	39	
caesium	29	671
francium	27	677

3. Why are the alkali metals solid at room temperature?
   Tick **one** box.

- ☐ Their melting points are higher than room temperature.
- ☐ Their melting points are lower than room temperature.
- ☐ Their boiling points are lower than room temperature.
- ☐ Because metals are always solid.

4. Predict the boiling point of rubidium.

_____ °C

The table shows what happens when some alkali metals are added to water.

Element	Observations
lithium	It floats on the water and fizzes, gradually becomes smaller until it disappears.
sodium	It fizzes rapidly and melts to form a ball that moves about on the surface of the water. The ball gets smaller quickly and disappears.
potassium	It melts and moves quickly around the surface of the water and gives off sparks and a violet flame. It disappears rapidly, sometimes with a small explosion.

5. Predict how rubidium would behave if added to water.
   Tick **one** box.

- ☐ It melts quickly, shoots across the water and disappears.
- ☐ It melts quickly and burns with a violent flame, then disappears in a violent explosion.
- ☐ It fizzes slowly and gradually disappears over a few minutes.
- ☐ It fizzes rapidly and melts. It sets alight as it disappears.

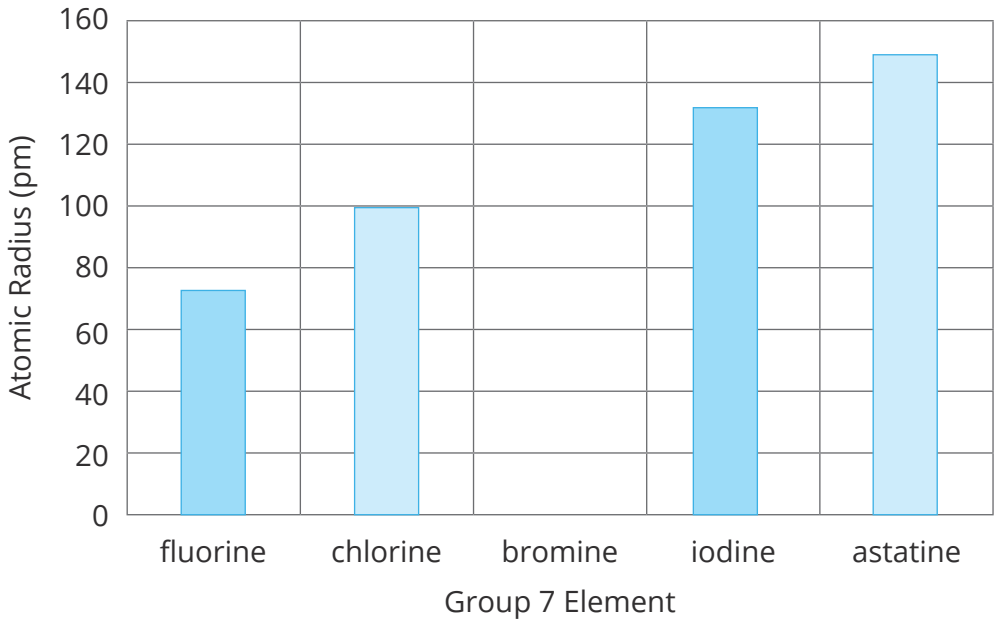
Trends in Group 7 Elements

Homework 4

The halogens are found in Group 7 of the periodic table.

1	2											3	4	5	6	7	0
							H										He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

The graph shows the radius of an atom of each halogen. The bar for bromine is missing.



1. Complete the sentence to describe the trend in the size of the atoms of the halogens.

   As you move down Group 7, the radius of the atoms

   _____.

2. Draw a bar on the graph to predict the radius of a bromine atom.

Homework 4

The table shows the melting and boiling points for the halogens.

Element	Melting Point (°C)	Boiling Point (°C)	State at Room Temperature
fluorine	-220	-188	gas
chlorine	-101		gas
bromine	-7	59	
iodine	114	184	solid
astatine	302	337	solid

3. Predict the state of bromine at room temperature (20°C).

   Tick **one** box.

   ☐ solid

   ☐ liquid

   ☐ gas

4. Predict the boiling point of chlorine.

   _____ °C

The table shows what happens when halogens react with iron wool.

Element	Observations
fluorine	It reacts instantly, setting the iron wool on fire.
chlorine	It reacts very quickly with a bright glow and a flame.
bromine	The iron must be heated and the bromine warmed to start the reaction. There is a bright glow.
iodine	Both substances must be heated strongly to start the reaction which then proceeds slowly. There is a faint glow.

5. Compare the reactivity of the Group 7 halogens with the alkali metals in Group 1.

   Tick **one** box.

   ☐ The elements get less reactive as you move down Group 7, the same as Group 1.

   ☐ The elements get less reactive as you move down Group 7, the opposite of Group 1.

   ☐ The elements get more reactive as you move down Group 7, the same as Group 1.

   ☐ The elements get more reactive as you move down Group 7, the opposite of Group 1.

Reactivity Series

Homework 5

The reactivity series for some common metals is shown below.

Carbon and hydrogen are non-metals but these elements can be used to extract metals, so it is helpful for you to learn where they fit into the reactivity series.

Task 1

Create a mnemonic (silly sentence) to help you learn the reactivity series of metals.

Once you are confident that you have learnt the reactivity series, test yourself with the questions – but no peeking!

most reactive

potassium

sodium

lithium

calcium

magnesium

aluminium

carbon

zinc

iron

hydrogen

copper

gold

least reactive

p _____

s _____

l _____

c _____

m _____

a _____

c _____

z _____

i _____

h _____

c _____

g _____

Homework 5

Task 2

Match up the key words to their definitions. Draw one line from each key word.

ore	A chemical reaction in which a metal loses oxygen. This method is used to extract metals less reactive than carbon.
reduction	The breakdown of a compound using electricity. This method is used to extract metals more reactive than carbon.
electrolysis	A naturally-occurring rock from which a metal can be extracted.

Task 3

Answer the questions about the reactivity series and extraction of metals.

1. Which of these metals is the most reactive?
   Tick **one** box.

   sodium ☐

   zinc ☐

   copper ☐

2. Which of these metals is the least reactive?
   Tick **one** box.

   potassium ☐

   magnesium ☐

   gold ☐

3. Only metals that are less reactive than carbon can be extracted by reduction with carbon.

   Name two metals that can be extracted this way.

   1. _____

   2. _____

4. A displacement reaction takes place when a more reactive metal displaces (takes the place of) a less reactive metal in a compound.

   e.g. magnesium + copper sulfate ⟶ magnesium sulfate + copper

   Predict the products of the displacement reactions below.

   a) calcium + zinc sulfate ⟶ _____ + _____

   b) sodium + magnesium chloride ⟶ _____ + _____

   c) magnesium + copper nitrate ⟶ _____ + _____

Reactions of Acids

Homework 5

Name _____ Class _____

Acids react with many materials, including metals. When an acid reacts with a metal, it produces a salt and releases hydrogen gas.

1. Complete the general word equation for the reaction between an acid and a metal.

   acid + metal → _____ + _____

Metals can be organised based on their reactivity. Part of the reactivity series for some common metals is shown below.

2. Complete the reactivity series by writing in the missing metals. Choose answers from the box.

aluminium	gold	iron

potassium
sodium
calcium
magnesium
zinc
tin
lead
copper
silver
platinum

most reactive

least reactive

3. Which observation would identify a gas as hydrogen?

   Tick **one** box.

   ☐ The gas relights a glowing splint.

   ☐ The gas turns limewater cloudy.

   ☐ The gas makes a squeaky pop when presented with a lit splint.

The name of the salt produced in a reaction between a metal and an acid depends on the metal and the acid involved in the reaction. The first part of the name comes from the metal, and the second part comes from the acid.

For example, **potassium** reacts with **sulfuric acid** to produce **potassium sulfate**.

The table below shows the general name of the salt produced by each acid.

Name of Acid	Name of Salt
sulfuric acid	sulfate
hydrochloric acid	chloride
nitric acid	nitrate

4. Complete the table to give the name of the salt produced in each reaction. The first one has been done for you.

Metal	Acid	Salt
sodium	hydrochloric acid	sodium chloride
zinc	nitric acid	
magnesium	sulfuric acid	
aluminium	hydrochloric acid	
silver	nitric acid	
copper	sulfuric acid	

5.

a. What is the word equation for the reaction between calcium and hydrochloric acid?

Tick **one** box.

☐ hydrochloric acid + calcium → calcium sulfate + hydrogen

☐ hydrochloric acid + calcium → calcium chloride + hydrogen

☐ hydrochloric acid + calcium → calcium sulfate + oxygen

☐ hydrochloric acid + calcium → calcium chloride + oxygen

b. Complete the word equation for the reaction between magnesium and hydrochloric acid.

magnesium + hydrochloric acid → _____ + _____

Acids also react with metal oxides and metal hydroxides. Metal oxides and metal hydroxides are bases so they will neutralise the acid, producing water as well as the metal salt. This is called a neutralisation reaction.

6.

a. Complete the general word equation for the reaction between an acid and a metal oxide.

acid + metal oxide → _____ + _____

b. Write the word equation for the reaction between sulfuric acid and potassium hydroxide.

_____

Acids also react with metal carbonates. The reaction between an acid and a metal carbonate produces a metal salt, water and carbon dioxide gas. Carbon dioxide gas can be tested for using limewater. The general equation for the reaction is:

acid + metal carbonate → metal salt + water + carbon dioxide

7. Complete the word equation for the reaction below.

nitric acid + calcium carbonate → _____ + _____ + _____

Properties of Metals and Materials

Homework 6

1. Sort the materials listed below into the table.

iron	wood	steel	concrete	porcelain
cardboard	aluminium	fabric	plastic	

Metals	Non-metals

2. Tick the properties to show which apply to metals and non-metals.

	Metals	Non-metals
malleable and ductile		
low melting and boiling points		
high density		
conducts electricity		
conducts heat		
strong		
dull		
brittle		
non-magnetic		

3. Draw **one** line from each type of material to the correct description.

polymers	These materials are good insulators of heat and electricity. They are brittle and stiff.
ceramics	These materials are made of two or more materials together, combining the useful properties in the new material.
composites	These materials are good insulators of heat and electricity. They are usually flexible, lightweight, and strong.

Homework 6

4. Tick **two** examples of polymers from the list below.

- [ ] bone china
- [ ] concrete
- [ ] fibreglass
- [ ] glass
- [ ] nylon
- [ ] PVC

5. Tick **two** examples of ceramics from the list below.

- [ ] bone china
- [ ] concrete
- [ ] fibreglass
- [ ] glass
- [ ] nylon
- [ ] PVC

6. Tick **two** examples of composites from the list below.

- [ ] bone china
- [ ] concrete
- [ ] fibreglass
- [ ] glass
- [ ] nylon
- [ ] PVC

7. The floor of a car park is made by pouring concrete over a mesh sheet made of steel.

Homework 6

a. What type of material is steel reinforced concrete?

Concrete has a low density and is lightweight, however, it is brittle and can crack easily under pressure. Steel is very dense and heavy, but strong and hardwearing.

b. Explain why concrete is reinforced using a steel mesh.