Introduction to Science **Knowledge Organiser**

A science laboratory is used for carrying out practical investigations. This can involve using hazardous chemicals and equipment such as Bunsen burners.

Some practical equipment, such as test tubes, are easily breakable so care must be taken.

Thinking about the students' and teacher's health and safety is very important so that no one gets hurt.

Laboratory Safety Rules

Your teacher will have made the safety rules for the laboratory very clear. Below are some important safety rules, which should always be followed, but there may be others which you need to consider in addition to these.

- Always wear eye protection during a practical.
- Carry out a practical while standing up.
- Do not eat or drink in the laboratory.
- Tie long hair back and tuck loose clothing in during practicals.
- If something is spilled or broken, tell the teacher.
- Ensure that the floor and work space is clear of obstacles.

Hazard Symbols

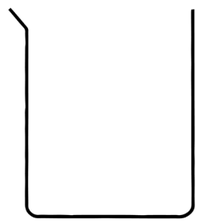
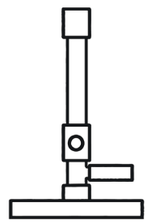
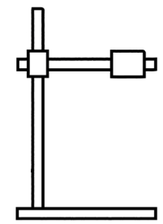
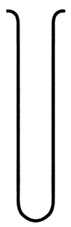
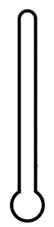
Hazard symbols show people how dangerous a chemical is, and what care should be taken when handling them.

Symbols can be used all over the world and are immediately recognisable, so it does not matter which language is used.

flammable	acute toxicity	corrosive	explosive
			
moderate health hazard	serious health hazard	harmful to the environment	
			

Scientific Equipment

Diagrams are used when drawing practical equipment to make it easier and quicker to draw.

beaker	Bunsen burner	tripod	evaporating basin	clamp stand, boss and clamp	conical flask
					
test tube	funnel	measuring cylinder	thermometer	heatproof mat	gauze
					xxxxxxxxxxxxxx

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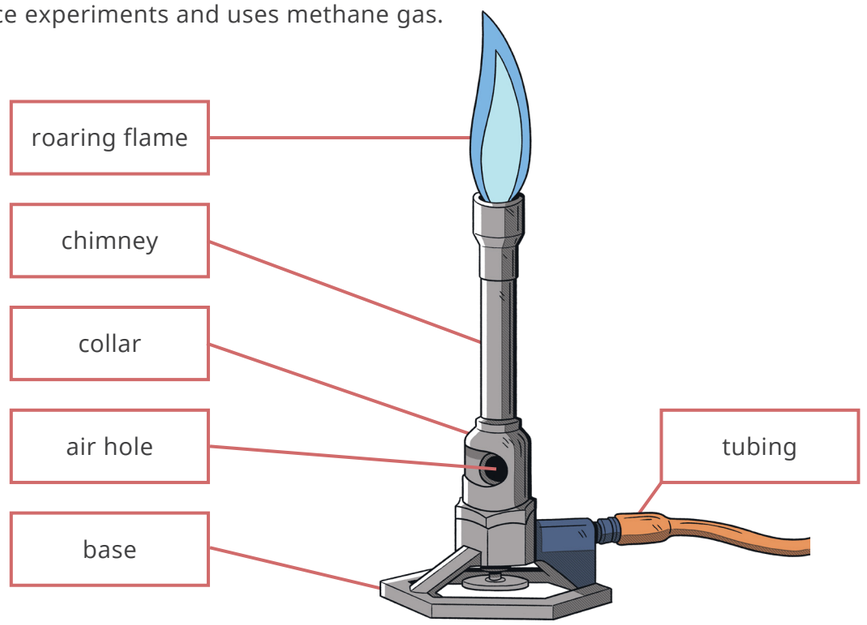
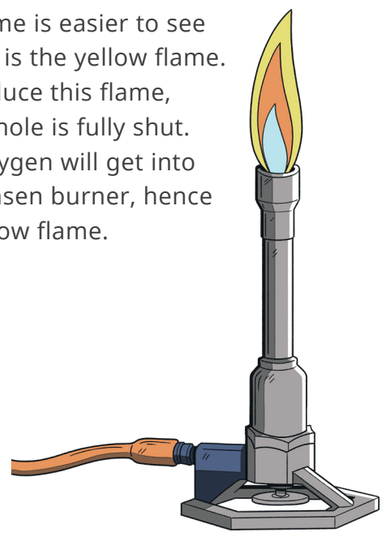
Bunsen Burner

The Bunsen burner is an important piece of scientific equipment. It is used in many science experiments and uses methane gas.



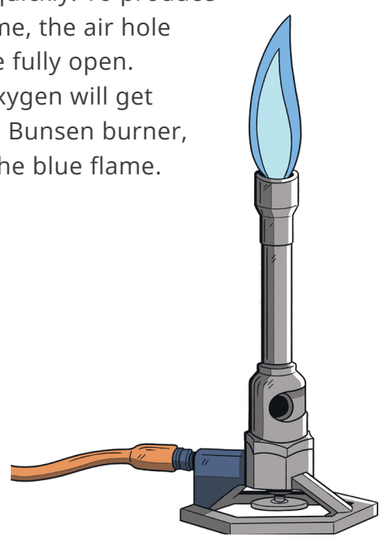
The Safety Flame

The safety flame is used when the Bunsen burner is not in use. The flame is easier to see when it is the yellow flame. To produce this flame, the air hole is fully shut. Less oxygen will get into the Bunsen burner, hence the yellow flame.



The Roaring Flame

The roaring flame is used to heat things quickly. To produce this flame, the air hole must be fully open. More oxygen will get into the Bunsen burner, hence the blue flame.

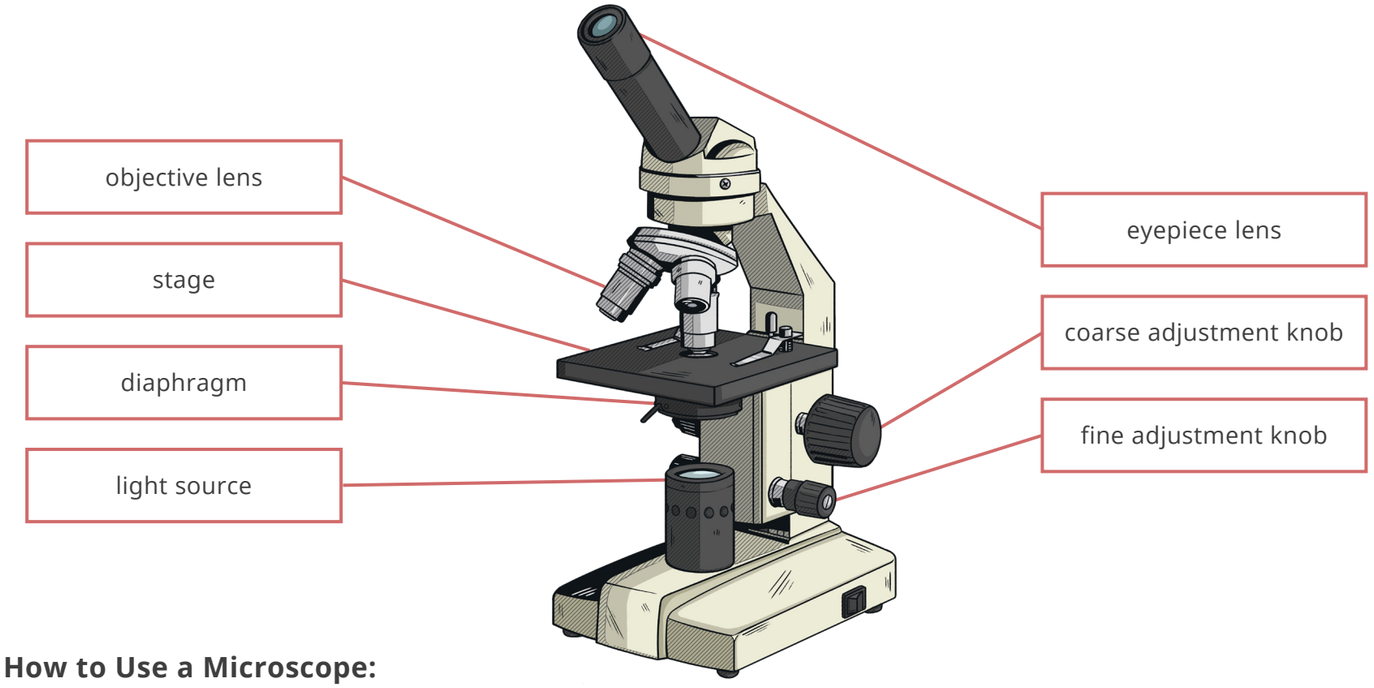


Microscope

Microscopes have been used for years to observe objects that are too small to see with the naked eye.

Over time, the magnification of microscopes has significantly improved due to developments in technology. We now have microscopes that can examine specimens at an atomic level.

We have made many important scientific discoveries thanks to microscopes.



How to Use a Microscope:

1. Plug in the microscope and turn on the light. If your microscope has a mirror, you may need to adjust it so light is directed through the diaphragm.
2. Place your specimen (the object you want to observe) on the stage and secure it with the stage clips.
3. Turn the objective lens to the lowest magnification (usually ×4).
4. Turn the coarse adjustment knob until the objective lens is almost touching the microscope slide. Look from the side of the microscope as you do this, not through the eyepiece, so you do not damage the slide.
5. Looking through the eyepiece, turn the coarse adjustment knob to move the stage away from the objective lens until the image comes into focus.
6. Use the fine adjustment knob to make the image clearer.
7. Turn to a higher power objective lens (×10 or ×40) and refocus the image using the fine adjustment knob.
8. Make a scientific drawing of the specimen or write down any observations.

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Investigation Skills

Independent variable: The variable that you change or select the values for.

Dependent variable: The variable that is measured for each change of the independent variable.

Control variable: A variable that may, in addition to the independent variable, affect the outcome of the investigation and therefore must be kept constant.

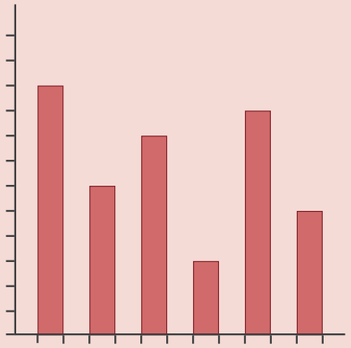
Prediction: What you think will happen and why.

Risk assessment: Identify hazards, the harms they can do and how you will minimise any risks in a practical investigation.

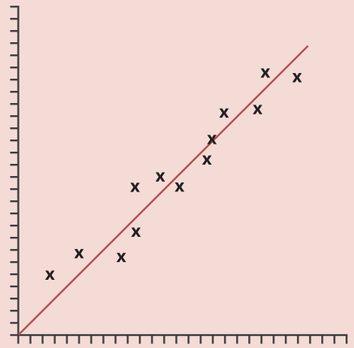
Method: Step-by-step instructions for how to carry out a practical investigation.

Results table: As the practical is carried out, write the results in a table.

Bar chart: used to display data when at least one variable is discrete or categoric.



Scatter graph: used to display data when both the independent and the dependent variables are continuous.



Conclusion: An explanation of what you found out in your investigation.

Evaluation: Where you consider the quality of your method and the data you collected.

The Flame Test

This test is used to find out which metal ion is in a compound. Each metal ion will produce a different coloured flame.

1. Dip a wooden splint into a test tube of a metal chloride solution, e.g. copper chloride.
2. Turn the Bunsen burner to the blue flame and carefully place the end of the splint with the metal chloride solution into the flame.
3. Write down any observations/colours in the results table.
4. Repeat with different metal chloride solutions.

Metal Ion	Flame Test Colour
potassium (K)	purple
calcium (Ca)	red–orange
lithium (Li)	crimson red
sodium (Na)	orange–yellow
copper (Cu)	green