








Lesson 1
Safety

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.

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

Lesson 2
Measuring Skills

When taking measurements in science there are various different pieces of equipment you can use and different units as well
Below are examples of measurements the equipment you can use and some units.

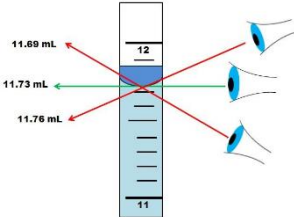
Measurement Length
Equipment Ruler, trundle wheel
Units cm, m, Km

Measurement Mass
Equipment Top Pan Balance, scales
Units g, Kg

Measurement Temperature
Equipment Thermometer
Units °C

Measurement Time
Equipment Stopwatch
Units seconds (s)

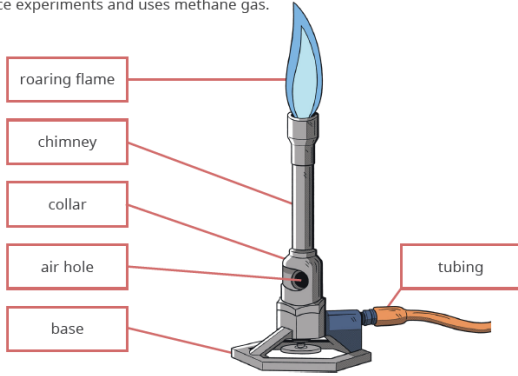
When making measurements always get down to eye level.

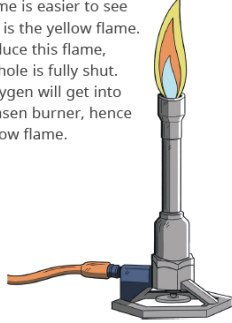
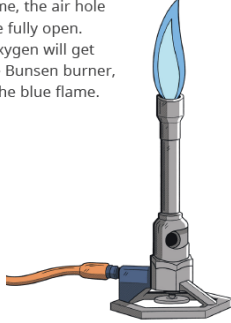




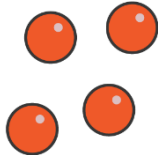
Lesson 3
Bunsen Burners

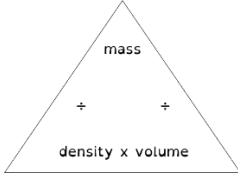
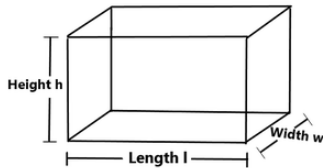
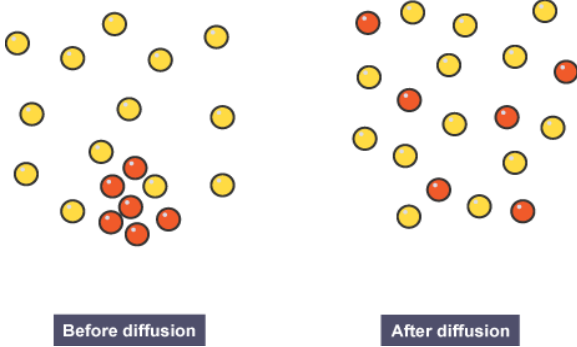
Bunsen Burner

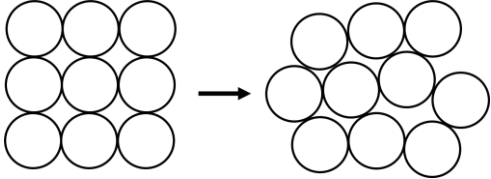
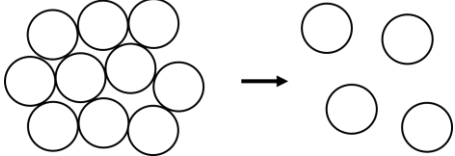

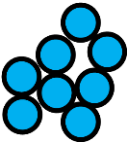
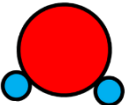
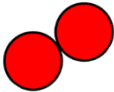
The Bunsen burner is an important piece of scientific equipment. It is used in many science experiments and uses methane gas.



The Safety Flame	The Roaring Flame
<p>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.</p> 	<p>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.</p> 

Lesson 4 States of Matter & Particle Model		Lesson 5 Changes of State																
<p>Matter: any substance that has mass and volume.</p> <p>Mass: how much of something there is</p> <p>Volume: how much 3D space something takes up</p> <p>Matter can exist in three physical states:</p> <ul style="list-style-type: none"> • Solid • Liquid • Gas <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>Solid</th> <th>Liquid</th> <th>Gas</th> </tr> </thead> <tbody> <tr> <td>Can it be compressed?</td> <td>✗</td> <td>✗</td> <td>✓</td> </tr> <tr> <td>Can it flow?</td> <td>✗</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Does it have a fixed shape?</td> <td>✓</td> <td>✗</td> <td>✗</td> </tr> </tbody> </table>		Solid	Liquid	Gas	Can it be compressed?	✗	✗	✓	Can it flow?	✗	✓	✓	Does it have a fixed shape?	✓	✗	✗	<p>All substances are made up of particles.</p> <p>Particles are attracted to each other.</p> <p>The particles move around.</p> <p>The higher the temperature of the matter the more the particles move around</p> <p>Solid</p> <ul style="list-style-type: none"> • Particles in a fixed arrangement • Particles vibrate around a fixed point • Particles are close together • Very strong attraction between particles  <p>Liquid</p> <ul style="list-style-type: none"> • Particles in an irregular arrangement • Particles move around each other • Particles are close together • Strong attraction between particles  <p>Gas</p> <ul style="list-style-type: none"> • Particles in a random arrangement • Particles move randomly in different directions and at different speeds • Particles are far apart • Weak attraction between the particles 	<p>Changes of state - Substances can change state, usually when they are heated or cooled.</p> <p>The closeness, arrangement and motion of the particles in a substance change when it changes state.</p> <p>Melting – The process that occurs when a solid turns into a liquid when heated.</p> <p>Evaporating – The process by which a liquid changes state and turns into gas.</p> <p>Condensation – A change in state in which gas becomes liquid by cooling.</p> <p>Freezing – A change of state in which liquid becomes solid by cooling.</p> <p>Some chemicals do not exist as a liquid.</p> <ul style="list-style-type: none"> • Going from a solid to a gas is called sublimation. • Going from a gas to a solid is called deposition.
	Solid	Liquid	Gas															
Can it be compressed?	✗	✗	✓															
Can it flow?	✗	✓	✓															
Does it have a fixed shape?	✓	✗	✗															

<p style="text-align: center;">Lesson 6 Density</p>	<p style="text-align: center;">Lesson 7 Density calculations</p>	<p style="text-align: center;">Lesson 8 Diffusion</p>
<p>Density is the amount of mass in a given volume.</p> <p>Denser objects sink in less dense fluids.</p> <p>General rule for density:</p> <ul style="list-style-type: none"> Solids > Liquids > Gases We know that this is not always the case. <p>When objects are heated their particles move further apart, this causes their density to decrease.</p> <p>Limitations to the particle model:</p> <ul style="list-style-type: none"> Only 2D Don't show movement of particles Don't show particle interactions <p>Some substances have a higher density as liquid than as a solid</p>	<p>Density is a measure of how heavy an object is for its size.</p> <p>Density = mass ÷ volume Mass in kg or g Volume in m³ or cm³ Density in kg/m³ or g/cm³</p>  <p>The density of regular solids can be found by determining the mass and volume of the solid, and then calculating the density.</p> <p>Mass is measured with a balance.</p> <p>For regular solids, you can calculate the volume if you measure the length of the sides using a ruler.</p>  <p>The volume of a cuboid is equal to: length × width × height</p>	<p>Diffusion is the movement of particles from a high concentration to a low concentration</p>  <p>Diffusion can also happen in liquids - particles in liquids can move around each other, which means that eventually they are evenly mixed.</p> <p>Diffusion in liquids is slower than diffusion in gases because the particles in a liquid move more slowly. It happens faster if the temperature is increased.</p> <p>Diffusion does not take place in solids as the particles are fixed in solids and cannot move round each other.</p>

Lesson 9 & 10 Particle Circus	Lesson 11 Elements, Mixtures and Compounds
<p>Making Observations:</p> <ul style="list-style-type: none"> • Notice things using your senses • Writing down what you have seen change, in as much detail as possible • A valid observation is that there has been no change <p>If an object changes state (by heating)</p> <ul style="list-style-type: none"> • Particles in a solid will vibrate so much they move further apart and begin to move  <ul style="list-style-type: none"> • Particles in a liquid will move so fast they get further apart and will begin to move freely 	<p>Atoms are the smallest particle of an element that can exist.</p>  <p>An element is a pure substance made from one type of atom.</p>  <p>Compounds are substances that are made up of two or more atoms chemically bonded together in a fixed ratio.</p>  <p>Molecules are substances that contain two or more (non-metal) atoms, chemically bonded together.</p> <ul style="list-style-type: none"> • Molecules can be elements, two or more of the same atom. • Molecules can be compounds, two or more different atoms.  <p>Mixtures can be defined as impure, as they are made from two or more different substances that are not chemically joined together.</p> 