



Year 6 Knowledge Organisers:

Name: _____ Class: _____

Science Teacher: _____

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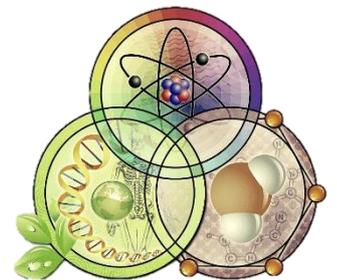
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Biology: the study of living organisms, their structure, adaptations and environment.

Chemistry: studies the properties of matter and how matter interacts with energy.

Physics: the study of matter and small parts that make up matter, its motion and behaviour through space and time, including energy and forces.



Lab Rules:

The lab rules are designed to keep you and the people around you safe. Make sure you have read these carefully.

1. Only enter the lab when you are told to do so by a teacher.



2. Do not run or mess about in a lab.

3. Keep your bench and floor clear – put bags and coats in provided storage spaces or neatly under your chair.

4. Follow all instructions first time, every time.



5. Wear goggles from the start of the practical until the teacher tells you to take them off.

6. Replace lids on all chemical bottles and only touch them when instructed to do so.



7. When using a Bunsen burner – tie hair back and tuck in ties.

8. Stand up during practical work.



9. Do not eat or drink in the lab – never smell or taste anything that is in the lab – if you do, report it to the teacher.

10. Wash your hands carefully after every practical lesson.



11. If you are burnt or a chemical splashes on your skin – wash the area immediately and report it to the teacher.

12. Do not put solid waste down the sink – it goes in the bin unless instructed otherwise.



13. Wipe up all small spills and report bigger ones to your teacher.

14. Report any breakages to the teacher.



15. Enjoy your practical lessons – ask questions, be inquisitive and learn some amazing science!

I have read and understand the rules of the lab at KMS/SMS: signed: _____ Date: _____

Working Scientifically Knowledge Organiser:

Keyword / Concept	Definition
Types of enquiry	Observing over time, research, classifying, fair testing, and pattern seeking.
Variable	A value that could be changed during an experiment.
Independent variable	The thing that you change
Dependent variable	The thing that you measure
Control variable	The thing that you keep the same
Prediction	What do you think will happen in an investigation and why?
Equipment	Special pieces of glassware and tools that allow you to carry out scientific investigations.
Risk assessment	A list of hazards, risks and how to reduce the chances of them.
Method	Step by step set of instructions on how to carry out an investigation
Conclusion	An explanation of what is found out during an investigation and why.
Evaluation	An explanation of what has gone well with an investigation and what can be done to improve it if carried out again.
Accuracy	An accurate measurement is considered to be close to the true value. Accurate readings are done by using suitable equipment.
Precision	How close together measurements are.
Anomaly	A result that does not fit the pattern.
Scale	A set of numbers that indicate certain intervals on a graph / measuring equipment used for measurement.
Axis	The horizontal (x axis) and vertical (y axis) lines on a graph that contain the scales.
Line of best fit	A line that follows the trend of data showing the correlation of results

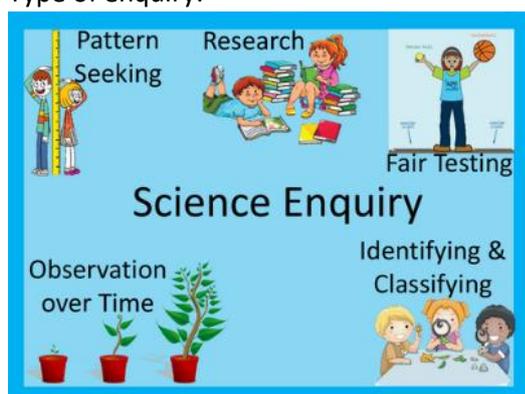
Working Scientifically:

1. Aim:

What are you investigating?

In this investigation we are going to

2. Type of enquiry:



3. Identifying variables:

- Independent variable
- Dependent variable
- Control variable

4. Prediction:

- Can you predict what your results will show?
I predict that if I change the (independent variable) it will *increase/decrease* the (dependent variable)
- Can you use a scientific idea to support your prediction?

5. Risk Assessment:

What are the risks with your investigation?

- Identify the hazard.
- State what harm the hazard can do (risk).
- How could you stop any accidents from happening?
- If an accident occurred, what would you do?

Hazard	Risk	Preventing Risk	What to do if an accident happens.

6. Method:

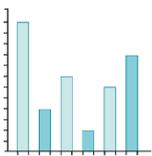
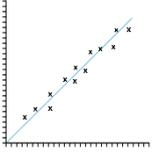
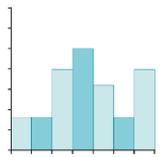
Make sure your method has:

- Numbered steps (step 1:.....)
- Written in a clear order
- Short, simple sentences
- Bossy verbs (Collect, Measure, Pour)
- Be specific – use amounts or timings
- Do not use I, we, you
- You may want to include a diagram

7. Collecting Results:

Independent variable (units)	Dependent variable (units)			
	Repeat 1	Repeat 2	Repeat 3	Mean Average

8. Representing data:

Types of Graph:	Graph Check List:
<ul style="list-style-type: none"> • Bar chart: When one of our variables is discrete, we draw a bar chart.  	<ul style="list-style-type: none"> <input type="checkbox"/> Drawn with a pencil and ruler <input type="checkbox"/> Axes drawn using the lines on the graph paper <input type="checkbox"/> X axis – independent variable (what you changed) <input type="checkbox"/> Y axis – dependent variable (what you measured) <input type="checkbox"/> Axes labelled – what do the numbers/words mean make sure you include units <input type="checkbox"/> Scales are evenly spaced <input type="checkbox"/> Bar chart – bars equal widths with spaces between them. <input type="checkbox"/> Line graph – points drawn with small x, line of best fit. <input type="checkbox"/> Histogram – bars equal without spaces between them. <input type="checkbox"/> Title – This graph shows....
<ul style="list-style-type: none"> • Line graph: When both variables are continuous, we draw a line graph.  	
<ul style="list-style-type: none"> • Histogram: When continuous data is grouped into categories, we draw a histogram.  	

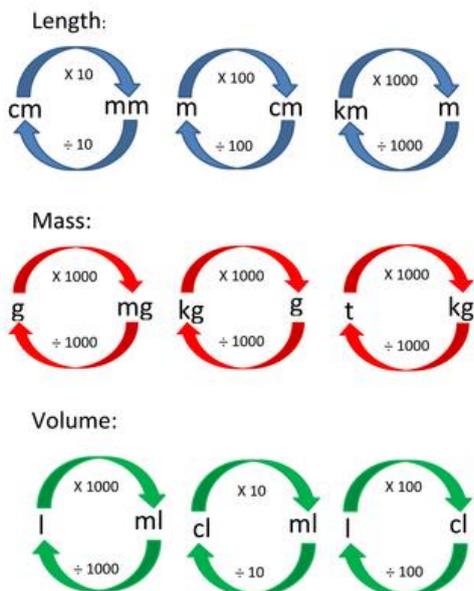
9. Conclusion:

- When the (independent variable) increases / decreases, (dependent variable)
- We can see this from... (use your data).
- This happened because... (explain your results using science).
- Was your prediction correct? My prediction was correct/not correct because...

10. **Evaluation:** Answer these questions below in full sentences to evaluate your experiment.
- Were your results reliable?
 - Did you take enough readings to highlight any anomalous results?
 - Were you able to work out a mean average?
 - Can you explain any anomalous results? Why might these have been caused?
 - What went well in your investigation?
 - Did you keep your control variables the same throughout your investigation?
 - What could you improve on if you were to complete this experiment again to make your results more reliable and / more accurate?

Measuring:

Thing being measured	Standard Units	Equipment if applicable
Energy	Joules (J)	
Force	Newtons (N)	Newton meter
Length	Meters (m)	Ruler
Speed	Metres per second (m/s)	
Gravity	Newton per kilogram (N/kg)	
Volume	Centimetres cubed (cm ³)	Measuring cylinder
Current	Amps (A)	Ammeter
Temperature	Degrees celcius (°C)	Thermometer
Mass	Kilogram (kg)	Balance
Distance	Metres (m)	Trundle wheel / meter ruler / tape measure
Time	Seconds (s)	Stopwatch
Angle	Degrees (°)	Protractor



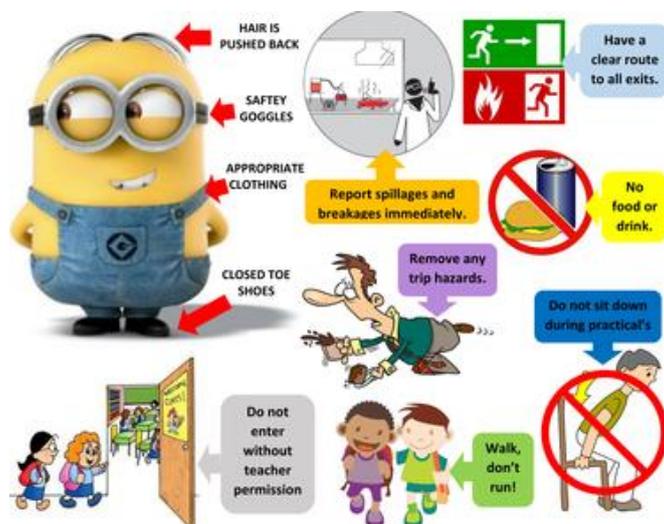
Introduction to Science Knowledge Organiser:

Accuracy	The value closest to the true value.
Precision	How close together measurements are.
Oxidising	Provides oxygen and can cause a fire or explosion.
Explosive	Chemical is unstable and could explode.
Flammable	Catches fire easily.
Gas under pressure	Compressed gas could explode if damaged or heated.
Toxic	Can cause death if swallowed, breathed or absorbed through the skin
Corrosive	Attacks and destroys living tissues.
Health hazard	Could cause irritation and harmful if swallowed, inhaled or contact with the skin.
Serious health hazard	Cause serious and long term damage to health.
Hazardous to the environment	Chemicals may present an immediate or delayed danger to the environment, including toxicity to aquatic life.
Bunsen burner	Piece of laboratory equipment used to heat things in a lab.
Measuring cylinder	Piece of equipment for measuring the volume of a liquid.
Thermometer	Piece of equipment for measuring the temperature.
Ruler	Piece of equipment used for measuring length.

Safety in the lab:

Science labs can be a dangerous place if they are not used sensibly and safely so we have to follow rules in the lab:

- Do not run around or play in the lab.
- Long hair is to be tied up.
- Safety goggles must be worn.
- Bags to be placed in the racks.
- Stand up, no sitting down.
- Chairs tucked under the desks.
- No eating or drinking.



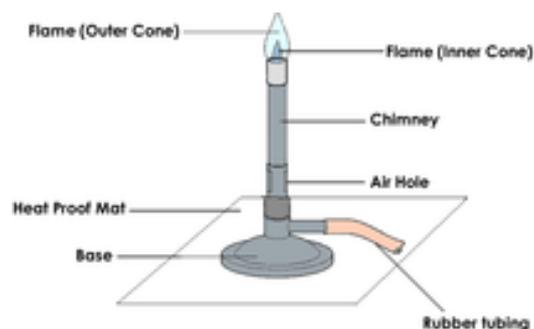
Hazard symbols are a way of identifying what hazards are associated with chemicals:



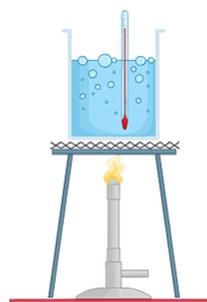
Lab Equipment:

Equipment	Name	Equipment	Name
	Test tube		Measuring cylinder
	Boiling tube		Tripod
	Beaker		Gauze
	Conical flask (i.e. cone-shaped)		Bunsen burner
	Crucible		Filter funnel (with paper)
	Tongs		Test tube holders
	Mortar and pestle		Thermometer
	Pipe clay triangle		Test tube holder
	Stand boss and clamp		Balance
	Dropping pipette		Evaporating basin
	Glass rod		Spatula

Bunsen Burner:



Boiling water:



Solid water (ice) melts at 0°C, liquid water boils at 100°C.

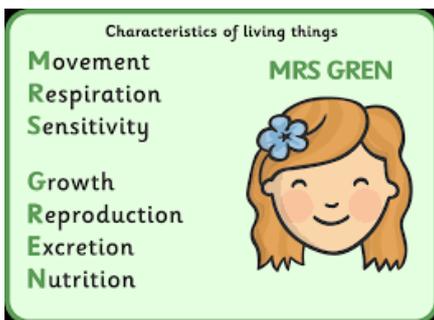
Risk Assessments:

Hazard	Nature of Hazard(s)	Control Measures to Reduce Risk
Glass Beaker	Glass beaker could smash. Broken glass could lead to cuts.	Wear eye protection. Care when handling glassware.
Boiling Water	Care with boiling water as this could cause scalds.	Wear eye protection. Teacher to pour boiling water into flask. Do not have equipment set up to near the edge of the bench, to avoid knocking and spilling boiling water.

Organisms Knowledge Organiser:

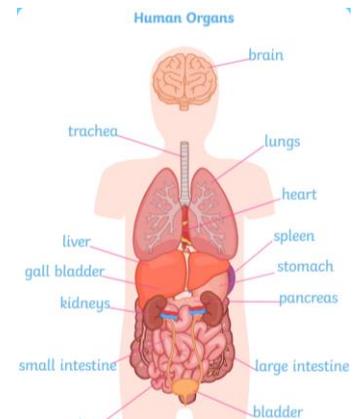
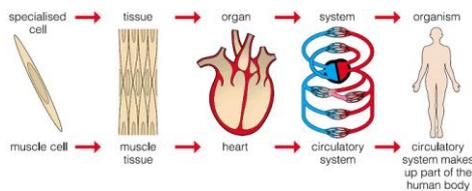
Alcohol	A substance made from the fermentation of grains, fruit or vegetables.
Artery	The type of blood vessel that carries oxygenated blood away from the heart, with thick walls and carrying high pressure blood.
Balanced diet	A diet that contains the appropriate amounts and proportions of each type food group.
Blood vessel	A tube that carries blood around the body as part of the circulatory system.
Capillary	The smallest type of blood vessel that carries blood through tissues.
Carbohydrate	Large molecule required in the diet for energy.
Cell	The basic unit of an organism, contains smaller parts called organelles to carry out life processes.
Circulatory system	Organ system responsible for transporting blood around the body.
Drug	A chemical that has an effect on the body.
Heart	The organ that pumps blood around the body.
Lipid (fat)	Large molecule required in the diet for insulation and energy storage.
Organ	Group of different tissues working together to carry out a job.
Organ system	Group of organs with related functions working together to perform certain functions within the body.
Organism	Any living thing.
Platelet	Small segments of cells that allow the blood to clot forming scabs.
Protein	Large molecule required in the diet for growth and repair.
Red blood cell	The cells found in the blood that carry oxygen round the body.
Tissue	Group of cells of one type.
Vein	The type of blood vessel that carries deoxygenated blood towards the heart, thin walls, low pressure blood and valves to prevent blood flowing backwards.
White blood cell	The cells found in the blood that fight infections.

Seven Life Processes:



Organisation:

Cells are described as the building blocks of life. Cells can be organised to create multicellular organisms. (multi = many)

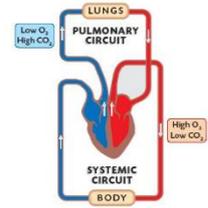


Diet:



The Circulatory System:

The circulatory system carries blood around the body to deliver oxygen, glucose and nutrients to where they are needed, it then transports waste substances for excretion.

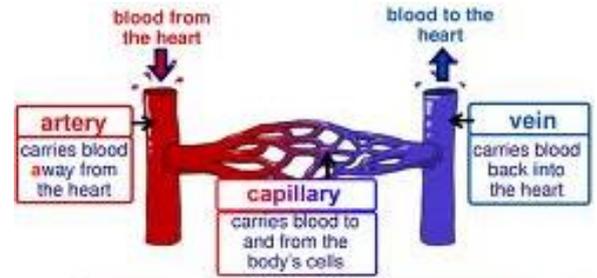


Components of blood:

Blood is made of four main components:

- Red blood cells – carry oxygen around the body.
- White blood cells fight infections.
- Platelets – blood clotting.
- Plasma – the liquid that carries the components and dissolved substances such as nutrients and water.

Blood Vessels:



The Heart and Exercise:

- When we exercise our heart rate and breathing rate increase.
- When we exercise we need more energy in our muscles.
- To release more energy, our muscles need to do more respiration which needs oxygen and glucose.
- The heart pumps faster to transport more glucose and oxygen around the body in the blood.



Health:

Drugs:

- A drug is a chemical that has an effect on the body.
- Drugs can be legal or illegal.
- Legal drugs are medicines such as painkillers, antibiotics, anesthetics.
- Illegal drugs are ones which it is against the law to use or distribute such as cannabis, psychedelics (magic mushrooms, LSD) and stimulants (ecstasy and cocaine).

Alcohol:

Alcohol is made from grains, fruit and vegetables in a process called fermentation. It is a drug with restrictions on limits and age of consumption. Excess drinking can lead to short and long term effects.

Smoking:

Smoking is bad for health and can cause major damage to the body resulting in cancer and chronic issues with the heart and lungs. Smoking is addictive due to the nicotine found in cigarettes.

Exercise:

Exercise has positive impacts on physical and mental wellbeing, these include:

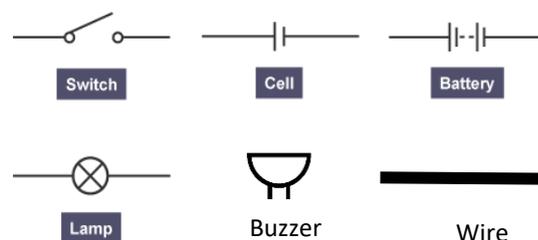
- Help you control your weight.
- Reduce your risk of heart diseases.
- Improve your mental health and mood.
- Help keep your thinking, learning, and judgment skills sharp as you age.
- Strengthen your bones and muscles.
- Improve your sleep.

Waves and Electricity Knowledge Organiser:

Cell	What provides push for the current in the circuit and energy to the components the circuit powers. Often referred to as a battery
Circuit	The loop of wires needed to allow electrical current to flow and the components that this flow provides energy to.
Complete circuit	A circuit that has no gaps that will let the electrical current flow round them.
Component	The objects that a circuit provides energy too.
Conductor	A conductor is a material that will allow electricity to pass through it.
Incomplete circuit	A circuit with a gap that will not allow an electrical current to pass through them.
Insulator	An insulator is a material that will not allow electricity to pass through it.
Luminous	An object that emits (gives out) light.
Non-luminous	Objects that can be seen when light reflects off them and into our eyes.
Opaque	Objects that do not allow light to pass through them
Shadow	A shadow forms when an opaque or non-transparent object blocks light from passing through and reaching a surface on the other side.
Translucent	Objects that allow some light to pass through them
Transparent	Objects that let light pass through them
Variable	Something that can be changed and have an effect in an investigation.

Electricity

Electricity is essential for modern life. Electricity must flow around a circuit. Circuits are made of conductors and form a loop that allows electrical current to flow around in one direction and form a complete circuit.



How to draw a circuit

Circuits are represented using circuit diagrams. When drawing a circuit its essential that; -

- symbols are used to represent the components
- straight lines are used for the wires
- right angles for the corners
- Components are placed in the middle of lines.

Changing circuits: To make a bulb brighter or a buzzer louder, more cells can be added to the circuit.

Conductors and Insulators:

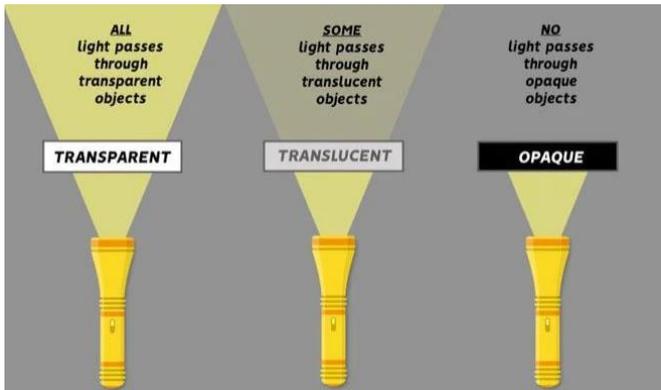
A conductor allows electricity to pass through it.

An insulator does not allow electricity to pass through it.



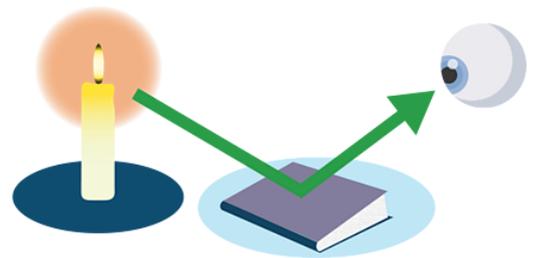
Light:

Light is emitted from **luminous** sources. It can be **transmitted** through, **reflected**, or **absorbed** by non-luminous objects.



Seeing objects:

To see an object, light travels from the object, hits a surface and reflects off it.



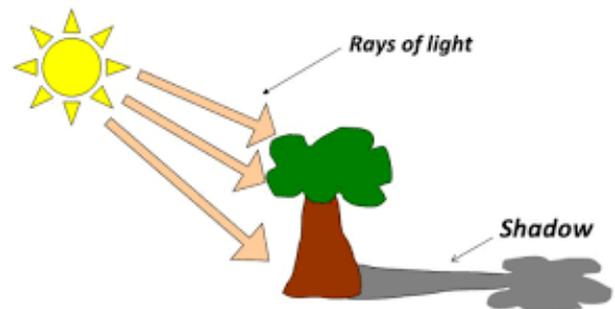
Shadows:

Opaque objects block the light.

The shadow is showing where the light has been blocked by the object.

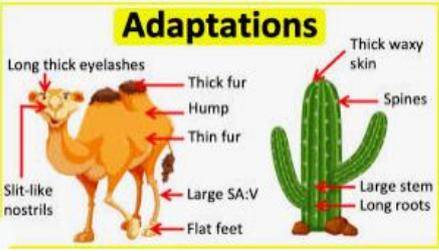
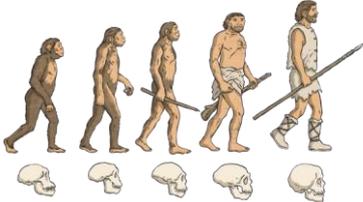
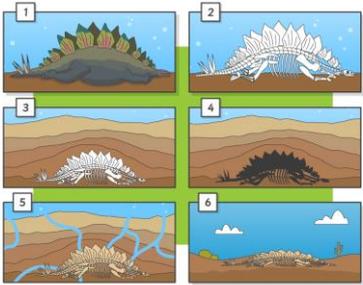
When the light is moved closer to the object, the shadow becomes bigger.

When the light is further away from the object, the shadow becomes smaller.

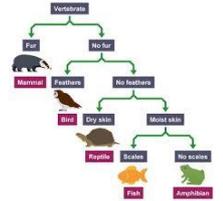
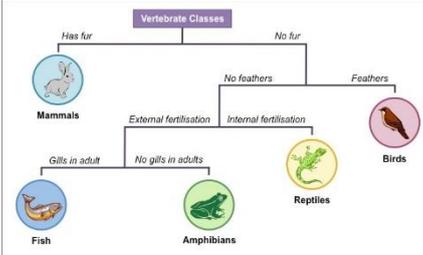
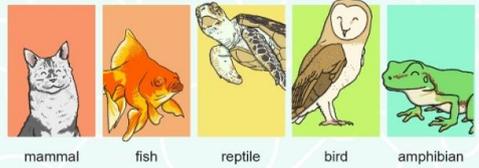


Genes and Ecosystems Knowledge Organiser:

Genes:

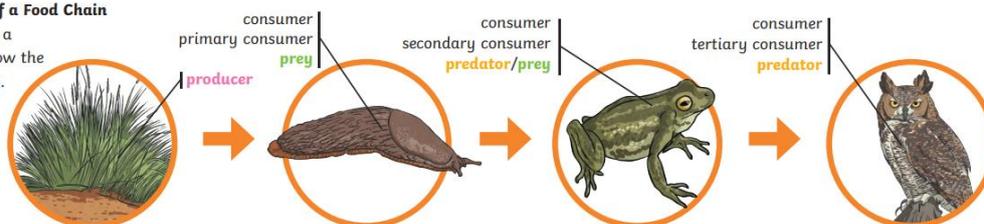
<p>Adaptation</p>	<p>These are special features that plants and animals develop to suit the place where they live.</p>	
<p>Environmental Variation</p>	<p>These are differences between individuals that are not inherited but caused by the environment that the organism has lived in, including scars and tattoos.</p>	
<p>Evolution</p>	<p>Is the process by which living things change over time, over many generations and relies on the process of natural selection.</p>	
<p>Fossils</p>	<p>Fossils are imprints of long dead plants and animals found in rocks. They are important because they were formed many millions of years ago. This means they can tell us how plants and animals on earth used to look.</p>	
<p>Gene</p>	<p>A gene is a section of DNA that is responsible for a characteristic like eye colour or blood group.</p>	
<p>Genetic Variation</p>	<p>These are differences between individuals that are inherited from parents, such as the colour of your eyes, hair and skin.</p>	
<p>Habitat</p>	<p>A place where an organism makes its home. It provides shelter, food, water and space.</p>	<p>Examples of habitats:</p> 
<p>Offspring</p>	<p>Is the product of reproduction.</p>	
<p>Survival of the fittest</p>	<p>Individuals with characteristics most suited to their environment are more likely to survive and reproduce</p>	
<p>Variation</p>	<p>The differences in characteristics between individuals of the same species.</p>	

Ecology:

<p>Carnivore</p>	<p>An animal that feeds on other animals.</p> 
<p>Classification</p>	<p>The arrangement of organisms into groups based on characteristic.</p> 
<p>Ecosystem</p>	<p>All the organisms living in a particular area and the non-living components that the organisms interact with</p>
<p>Herbivore</p>	<p>An animal that inly eats plants.</p> 
<p>Invertebrates</p>	<p>An animal that doesn't have a back bone.</p> 
<p>Keys</p>	<p>A key is a set of questions about the characteristics of living things. You can use a key to identify a living thing or decide which group it belongs to by answering the questions.</p> 
<p>Omnivore</p>	<p>An animal that eats plants and animals.</p> 
<p>Population</p>	<p>All the organisms of one species found in a particular area</p>
<p>Predator</p>	<p>An animal that hunts and eats other animals.</p>
<p>Prey</p>	<p>An animal that get hunted and eaten by another animal</p>
<p>Producer</p>	<p>An organism, such as a plant, that produces it own food.</p>
<p>Species</p>	<p>A group of organisms capable of breeding with each other to produce fertile offspring</p>
<p>Vertebrates</p>	<p>An animal that has a backbone.</p> 

An Example of a Food Chain

The arrows in a food chain show the flow of energy.



Classifying vertebrates:

Class of vertebrates	Where do they live?	How do they produce young?	What covers their bodies?	Hot or cold blooded?	Extra features	Examples of this group
Fish	In water	Lay soft eggs	Scales and fins	Cold blooded.	Breathe using gills	Cod, salmon
Reptiles	On land	Most lay eggs. Some give birth to live young.	Scales	Cold blooded	Ear holes, dry skin, four or no legs.	Snakes, lizards
Birds	On land	Lay eggs	Feathers and wings	Warm blooded	Ear holes, two legs.	Penguins, sparrows
Amphibians	On land or in water	Soft jelly like eggs	Skin	Cold blooded	Moist skin	Toads, frogs, salamanders.
Mammals	On land	Live young	Hair or fur	Warm blooded	Produce milk to feed young	Humans, dolphins,

Classifying invertebrates:

Class	Characteristics
Insect	Exoskeleton covering their body. Body has three parts. Many have wings.
Crustacean	Hard, external shell. Mostly live in oceans or other waters. Many have claws. Head and abdomen.
Mollusc	Live on land or in water. Soft, skin like organ covered with a hard shell.
Arachnid	4 pairs of legs. Hard exoskeleton. Jointed legs for walking. No antennae.
Annelid	Bodies divided into segments. No limbs. Some have long bristles, some have shorter bristles and appear smooth.

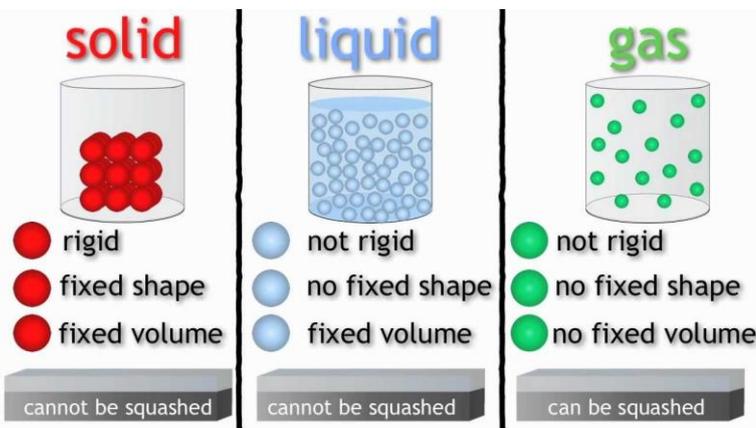
Classifying plants:

Seeded or non seeded?	Type of plant	Characteristics
Seeded plant	Flowering plants.	These plants grow specialised parts for reproduction called flowers and from these flowers grow their seeds.
Seeded plant	Conifer	These plants grow parts for reproduction from their leaves or stems and from these grow their seeds.
Non-seeded plant	Ferns	These plants have stems and root systems. They release billions of spores instead of seeds. They are different as they are much smaller than seeds.
Non-seeded plant	Mosses	These plants do not stems and root systems. They release billions of spores instead of seeds. They are different as they are much smaller than seeds.

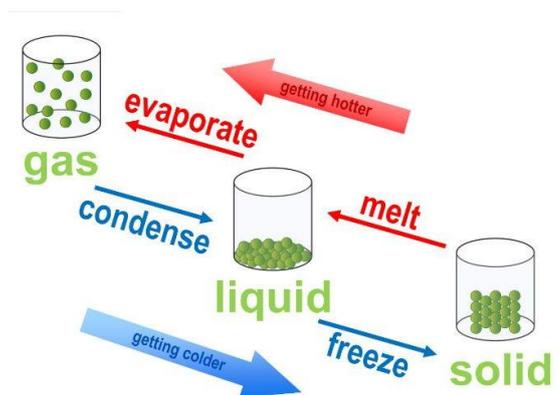
Matter Knowledge Organiser:

Boiling point	The temperature at which a liquid turns into a gas. The boiling point for water is 100°C.
Condensation	When a gas changes to a liquid.
Conductor	Will allow electricity to pass through it.
Dissolving	Some substances dissolve when you mix them with water. When a substance dissolves, it might look like it has disappeared but has in actual fact mixed in with the water particles.
Evaporation	When a liquid changes to a gas.
Freezing	When a liquid changes to a solid.
Gas	Can spread and take what ever space you put it in. Volume can change and can be squashed.
Insoluble	Something that cannot dissolve in water.
Insulator	Will not allow electricity to pass through it.
Liquid	Can flow and take the shape of a container. Volume does not change and cannot be compressed.
Melting	When a solid changes to a liquid.
Melting point	The temperature at which a solid change into a liquid. Different solids melt at different temperatures. Ice melts at 0°C.
Opaque	Will not allow any light through.
Particles	The smallest unit of matter.
Permeable	Will allow water to go into or pass through.
Solid	Has a fixed shape, volume does not change and cannot be compressed.
Soluble	Something that can dissolve in water.
Translucent	Will allow some light through.
Transparent	Will allow all the light through

States of Matter:



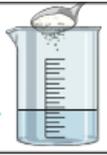
Changes of State:



Dissolving

A solution is made when **solid** particles are mixed with **liquid** particles. **Materials** that will dissolve are known as soluble. **Materials** that won't dissolve are known as insoluble. A suspension is when the particles don't dissolve.

Sugar is a soluble **material**.



Sand is an insoluble **material**.



Classifying Materials:

Key Knowledge

Different **materials** are used for particular jobs based on their properties: electrical **conductivity**, flexibility, hardness, **insulators**, magnetism, solubility, thermal **conductivity**, **transparency**.