Topic: Y8 Inheritance	Duration: 6 lessons	Composite: Unit test

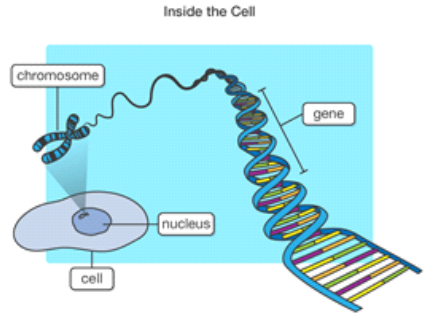
Key vocabulary:	Core knowledge Components Powerful knowledge components crucial to commit to long term memory (in red box)	Links to previous and future topics

Variation
Species
Inherited
Environmental
Continuous
Discontinuous
Chromosome
Gene
Cell
DNA
Evolution
Ancestor
Fossil
Extinction
Biodiversity
Gene Bank
Endangered

1. Variation is the distinct form or version of something for example humans have variation in eye colour.
2. 3 inherited factors that are not affected by environmental factors are: natural hair colour, eye colour and height.
3. Heredity is the process where genetic information is passed from parents to offspring.
4. Genes are found on chromosomes.
5. A gene is a section of DNA that has the code for a specific characteristic for example eye colour.
6. Chromosomes are long chains of DNA that contain genetic codes for certain characteristics.
7. DNA carries the genetic code for all living things and characteristics are passed on to offspring by the DNA.
8. Discontinuous variation is limited by a number of possible values for example there are only 4 blood groups with no value in between.
9. Continuous variation is a characteristic that ranges across a species for example height it ranges from the shortest to the tallest with any possible value in between
10. Bar graphs should be used for discontinuous data and bar or line graphs can be used for continuous data
11. Fossils support Darwin's theory of evolution that a species changed gradually over a period of time.
12. Endangered means a species that is at risk of extinction
13. When a species no longer exists or when it is no longer viable for example there is no breeding pair the species is said to be extinct
14. 4 factors that can result in extinction: changes to environment, destruction of habitat, new disease, new predators/competitors.
15. Gene banks store genetic material of lots of species to maintain genetic diversity.
16. When a species becomes extinct it can affect biodiversity for example when a predator becomes extinct the population of the prey for that predator can increase which would mean more of the plant/ producer being consumed.
17. Humans are increasing the likelihood of species extinction by deforestation, pollution and hunting.

POWERFUL KNOWLEDGE

1. **Species = a group of living organisms consisting of similar individuals capable of breeding**
2. **Variation = the differences between different types of organism and within the same type of organism.**
3. **Variation happens due to the environment or is inherited.**
4. **Environmental variation is caused by the environment for example weight is caused by diet.**
5. **Inherited variation is passed from parent to the offspring in genes.**



6.
7. **A normal human cell has 23 pairs of chromosomes**
8. **Survival of the fittest = species that have adaptions better suited to their environment (for example longer necks to reach food higher up) have a better chance at survival.**
9. **Natural selection = a process by which a species changes over time in response to changes in the environment.**
10. **Evolution = the gradual change of a species over time**
11. **4 factors that can result in extinction: changes to environment, destruction of habitat, new disease, new predators/competitors.**

Links to previous and future topics

Students have previously studied cells and reproduction so should recall Levels of Organisation within organisms.

They should also recall the 5 Kingdoms from Microorganisms and recall the definition for Classification.

Students will then look at the features they share, as humans, with their peers. They will start to consider differences also.

Students should then consider the causes of their similarities and differences in terms of environmental and inherited factors.

More detail will then be added as to what genetic information is; how it is stored and how it is inherited.

This will then lead to changes within species, variation and evolution.

Students will then examine the evidence to support Darwin's Theory of Evolution.

Students will explore the factors that affect a species' survival; examine why some become extinct/endangered and how human activity influences biodiversity.

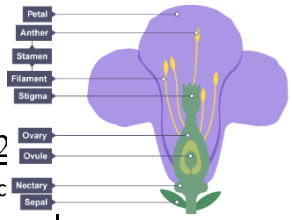
Topic: KS3 – Yr 8 Plants	Duration: 7 lessons	Composite: Unit test

Key vocabulary:	Core knowledge Components Powerful knowledge components crucial to commit to long term memory (in red box)	Links to previous and future topics

Petals, Sepals, Stamen, Anther, Filament, Carpel, Stigma, Style, Ovary Ovule, Pollination, Fertilisation, Fruit, Seeds, Germination, Wind, Animal, Water, Explosive, Seed Dispersal, Wind, Animal, Water, Explosive Nitrates, Phosphates, Potassium, Magnesium, Deficiency, Fertiliser, Chemosynthesis, Bacteria, Symbiotic, Mutualistic

Flowers;-

1. Identify the main structures of a flower

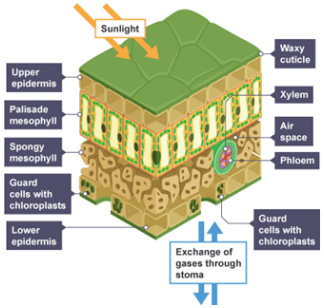


2 main structures of a flower.

Struc	
Sepals	Protect the unopened flower
Petals	Brightly coloured to attract insects
Stamens	Male parts of a flower
Anthers	Produce male sex cells
Stigma	The top of the female part which collects the pollen
Ovary	Produces the female sex cells
Nectary	Produces nectar which attracts insects

Leaves:-

3. Label a diagram of a leaf.



Describe the structure and function of the main components of a leaf.

Photosynthesis: (Sunlight and chlorophyll are needed too)

$6CO_2 + 6H_2O$ —> $C_6H_{12}O_6 + 6O_2$
Carbon Dioxide + Water —> Glucose + Oxygen

Aerobic respiration:

$C_6H_{12}O_6 + 6O_2$ —> $6CO_2 + 6H_2O$ + Energy
Glucose + Oxygen —> Carbon Dioxide + Water + Energy

1. Plants photosynthesise to release energy to use in aerobic respiration.
2. Chloroplasts = where photosynthesis happens in the leaf.
3. Most leaves are green because the chloroplasts contain a green pigment called chlorophyll.
4. Water gets into the plant via the roots.
5. When a plant grows, roots grow downwards, in the direction of gravity and away from light. The shoots will grow upwards, away from gravity and towards light.
6. Germination is a process where the seed begins to develop into a new young plant.
7. Pollination = pollen grains move from the anther of one flower to the stigma of another.
8. Fertilisation = pollen grain (male) joins with ovule (female).
9. Fruit forms from ovules (become seeds) and ovary wall.
10. Dispersal = spreading out of seeds.
11. 4 minerals needed for a healthy plant = nitrates, phosphates, magnesium, potassium compounds.
12. Chemosynthesis = similar to photosynthesis but uses chemical energy instead of light energy.

Seed dispersal:-

Once seeds have been made, they need to be dispersed (spread out). There are 4 main ways that this happens:

- Wind. Seeds that have lightweight parts, wings or parachutes to help them be carried by the wind.
- Inside animals. Brightly coloured and tasty fruits contain seeds that are indigestible. These seeds pass through the animal's digestive system undamaged.
- Outside animals. Some seeds have hooks that attach them to the fur of passing animals
- Self propelled. Some plants have pods that burst open when ripe, throwing the seeds away from the parent plant.

KS3
Ecology, Reproduction, Cells

KS4
Cell biology, Transport systems, Photosynthesis, Ecosystems, Evolution

KS5
Biodiversity, cells, ecosystems, control systems, genetics and evolution, energy for biological processes

Structure	Function
Palisade mesophyll	Packed with lots of chloroplasts and near the top of the leaf to get as much sunlight as possible for photosynthesis
Spongy mesophyll	Loosely arranged for gas exchange. The cells here are covered in a thin layer of water for gas exchange too.
Stomata	Gases diffuse through these small holes. Water can also be lost through these.
Phloem	Moves food substances around the plants.
Waxy cuticle	Reduce water loss from leaf.

Plant growth:-

4. Name and describe the 3 factors needed for germination.

· Water: lets the seed swell and the embryo start to grow
· Oxygen: needed for aerobic respiration
· Warmth: increases the growth rate and enzyme activity.

Fertilisation:-

If a pollen grain lands on the stigma of the correct flower species then a pollen tube will grow. This tube grows through the tissues of the flower until it reaches an ovule inside the ovary. The nucleus of the pollen grain then passes along the pollen tube and joins with the nucleus of the ovule. This is called fertilisation.

It is important that seeds are dispersed away from the parent plant and each other to reduce competition for light, water, space and minerals between the parent plant and the offspring.

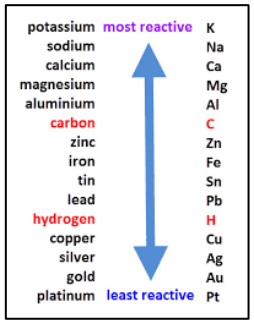
Plant Health:-

Plant mineral	Function	
Nitrates	Needed to make proteins	Leaves turn pale green/yellow. Reduces the amount of photots Reduces plant growth.
Magnesium	Used to make chlorophyll	Plant cannot photosynthesis to the best of it's ability. Reduces plant growth.
Phosphates	Needed to make DNA and cell membranes	Poor root growth and discoloured leaves
Potassium compounds	Needed in enzymes involved in respiration and photosynthesis	Poor growth of fruit and flowers, discoloured leaves.

Chemosynthesis:-

Some bacteria make food by using chemical energy instead of light energy. This process is called chemosynthesis. In chemosynthesis, one or more carbon molecules and nutrients is converted into organic matter, using energy from substances such as hydrogen gas, hydrogen sulfide (H_2S) or ammonia (NH_3)) or methane, rather than sunlight. Many organisms that use chemosynthesis are extremophiles, living in harsh conditions, such as in the absence of sunlight and a wide range of water temperatures.

Topic: KS3 – Yr 8 Metals, Materials and Reactions	**Duration: 9 lessons**	**Composite: Unit test**
Key vocabulary:	**Core knowledge Components** **Powerful knowledge components crucial to commit to long term memory (in red box)**	**Links to previous and future topics**

Metal Oxygen, Reactive, State symbol, Combustion, Oxidation, Vigorous, Reactivity Series, Water, Unreactive, Reactant, Product, Displace, Displacement, Ore, Extract, Smelting, Thermal, Decomposition, Rate, Composite, Carbon-fibre, Mixture, Ceramic, Compound, Physical property, Chemical property, Monomer, Polymer, Polymerisation, Natural, Synthetic	1. A more reactive metal can displace a less reactive metal from its compounds. magnesium + copper sulfate → magnesium sulfate + copper $Mg + CuSO_4 \rightarrow MgSO_4 + Cu$ 2. *Carbon* is a non-*metal* but it is more reactive than some *metals*. This means that some *metals* can be extracted from their *metal* oxides using *carbon*. This works for zinc, iron, tin, lead and copper. Copper is the least reactive of these five *metals.* copper oxide + carbon → copper + carbon dioxide $2CuO + C \rightarrow 2Cu + CO_2$ 3. A decomposition reaction = a type of chemical reaction in which one reactant yields two or more products. The general equation for a decomposition reaction is: AB → A + B. The higher the metal in the Reactivity Series, the quicker the reaction. 4. Some compounds break down when heated, forming two or more products from one reactant = thermal decomposition. Many metal carbonates can take part in thermal decomposition reactions: copper carbonate → copper oxide + carbon dioxide $CuCO_3 \rightarrow CuO + CO_2$ 5. Combustion is an example of oxidation. In an oxidation reaction, a substance gains oxygen. Metals and non-metals can take part in oxidation reactions. magnesium + oxygen → magnesium oxide $2Mg + O_2 \rightarrow 2MgO$ Metal oxides are bases. They react with acids and neutralise them. Some metal oxides dissolve in water to produce alkaline solutions. Non-metals react with oxygen in the air to produce non-metal oxides. carbon + oxygen → carbon dioxide $C + O_2 \rightarrow CO_2$ Non-metal oxides are acids – they react with bases and neutralise them. Some non-metal oxides dissolve in water to produce acidic solutions. 6. When a metal reacts with water, a metal hydroxide and hydrogen are formed.	**1. Reactivity Series:-**  **The reactivity series lists metals from the most reactive to the least reactive. It can be used to predict reactions.** **2. Ore = naturally occurring rocks that contain metals or metal compounds in sufficient amounts to make it worthwhile extracting them.** **3. The method used to extract a given metal from its ore depends upon the reactivity of the metal and so how stable the ore is.** **4. Decomposition reaction = a type of chemical reaction in which a single compound breaks down into two or more elements or new compounds (thermal decomposition uses heat)** **5. Oxidation: Combustion is an example of a type of reaction called oxidation . In an oxidation reaction, a substance gains oxygen.** **6. *Displacement reactions* involve a metal and a compound of a different metal. In a *displacement reaction*: a more reactive metal will displace a less reactive metal.** **7. metal oxide + carbon → metal + carbon dioxide** **8. metal + oxygen → metal oxide** **9. metal + water → metal hydroxide + hydrogen** **10. A monomer is a molecule that can be reacted together with other monomer molecules to form a larger polymer chain (polymer).** **11. A polymer is a large molecule made up of many repeated units.**	KS2: Use of everyday materials, states of matter, properties and changes of materials KS3: Elements and compounds, States of Matter, Solutions & Mixtures, The Periodic Table, Separation Techniques KS4: Obtaining & Using Metals, The Periodic Table

	Sodium + water → sodium hydroxide + hydrogen $2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$ 7. Polymers often have these properties in common. They are: • chemically unreactive • solids at room temperature • plastic – they can be moulded into shape • electrical insulators • strong and hard-wearing	**12. A *ceramic* is a solid made up of either metal or non-metal compounds that have been shaped and then hardened by heating to high temperatures.** **13. Composite = a substance made from two or more materials with significantly different physical or chemical properties that, when combined, produce a substance with characteristics different from the individual components.** **14. test for carbon dioxide = bubble gas through lime water. Carbon dioxide tuns lime water milky white/cloudy.** • Polymers are usually chemically unreactive. This is a useful property because it means that plastic bottles will not react with their contents. Unfortunately, it makes polymers difficult to dispose of. They do not rot away very quickly and they can cause litter problems. • Name examples of natural polymers and their uses. • Name examples of synthetic polymers and their uses. • Describe the uses of Composites based on their properties. • Describe the uses of Ceramic materials based on their properties.	

Topic: YEAR 8 MAGNETISM	Duration: 4 lessons	Composite: Unit test

Core Key vocabulary:	Core knowledge Components Powerful knowledge components crucial to commit to long term memory (in red box)	Links to previous and future topics
Magnet Field Line Pole North South Repel Attract Electromagnet Core Magnetise Relay Motor		KS2: Exploring the strength of different magnets. KS4: Magnetism and the Motor Effect; Electromagnetic Induction

Y8 MAGNETISM KNOWLEDGE ORGANISER

POWERFUL KNOWLEDGE

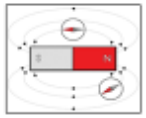
- **Magnets have a North pole and South pole.**
- **Like poles repel; opposite poles attract.**
- **Iron, nickel, cobalt and steel are magnetic materials.**
- **Magnetic materials feel a force in the region around a magnet called a magnetic field.**
- **Magnetic field lines show the pattern and direction of the magnetic field.**
- **A current flowing in a coil of wire wrapped around a magnetic material is an electromagnet.**
- **Electromagnets behave like bar magnets but can be turned on and off.**
- **Electromagnets are used in cars, trains and hospitals.**

Magnetic Fields

- Magnets create magnetic fields.
- These magnetic fields cannot be seen.
- They fill the space around a magnet where the magnetic forces work, and where they can attract or repel magnetic materials.
- We can detect them using **iron filings**. The tiny pieces of iron line up in a magnetic field.
- This diagram is a bar magnet.

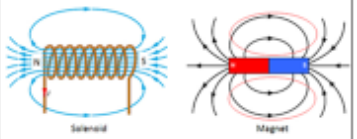
Plotting Magnetic Field Lines for a Bar Magnet

- Magnetic fields can be mapped out using small plotting compasses:
- Place the plotting compass near the magnet on a piece of paper.
- Mark the direction the compass needle points.
- Move the plotting compass to many different positions in the magnetic field, marking the needle direction each time.
- Join the points to show the field lines.

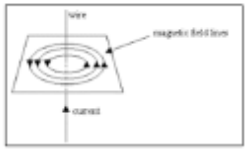


- Bring two bar magnets together, 2 things can happen: attraction or repulsion.
- Bring a north pole and a south pole together, they attract, and the magnets stick together.
- Bring two north poles together, or two south poles together, they repel, and the magnets push each other away

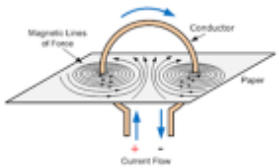
The magnetic field lines around a **coil of wire** (also called a **solenoid**):-



The magnetic field lines around a **straight current-carrying wire:-**



The magnetic field lines around a **single loop of wire**:-



Earth:-

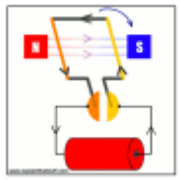
- Earth behaves like it has a magnet inside.
- This is due to a magnetic field being generated by a mixture of molten iron and nickel in the Earth's outer core.

6 uses of electromagnets:-

- Maglev trains
- Relays in X-ray machines
- Starting a car
- Lifting cars
- Sorting metal
- Motors

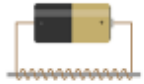
Motors:-

- A motor works by the use of two magnets and a coil wire.
- When you connect the coil to a battery a current flows in the coil.
- The coil becomes an electromagnet.
- The forces between the coil and the permanent magnet make the coil spin.



To make a simple electromagnet:-

- Wrap a coil of wire around a piece of iron (such as an iron nail).
- advantages: the magnet can be switched on and off.



- Electromagnets usually have a magnetic material in the centre of the coil, called a core.
- This makes the electromagnet much stronger.
- Most cores are made of iron.
- Iron is easy to magnetise but loses its magnetism easily.

3 ways to make an electromagnet stronger:

- Increase the number of loops or turns around the coil
- Increase the current flowing through the wire
- Change the type of material used for a core. Using a magnetic material in the core will make a stronger electromagnet.

Key words:-

Magnet	Field
Line	Pole
North	South
Repel	Attract
Core	Magnetise
Electromagnet	Motor