Curriculum and Assessment Overview: Mixtures and Separation

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 7**

Unit Topic: 7E Mixtures and Separation

Composite Question: How do we classify and separate mixtures?

Why this and why now? Our understanding of conservation of mass is a key component of chemical reactions and changes of state. This topic will support of understanding the concepts of a pure substance, including mixtures and dissolving. The topic will include simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography. These concepts of separating mixtures will support all future Chemistry topics in KS3 and KS4.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What kind of mixtures are there?	The definitions of: mixture, solution, suspension, colloid, solvent, solute.	End of topic test.
2. How can soluble substances form solutions?	How solubility is affected by temperature.	End of topic test.
3. What is evaporation?	How mixtures can be separated by evaporation. How evaporation works.	End of topic test. Extended question.
4. What is chromatography?	How mixtures can be separated by chromatography. How to use chromatograms to identify specific samples.	End of topic test.
5. How can we use distillation to make sea water drinkable?	How mixtures can be separated by filtration and distillation. How separation techniques are used in specific scenarios. How distillation works. Explain how to maximize some separation techniques.	End of topic test.

Curriculum and Assessment Overview: Mixtures and Separation

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
Mixture	A material made up of two or more different chemical substances which are not chemically bonded.	**Dissolving**	The process where a solute in gaseous, liquid, or solid phase dissolves in a solvent to form a solution
Evaporate	When a liquid turns into a gas.	**Suspension**	A heterogeneous mixture of a fluid that contains solid particles sufficiently large for sedimentation.
Colloid	A mixture in which one substance consisting of microscopically dispersed insoluble particles is suspended throughout another substance.	**Solution**	A mixture of two or more substances in relative amounts that can be varied continuously up to what is called the limit of solubility. The term solution is commonly applied to the liquid state of matter, but solutions of gases and solids are possible
Solute	The substance that dissolves in a solvent to produce a homogeneous mixture.	**Solvent**	A substance that dissolves a solute, resulting in a solution. A solvent is usually a liquid but can also be a solid, a gas, or a supercritical fluid.
Boiling	The process by which a liquid turns into a vapor when it is heated to its boiling point.	**Separation**	A method that converts a mixture or solution of chemical substances into two or more distinct product mixtures.
Soluble	The degree to which a substance dissolves in a solvent to make a solution.	**Insoluble**	A substance (solid) that will not dissolve in a solvent even after mixing.
Filters	The process in which solid particles in a liquid or gaseous fluid are removed by the use of a filter medium	**Condenser**	Laboratory apparatus used to condense vapors – that is, turn them into liquids – by cooling them down
Pure	A pure substance is a chemical that contains only one type of particle, with only one chemical composition	**Chromatography**	A process for separating components of a mixture

Curriculum and Assessment Overview: Particles

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 7**

Unit Topic: 7G Particles

Composite Question: How do particles behave?

Why this and why now? This topic links to aspects of science met in primary school where you will have been introduced to particles and the idea of solids, liquids and gasses and changes of state. Particle theory helps to explain properties and behavior of materials by providing a model which enables us to visualize what is happening on a very small scale inside those materials. The concept of particles is an important topic to start with as it introduces key concepts and vocabulary that will be revisited in many future units of work.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do we describe the three states of matter?	How to describe the different states of matter, including their properties.	Prior learning checked at start of unit. End of topic test.
2. What is the particle model and how do we use it do describe states of matter?	What the key principles of the particle model are. How to describe the different states of matter, including their properties, using the particle model. How to describe changes of state using the particle model. How to explain the properties of different states of matter using the particle model.	End of topic test. There is an extended answer question based upon particles (with WCF).
3. How do we use the particle model to explain Brownian motion?	The definition of Brownian motion, diffusion and air pressure in terms of the particle model. How to explain Brownian motion using the particle model.	End of topic test.
4. How does the particle model explain diffusion?	Define diffusion. Use the particle model to explain diffusion.	There is a practical activity based on diffusion, graph drawing skills will be assessed. End of topic test.
5. How does the particle model explain air pressure?	Explain how differences in atmospheric and internal pressure can give rise to familiar phenomena. How to explain diffusion and air pressure using the particle model, including how both can be changed.	End of topic test.

Curriculum and Assessment Overview: Particles

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
gas	Something that does not have a fixed shape or volume, and is easy to squash.	particle theory	Theory used to explain the different properties and observations of solids, liquids and gases.
liquid	Something with a fixed volume but no fixed shape.	particles	The tiny pieces that everything is made out of.
property	A description of how a material behaves and what it is like. Hardness is a property of some solids.	random	Having no regular pattern.
solid	Something with a fixed shape and volume.	data	Observations collected in experiments.
Brownian motion	Erratic movement of small specks of matter caused by being hit by the moving particles that make up liquids or gases.	evidence	Information that is used to support a hypothesis or theory.
diffusion	When particles spread and mix with each other without anything moving them.	hypothesis	An idea which explains how or why something happens.
vacuum	A completely empty space, containing no particles	prediction	What you think will happen in an experiment.
theory	A hypothesis or set of hypothesis that explains how and why something happens. The predictions made using a theory should have been tested on several occasions and always found to work.	scientific method	A way scientists use observations, hypotheses, predictions and experiments to produce theories to explain the things they see around them.

Curriculum and Assessment Overview: Energy

Department Name: **Science** **Year: 7**

Unit Topic: 7I Energy

Composite Question: What is energy and how does energy get transferred?

Why this and why now? This topic links to aspects of science met in primary school where you will have been introduced to energy in fuels and foods. Energy is an important topic and will be taught in greater detail as you progress through the school. It is very important because energy is limited and we should know how to use efficiently and therefore be more environmentally friendly.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How much energy is in food?	● Recall that our body requires energy which is found in food. ● Recall that the unit of energy is the Joule. ● Explain why different people need different amounts of energy from food.	There will be a working scientifically task based on energy in food. End of topic test.
2. What does energy do?	● Describe that energy can only be transferred or stored. ● State some of the ways that energy can be transferred or stored. ● State that energy is conserved.	End of topic test.
3. What do we use as fuels?	● Describe what fossil fuels are and how they were made. ● Describe the advantages and disadvantages of different energy resources	End of topic test. Long Question with WCF.
4. What energy resources do we use?	● Recall the types of renewable energy resources ● Explain how the Sun is the original source of most energy resources and state the exceptions to this.	End of topic test.
5. Which energy resources should we use?	● Describe the advantages and disadvantages of different energy resources ● Explain what is meant by efficiency. ● Suggest ideas for reducing the disadvantages of devices based on their use of fuel and efficiency.	End of topic test.

Curriculum and Assessment Overview: Energy

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
Chemical energy	A name used to describe energy when it is stored in chemicals. Food, fuel and batteries all store chemical energy.	Fuel	A substance that contains a store of chemical or nuclear energy that can easily be transferred.
Nuclear energy	A name used to describe energy when it is stored inside materials	Natural gas	Fossil fuel formed from the remains of microscopic dead plants and animals that lived in the sea.
Transfer	When energy is moved from one store into another or from one place to another we say it is transferred.	Non-renewable	Any energy resource that will run out because we cannot renew our supplies of it (e.g. oil).
Biofuel	A fuel made from plants or animal droppings.	Renewable	An energy resource that will never run out (e.g. solar power).
Coal	A fossil fuel made from the remains of plants.	Oil	Fossil fuel formed from the remains of microscopic dead plants and animals that lived in the sea.
Electricity	A way of transferring energy through wires.	Law of conservation of energy	The idea that energy can never be created or destroyed, only transferred from one store to another.
Fossil	The remains of a dead animal or plant that became trapped in layers of sediment and turned into rock.	Thermal energy	A name used to describe energy when it is stored in hot objects. The hotter something is the more thermal energy it has.
Fossil Fuel	Coal, oil and natural gas – all fuels that were formed from the remains of dead plants and animals.	scientific method	A way scientists use observations, hypotheses, predictions and experiments to produce theories to explain the things they see around them.

Curriculum and Assessment Overview: Forces

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 7**

Unit Topic: Forces

Composite Question: What do forces do and how do we describe and measure them?

Why this and why now? This topic builds on topics you will have studied in primary school. In this unit you will learn how to describe forces using scientific vocabulary and diagrams. You will use your knowledge of pull, push and twist forces to describe how forces can cause an object to change shape.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What are forces?	Forces are pushes or pulls, which arise from the interaction between 2 objects. That forces are measured in newtons.	Included in end of topic test (MMA).
2. How do we represent forces?	How to use force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces. That change depends on direction of force and its size That forces are needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)	Extended answer question (lower ability) – WCF. Also included in end of topic test (MMA).
3. What is friction?	How can we show forces acting on an object as they move? What happens when forces are balanced and unbalanced? How can we reduce resistance from water or air resistance?	Friction practical and working scientifically write up (WCF).
4. How do forces lead to deformation?	About forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water The force-extension linear relation; Hooke's Law as a special case About opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface	End of topic test (MMA).
5. What is pressure?	That pressure measured by ratio of force over area – acting normal to any surface That pressure in liquids, increasing with depth; up thrust effects, floating and sinking That atmospheric pressure, decreases with increase of height as weight of air above decreases with height	Extended answer question (higher ability) – WCF. Also included in end of topic test (MMA).

Curriculum and Assessment Overview: Forces

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
air resistance	A force on objects moving through air.	mass	The amount of matter that something is made from. Mass is measured in grams (g) and kilograms (kg). Your mass does not change if you go into space or to another planet.
contact forces	A force where there needs to be contact between objects before the force can have an effect (e.g. friction).	newton (N)	The unit of force.
friction	A force between two objects that are touching. It usually acts to slow things down or prevent movement.	non-contact force	A force that can affect something from a distance (e.g. gravity).
gram (g)	A unit for measuring mass.	static electricity	A force that can attract or repel things. It is caused when certain materials rub together.
gravity	The force of attraction between any two objects. The Earth is very big and so has strong gravity that pulls everything down towards it.	up thrust	A force that pushes things up in liquids and gases.
kilogram (kg)	A unit for measuring mass. There are 1000 g in 1 kg.	water resistance	A force on objects moving through water.
magnetism	A force that attracts objects made of iron or other magnetic materials. Two magnets can also repel each other.	weight	The amount of force with which gravity pulls things. It is measured in newtons (N). Your weight would change if you went into space or to another planet.

Curriculum and Assessment Overview: The Periodic Table

Department Name: **Science** **Year: 8**

Unit Topic: 8F The Periodic Table

Composite Question: How did the periodic table arise and how is it arranged today?

Why this and why now? The chemical elements are the heart of chemistry and the building blocks of the universe. When we make and discover new synthetic elements we are carrying out chemistry of the type only seen naturally in the stars. The periodic table underpins all future Chemistry topics in KS3 and KS4.

What am I Learning?	What do I need to know?	How will I be assessed?
1. "Who was John Dalton?"	Describe Dalton's atomic theory. Describe elements using physical properties. Write and identify the chemical symbols for elements	In the Extended question and end of topic test
2. "How can we compare elements and their reactions?"	Explain the difference between physical and chemical changes and properties. Use atomic theory to explain what happens during chemical reactions. Write and interpret chemical formulae	In the Extended question and end of topic test
3. "How can a chemistry textbook make you famous?"?	Use the periodic table to find elements with similar properties. Describe some typical properties of alkali metals, halogens and noble gases. Describe how the periodic table is arranged.	In the Extended question and end of topic test
4. "How do chemicals compare when states change?"	Explain melting, freezing and boiling points and use them to predict the state of a substance. Describe and identify trends in physical properties within the periodic table	End of topic test
5. "How does the group link to the properties of an element?"	Describe the reactions of some elements with water and oxygen. Identify trends and make predictions about chemical properties using the periodic table	In the Extended question and end of topic test

Curriculum and Assessment Overview: The Periodic Table

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
Atoms	Atoms are small particles from which all substances are made.	element	A simple substance, made up of only one type of atom.
chemical reaction	A change in which one or more new substances are formed.	matter	All things are made of matter. There are three states of matter: solid, liquid, gas.
compound	A substance that can be split up into simpler substances, since it contains the atoms of two or more elements joined together.	physical change	A change in which no new substances are formed (e.g. changes of state).
chemical change	A change that forms one or more new substances.	physical property	A description of how a material behaves and responds to forces and energy. Hardness is a physical property.
chemical formula	A combination of symbols and numbers that shows how many atoms of different elements are in a particular molecule. In compounds that do not form molecules, it shows the ratio of the different elements in the compound.	chemical property	How a substance reacts with other substances.
chemical reaction	A change in which one or more new substances are formed.	alkali metal	A group of very reactive metals. Found in group 1 of the periodic table.
group (chemistry)	A vertical column of elements in the periodic table.	halogen	An element in group 7 of the periodic table, such as fluorine and chlorine.
noble gas	Group of very unreactive non-metal gases. Found in group 0 of the periodic table.	periodic table	An ordered list of all known elements.
boiling point	The temperature at which a liquid boils.	malleable	Able to be beaten and bent into shape.
transition metal	One of a central group of elements in the periodic table.	period (chemistry)	A horizontal row in the periodic table.

Curriculum and Assessment Overview: Energy Transfers

Department Name: **Science** **Year: 8**

Unit Topic: 8K Energy Transfers

Composite Question: How is energy transferred?

Why this and why now? Our understanding of energy flow helps to predict chemical reactions, determine the trajectory of objects, and many other processes. The concepts of energy transfers and stores underpin all future physics topics in KS3 and KS4.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What's the difference between energy and temperature?	• The unit for temperature and how to measure it. • The unit for energy.	End of topic test.
2. How is energy transferred by heating?	• The 3 types of heat transfer. • Knowledge of heat transfers to explain how heat is transferred in different situations.	End of topic test.
3. How can we control energy transfers?	• What insulation does. • Use knowledge of heat transfers to explain how insulating materials work.	There is an extended response question on how vacuum flasks reduce energy transfers which will be assessed by your teacher with whole class feedback. There is also a working scientifically task for measuring the effect of different types of insulation – you will receive whole class feedback for this. End of topic test.
4. How much energy do different appliances use?	• What is power? • What is efficiency? • How do we calculate efficiency?	End of topic test.
5. How do we pay for electricity?	• Apply knowledge of heat transfers and insulation to describe ways of reducing energy bills in your home. • Draw and interpret Sankey diagrams.	End of topic test.

Curriculum and Assessment Overview: Energy Transfers

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
degrees Celsius (°C)	A unit for measuring temperature.	**radiation**	A way of transferring energy by heating. Also known as infrared radiation. Infrared radiation can travel through transparent things and a vacuum (empty space).
evaporate	When a liquid turns into a gas.	**thermal conductor**	A material that allows internal (thermal) energy to be transferred through it easily.
internal energy	The energy stored in the movement of particles. Sometimes called thermal energy.	**thermal insulator**	A material that does not allow internal (thermal) energy to be transferred through it easily.
joule (J)	A unit for measuring energy.	**efficiency**	A way of saying how much energy something wastes.
temperature	How hot something is, usually measured in degrees Celsius.	**kilowatt (kW)**	A unit for measuring power. There are 1000 watts (W) in 1 kilowatt (kW).
thermal energy	Another term for internal energy.	**power**	The amount of energy (in joules, J) transferred every second. It is measured in watts (W).
conduction	The way energy is transferred through solids by heating.	**power rating**	The number of joules of energy an appliance uses every second.
convection	The way energy is transferred by heating in fluids.	**Sankey diagram**	A diagram showing energy transfers, where the width of each arrow is proportional to the amount of energy it represents.
convection current	A flow of liquid or gas caused by part of it being heated or cooled more than the rest.	**watt (W)**	A unit for measuring power. 1 watt (W) is 1 joule (J) per second.

Curriculum and Assessment Overview: Combustion

Department Name: **Science** **Year: 8**

Unit Topic: 8E Combustion

Composite Question: What is combustion and what are its impacts on the environment?

Why this and why now? Combustion is the scientific term for burning which is a chemical reaction. It builds on your knowledge of other chemical reactions and builds on practical skills. There are many links within this topic to aspects of the Geography course where you will also look at the impact of combustion on the environment.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is burning?	How to describe the reactions of hydrogen and hydrocarbons with oxygen. Use word equations to model combustion reactions.	Prior learning checked at start of unit. There is an extended answer question based upon burning methane (with WCF). End of topic test.
2. What is oxidation?	How to describe oxidation reactions of metals and non-metals. Explain changes in mass seen in oxidation reactions. Compare how phlogiston and oxygen explain combustion.	End of topic test.
3. How do we prevent fires?	How to use the fire triangle to explain how to control a fire. Identify hazard symbols for substances likely to cause fires.	End of topic test.
4. What is the impact air pollution?	How to describe pollutants that are formed by burning fuels. Explain how these pollutions cause problems and how their effects can be reduced.	End of topic test.
5. What is global warming?	How to describe the greenhouse effect and how it is caused. Explain how human activity may be causing global warming.	There is an assessed question analyzing a graph which will be marked by your teacher. End of topic test.

Curriculum and Assessment Overview: Combustion

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
metal	Any element that is shiny when polished, conducts heat and electricity well, is malleable and flexible and often has a high melting point.	complete combustion	When a substance reacts fully with oxygen, such as: carbon + oxygen → carbon dioxide
metal oxide	A metal that has combined with oxygen in a chemical reaction, e.g. magnesium oxide. The general word equation for the reaction is: metal + oxygen → metal oxide	incomplete combustion	When a substance reacts only partially with oxygen, such as when carbon burns in air producing carbon dioxide, carbon monoxide and soot (unburnt carbon).
non-metal	Any element that is not shiny and does not conduct heat and electricity well.	nitrogen oxide	Acidic gas formed when nitrogen reacts with oxygen at high temperatures, such as in a car engine. There are different types of nitrogen oxide.
oxidation	Reacting with oxygen. For example, when a fuel combusts or when a metal reacts with oxygen to form a metal oxide.	pollutant	A substance that can harm the environment or the organisms that live there.
oxide	A compound of a metal or non-metal with oxygen, such as magnesium oxide or carbon dioxide.	soot	A form of carbon, which is produced as very fine particles when hydrocarbon fuels undergo incomplete combustion.
fire triangle	A way of showing in a diagram that heat, fuel and oxygen are needed for fire.	sulfur dioxide	An acidic gas released from burning fossil fuels, which contributes to acid rain.
hazard symbol	A warning symbol that shows why something is dangerous.	global warming	Increased warming of the Earth's surface as a result of increased amounts of carbon dioxide and other greenhouse gases in the air.
acid rain	Rainwater that is more acidic than usual due to air pollution, usually caused by sulfur dioxide and nitrogen oxides dissolved in it.	greenhouse effect	The warming effect on the Earth's surface caused by greenhouse gases absorbing energy emitted from the warm Earth's surface and re-emitting it back to the surface.

Curriculum and Assessment Overview: Food and Nutrition

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 8**

Unit Topic: 8A Food and Nutrition

Composite Question: How does our knowledge of food and nutrition contribute to health?

Why this and why now? In this topic, you build upon your knowledge of the seven food groups, why we need them and how to test for them. You will study the process of digestion and how the digestive system is adapted to its function. It builds on work from Year 7 when we looked at systems in the body, including the digestive system.

What am I Learning?	What do I need to know?	How will I be assessed?
1. Which nutrients do we need in our diets?	What nutrients do we need? How can we test for these in food? What do nutritional labels mean?	Prior learning checked at start of unit. There will be an activity on how to draw tables which will be assessed by your teacher. End of topic test.
2. Why do we need a range of nutrients in our diets?	Where do we get our nutrients? What do they do? How much do we need of them?	End of topic test
3. What is a balanced diet?	What is a balanced diet? What happens if our diet isn't balanced?	End of topic test
4. How do we digest our food?	What're the organs in the digestive system? What do each of these units do? What are enzymes and what do they do?	There is an extended answer question based upon digestion (with WCF). End of topic test
5. How are nutrients absorbed?	What is diffusion? What is surface area? How is the small intestine adapted and how does this help absorption?	End of topic test

Curriculum and Assessment Overview: Food and Nutrition

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
carbohydrate	A nutrient that is used as the main source of energy	nutrient	A substance needed in the diet to provide raw materials for making new substances and for energy release.
diet	The food that you eat.	nutrition	The substances that help organisms respire and grow. All organisms need nutrition.
fat	A nutrient that is stored to be used for energy in the future. It also acts as a thermal insulator.	oil (biology)	A liquid fat.
fibre	A substance found in food that is not used up by the body. It helps to keep our intestines clean.	protein	A nutrient used for growth and repair.
lipid	Fats (and oils) are part of a large group of similar substances called lipids.	raw material	A substance used to make other substances.
mineral (biology)	An element that is a nutrient needed in small quantities for health (e.g. calcium). Minerals are found in foods and soils as compounds called mineral salts.	starch	A type of insoluble carbohydrate found in plants.
Kilojoule (kJ)	A unit for measuring energy. There are 1000 joules (J) in 1 kilojoule (kJ).	sugar	A type of soluble carbohydrate. Glucose is an example of a sugar.
respiration	A process in which energy is released from substances so it can be used by an organism. All organisms respire.	vitamin	A nutrient needed in small quantities for health (e.g. vitamin C).

Curriculum and Assessment Overview: Reactivity

Department Name: **Science** **Year: 9**

Unit Topic: 9F Reactivity

Composite Question: What is the reactivity series?

Why this and why now? All matter is made up of elements many of which react with each other. You know how spot a chemical reaction. It is now important that you understand how elements compare in terms of reactivity and how this can be applied to the real world, for example extracting metals from ores in the ground. This topic will lead you on to more complex ideas at KS4, where you will learn about the structure of atoms, how atoms bond together during chemical reactions and why all elements are arranged as they are in the periodic table, to name a few.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is the difference between a physical change and a chemical reaction?	The difference between a chemical and physical change and the signs of a chemical reaction.	Prior learning checked at start of unit. End of topic test with individual feedback.
2. How do metals compare in terms of reactivity?	The general word equations for metals reacting with oxygen, water and acids	End of topic test with individual feedback. Extended answer question based on reactions between metals and water and metals and acid. You will also be assessed on writing a conclusion for an experiment.
3. How is energy linked to chemical reactions?	The difference between endo and exothermic reactions Use the particle model of gas pressure to explain how an explosion occurs. How increased energy transfer will be reflected in the reaction.	End of topic test.
4. What is a displacement reaction?	What a displacement reaction is and how to show this in a word equation. How displacement reactions with solutions can be used to develop a reactivity table.	End of topic test with individual feedback.
5. How is the reactivity series used to extract metals from ore in the ground?	How displacement is used to extract iron. How sacrificial protection is used to prevent the rusting of iron.	End of topic test with individual feedback.

Curriculum and Assessment Overview: Reactivity

Key Term	Definition	Key Term	Definition
chemical reaction	A change in which one or more new substances are formed.	electrolysis	Breaking down a substance using electricity.
physical change	A change in which no new substances are formed (e.g. changes of state).	mineral	A naturally occurring element or compound that can form distinct grains in rocks.
word equation	An equation in which the names of the reactant(s) are written on the left-hand side, there is an arrow pointing from left to right and the names of the products are written on the right-hand side.	ore	A rock that contains enough of a certain mineral to make it worth mining.
native state	When a metal is found in the Earth as an element.	reduction	Reaction in which a substance loses oxygen
oxidation	Reaction in which a substance gains oxygen.	endothermic reaction	A reaction in which energy is transferred to the reactants from the surroundings. The temperature of the surroundings decreases.
reactivity series	A list of metals that shows them in order of reactivity with the most reactive metal at the top.	exothermic reaction	A reaction in which energy is transferred from the reactants to the surroundings. The temperature of the surroundings increases.
rust	A weak, brown, crumbly solid, formed when iron corrodes. (A mixture of oxides and hydroxides of iron including iron hydroxide.)	displacement reaction	A reaction where a more reactive element takes the place of a less reactive element in a compound.
sacrificial protection	Using a more reactive metal to protect iron from rusting.		

Curriculum and Assessment Overview: Making Materials

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 9**

Unit Topic: 9E Making Materials

Composite Question: Why is materials science so important?

Why this and why now? Materials science teaches us what things are made of and why they behave as they do. Materials engineering shows us how to apply knowledge to make better things and to make things better. Materials science and engineering drives innovation in both research and industry in everything from aerospace to medicine. This topic has many close links to content you will meet in Design and Technology, and builds on prior scientific learning about properties of materials.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What are ceramics?	Definitions, properties, examples and uses of ceramics. How ceramics are manufactured. How the production and structure of ceramics is linked to their properties. How the properties of certain ceramics are related to their use.	Prior learning checked at start of unit. End of topic test.
2. What are polymers?	Definitions, properties, examples and uses of polymers. How polymers are manufactured. How the production and structure of polymers is linked to their properties. How the properties of certain polymers are related to their use.	End of topic test.
3. What are composite materials?	Definitions, properties, examples and uses of composites. How composites are manufactured. How the production and structure of composites is linked to their properties. How the properties of certain composites are related to their use.	End of topic test.
4. What are endothermic and exothermic reactions?	Definitions and examples of endothermic and exothermic reactions.	Working scientifically task based on writing a risk assessment for an experiment, this will be marked by your teacher and whole class feedback will be provided. End of topic test.
5. What are the problems with materials?	Examples of gases released in industry. How the production and disposal of some materials can impact the environment (such as gas release and non-biodegradability) Why recycling of some materials is possible and desirable. How recycling can limit the impact of material manufacture and usage on the environment	Longer answer question which will be marked by your teacher and whole class feedback given. End of topic test.

Curriculum and Assessment Overview: Making Materials

Key Term	Definition	Key Term	Definition
bond	A force that holds some atoms tightly together.	elastic	Any substance that will return to its original shape and size after it has been stretched or squashed.
brittle	Hard but easily broken or cracked	endothermic	A change or reaction that absorbs energy from the surroundings making the temperature of the surroundings fall.
ceramic	A range of hard, durable, non-metallic materials, which are generally unaffected by heat. E.g. china and glass.	exothermic	A change or reaction that transfers energy into the surroundings making the temperature of the surroundings rise.
clay	Very fine particles of rock.	monomer	A small molecule that can join with other molecules like itself to form a polymer.
crystals	Pieces of a mineral with sharp edges. A solid with a regular shape and flat surfaces which reflect light	natural polymer	A substance found in nature that is made up of very long molecules containing repeating groups of atoms.
heat resistant	A substance that is not easily damaged by heat.	plastic	A description of a substance that can be moulded into different shapes.
insulator	A material that does not allow something to pass through it (e.g. heat, electricity).	polymer	A substance made up very long molecules containing repeating groups of atoms. (Formed by joining monomer molecules together.)
lattice structure	An arrangement of many atoms or other particles, which are bonded together in a fixed regular (grid-like) pattern.	composite material	A material made by combining two or more other materials. The separate materials do not react together.
sand	Fine particles of rocks, mainly made of quartz (silicon dioxide).	cement	A substance that binds materials together. In building it refers to a mixture of clay and lime (calcium oxide).
unreactive	A substance that reacts with few other substances, or reacts very slowly or not at all.	concrete	Artificial stone made from a mixture sand, cement, water, and larger pieces of material such as gravel or small stones (aggregate).
landfill site	Large area in which rubbish is left.	recycling	Using a material again, often by melting it and using it to make new objects.

Curriculum and Assessment Overview: Genetics and Evolution

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 9**

Unit Topic: 9A Genetics and evolution

Composite Question: Why do organisms show variation?

Why this and why now? Genetics holds a central position in modern biology, so its understanding is essential when studying biology. The study of genetics has had a great impact on many everyday aspects of our life. The food we eat and the clothes we wear come from organisms improved by applications of genetic principles. This topic builds on your prior knowledge of cells and prepares you for more complex ideas met at GCSE level.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is environmental variation?	The definition of environmental variation. How variation leads to adaptation. How variation within a species can be both environmental and inherited (EQ).	Prior learning checked at start of unit. End of topic test with individual feedback.
2. What is inherited variation?	The definition of inherited variation. How variation leads to adaptation. *How variation can be displayed using graphs and normal distributions (WS)* How variation within a species can be both environmental and inherited (EQ).	End of topic test with individual feedback. There is an extended answer question based upon inherited and environmental variation (with WCF).
3. Why is DNA important?	The structure of DNA and chromosomes. The definitions of gamete, zygote and chromosomes.	End of topic test with individual feedback.
4. How can genes lead to extinction?	How variation leads to adaptation.	End of topic test with individual feedback.
5. Why does natural selection occur?	How variation leads to adaptation. How variation and competition leads to natural selection. How natural selection leads to extinction and evolution.	End of topic test with individual feedback.

Curriculum and Assessment Overview: Genetics and Evolution

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
genus	A group of similar organisms. The genus name is the first word in the scientific name for a species (the second word is the 'species name'). Different closely-related species belong to the same genus.	discontinuous	Data values that can only have one of a set number of options are discontinuous. Examples include shoe sizes and blood groups.
species	A group of organisms that can reproduce with each other to produce offspring that will also be able to reproduce.	environmental variation	Differences between organisms caused by environmental factors.
variation	The differences between things.	inherited variation	Differences between organisms that are passed on to offspring by their parents in reproduction.
characteristic	A feature of an organism.	chromosome	A structure found in the nuclei of cells. Each chromosome contains one enormously long DNA molecule.
classification	Sorting things into groups.	DNA	A substance that contains genetic information. Short for deoxyribonucleic acid.
continuous variation	When the value of a variable is continuous, it shows 'continuous variation'.	gene	Section of the long strand of DNA found in a chromosome, which contains instructions for a characteristic.
continuous	Continuous data can take any value between two limits. Examples include length, mass, time.	evolution	A change in one or more characteristics of a population over a long period of time.
discontinuous variation	When the value of a variable is discontinuous, it shows 'discontinuous variation'.	natural selection	A process in which an organism is more likely to survive and reproduce than other members of the species because it possesses a certain inherited variation.

Curriculum and Assessment Overview: Forces and Motion

Department Name: **Science** **Year: 9**

Unit Topic: 9I Forces and Motion

Composite Question: Why are forces so important?

Why this and why now? Forces make things change. Understanding forces helps us to predict and control physical change. This links to many topics studied so far at KS3 and to more complex ideas that you will study during KS4. It also directly relates to a large range of jobs you may consider in the future.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What do we mean by forces and motion?	The names of different types of force. The effects of balanced and unbalanced forces. Why moving objects have a top speed.	Prior learning checked at start of unit. End of topic test with individual feedback.
2. How is movement linked to energy?	How energy can be stored and transferred. The law of conservation of energy. Meaning of efficiency.	End of topic test with individual feedback.
3. How do we calculate and visualise speed?	The meaning of speed and how to calculate speed. Draw and interpret distance-time graphs.	End of topic test. There is an extended answer question based upon interpreting a journey using a distance time graph (with WCF).
4. How do levers work?	How simple a simple lever can multiply forces or distances. How to identify the load, effort and pivot on a diagram of a lever. How to describe the forces that affect the size of a moment.	End of topic test with individual feedback.
5. How do gears work?	How simple machines can magnify forces. The factors that affect the total work done.	End of topic test with individual feedback.

Curriculum and Assessment Overview: Forces and Motion

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
accelerate	To change speed.	chemical energy	A name used to describe energy when it is stored in chemicals. Food, fuel and batteries all store chemical energy.
air resistance	A force that slows things down that are moving through air. It is caused by friction and by the object pushing the air out of the way.	efficiency	A way of saying how much energy something wastes.
balanced forces	When two forces on an object are the same strength, but in opposite directions.	elastic potential energy	A name used to describe energy when it is stored in stretched or squashed things that can change back to their original shapes. Another name for strain energy.
drag	Another name for air resistance or water resistance.	gravitational potential energy	A name used to describe energy when it is stored in objects in high places that can fall down.
fluid	A gas or a liquid.	kinetic energy	A name used to describe energy when it is stored in moving things.
friction	A force between two objects that are touching. It usually acts to slow things down or prevent movement.	non-renewable resource	Any energy resource that will run out because we cannot renew our supplies of it (e.g. oil).
resultant force	The difference between forces in two opposite directions.	nuclear energy	A name used to describe energy when it is stored inside materials
unbalanced forces	When two forces acting in opposite directions on an object are not the same strength. Unbalanced forces change the motion of objects.	renewable resource	An energy resource that will never run out (e.g. solar power).
upthrust	A force that pushes things up in liquids and gases.	strain energy	A name used to describe energy when it is stored in stretched or squashed things that can change back to their original shapes. Another name for elastic potential energy.
water resistance	A force that slows things down that are moving through water. It is caused by friction and by the object pushing the water out of the way.	thermal energy	A name used to describe energy when it is stored in hot objects. The hotter something is the more thermal energy it has.
weight	The amount of force with which gravity pulls something towards the Earth. It is measured in newtons (N).	moment	The turning effect of a force. It is calculated by multiplying the force by the perpendicular distance of the force from the pivot.

Curriculum and Assessment Overview: Forces and Motion

Dame Elizabeth Cadbury School

Curriculum and Assessment Overview: States of Matter and Separation Techniques

Department Name: **Science** **Year: 10**

Unit Topic: C1 & C2 States of Matter and Separation Techniques

Composite Question: How do we define and refine substances?

Why this and why now? This topic builds on content first started at the beginning of year 7 and developed throughout KS3. This unit will strengthen these concepts and enable more complex topics (such as the fractional distillation of oil and production of a sample of a pure salt) in later units to be understood.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do we describe and explain the properties of solids, liquids and gases?	Describe the arrangement, movement and the relative energy of particles in each of the three states of matter: solid, liquid and gas Recall the names used for the interconversions between the three states of matter, recognising that these are physical changes: contrasted with chemical reactions that result in chemical changes Explain the changes in arrangement, movement and energy of particles during these interconversions Predict the physical state of a substance under specified conditions, given suitable data	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. What are mixtures and how do we separate them?	Interpret melting point data to distinguish between pure substances which have a sharp melting point and mixtures which melt over a range of temperatures Explain the types of mixtures that can be separated by using the following experimental techniques: a simple distillation b fractional distillation c filtration d crystallisation e paper chromatography Describe an appropriate experimental technique to separate a mixture, knowing the properties of the components of the mixture Describe paper chromatography as the separation of mixtures of soluble substances by running a solvent (mobile phase) through the mixture on the paper (the paper contains the stationary phase), which causes the substances to move at different rates over the paper Interpret a paper chromatogram: a to distinguish between pure and impure substances b to identify substances by comparison with known substances c to identify substances by calculation and use of Rf values	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will be a core practical (to include distillation and chromatography) in this unit which you will have to complete. Separation techniques will be assessed in an extended question with whole class feedback given.
3. How do we make clean drinking water?	You will need to know how the techniques you have learnt about earlier in the unit can be used to produce potable water in desalination plants.	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. Desalination will also be assessed using an extended question where whole class feedback will be given.

Curriculum and Assessment Overview: States of Matter and Separation Techniques

Key Term	Definition	Key Term	Definition
compound	A substance that can be split into simpler substances, because it contains the atoms of two or more elements joined together.	solvent	The liquid in which a solute dissolve to make a solution.
element	A substance made up of only atoms with the same number of protons in the nucleus.	chromatography	A technique for separating the components of a mixture – for example different food colouring agents.
mixture	Two or more substances jumbled together but not joined to each other. The substances in many mixtures can be separated from each other.	stationary phase	The surface through which the solvent and dissolved substances move in chromatography.
crystallisation	Separating the solute from a solution by evaporating the solvent.	mobile phase	In paper chromatography, the solvent that moves along the paper carrying the dissolved samples with it.
distillation	The process of separating a liquid from a mixture by evaporating the liquid and then condensing it (so that it can be collected).	Rf value	The ratio of the distance travelled by the solute on a chromatogram (measured from the centre of the spot) to the distance travelled by the solvent under the same conditions. The values for different substances can be used to identify them.
filtration	Using a filter to separate insoluble substances from a liquid.	filtrate	Solution passing through a filter.
insoluble	Describes a substance that cannot be dissolved in a certain liquid.	precipitate	Insoluble substance formed when two soluble substances react together.
solute	Substance that dissolves in a liquid to make a solution.	sedimentation	The process in which rock grains and insoluble substances sink to the bottom of a liquid.

Curriculum and Assessment Overview: Conservation of Energy

Department Name: **Science** **Year: 10**

Unit Topic: P3 – Conservation of Energy

Composite Question: Why should we conserve energy?

Why this and why now? This topic builds on the knowledge of energy that students have studied in KS3 in terms of storing, and transferring energy, and allows students to explore how energy changes in a system is related to doing work with forces (link to P2), how we can calculate efficiency and understanding the benefits/drawbacks to renewable and non-renewable energy.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How is energy stored and transferred?	3.3 Draw and interpret diagrams to represent energy transfers 3.4 Explain what is meant by conservation of energy 3.5 Analyse the changes involved in the way energy is stored when a system changes, including: a) an object projected upwards or up a slope b) a moving object hitting an obstacle c) an object being accelerated by a constant force d) a vehicle slowing down e) bringing water to a boil in an electric kettle 3.6 Explain that where there are energy transfers in a closed system there is no net change to the total energy in that system 3.8 Explain, using examples how in all system changes energy is dissipated so that it is stored in less useful ways.	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. Why do we use Sankey diagrams?	3.7 Explain that mechanical processes become wasteful when they cause a rise in temperature so dissipating energy in heating the surroundings 3.9 Explain ways of reducing unwanted energy transfer including through lubrication, thermal insulation 3.11 Recall and use the equation: efficiency=((useful energy transferred by the device))/((total energy supplied to the device)) 3.12 HT only: Explain how efficiency can be increased 3.9 Explain ways of reducing unwanted energy transfer including through lubrication, thermal insulation 3.10 Describe the effects of the thickness and thermal conductivity of the walls of a building on its rate of cooling qualitatively	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
3. How do we calculate changes in gravitational potential energy (GPE)?	3.1 Recall and use the equation to calculate the change in gravitational PE when an object is raised above the ground: change in gravitational potential energy (joule, J) = mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg) × change in vertical height (metre, m) $\Delta GPE=m\times g\times \Delta h$	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.

Curriculum and Assessment Overview: Conservation of Energy

4.	How do we calculate how much energy is associated with a moving object?	3.2 Recall and use the equation to calculate the amounts of energy associated with a moving object: kinetic energy (joule, J) = 0.5 × mass (kilogram, kg) × (speed)^2 ((metre/second)^2, (m/s)^2) $KE=(1/2)\times m\times v^2$	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.
5.	What are the benefits/drawbacks to renewable and non-renewable energy resources?	3.13 Describe the main energy sources available for use on Earth (including fossil fuels, nuclear fuel, bio-fuel, wind, hydro-electricity, the tides and the Sun), and compare the ways in which both renewable and non-renewable sources are used 3.14 Explain patterns and trends in the use of energy resources	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.

Curriculum and Assessment Overview: Conservation of Energy

Key Term	Definition	Key Term	Definition
chemical energy	A name used to describe energy when it is stored in chemical substances. Food, fuel and batteries all store chemical energy.	efficiency	A way of saying how much energy something wastes. A more efficient machine wastes less energy.
elastic potential energy	A name used to describe energy when it is stored in stretched or squashed things that can change back to their original shapes. Another name for 'strain energy'.	conduction	The way energy is transferred through solids by heating. Vibrations are passed on from particle to particle.
gravitational potential energy	A name used to describe energy when it is stored in objects in high places that can fall down.	convection	The movement of particles in a fluid (gas or liquid) depending on their temperature. Hotter, less dense regions rise, and cooler, denser regions sink.
kinetic energy	A name used to describe energy when it is stored in moving things.	infrared radiation	Another name for energy that travels by radiation. It can travel through transparent things and a vacuum or empty space.
law of conservation of energy	The idea that energy can never be created or destroyed, only transferred from one store to another.	climate change	Changes that will happen to the weather as a result of global warming, which is caused by the increase in the amount of carbon dioxide in the atmosphere.
Sankey diagram	A diagram showing energy transfers, where the width of each arrow is proportional to the amount of energy it represents.	renewable	An energy resource that will never run out (e.g. solar power).
system	A set of things being studied – for example a kettle, the water in it and its surroundings form a simple system.	non-renewable	Any energy resource that will run out because we cannot renew our supplies of it (e.g. oil).
dissipated	Spread out.	fossil fuel	A fuel formed from the dead remains of organisms over millions of years (e.g. coal, oil or natural gas).

Curriculum and Assessment Overview: Atomic structure and the periodic table

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 10**

Unit Topic: C3+4 Atomic Structure and the Periodic Table

Composite Question: What can the periodic table tell us about the atomic structure of elements?

Why this and why now? This topic adds detail and understanding to knowledge from KS3, and is fundamental as it is the foundation required for the whole of chemistry in KS4. The model of the atom will be studied and combined with the knowledge of isotopes and how we can use the periodic table to predict the atomic structures of elements.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is atomic structure and how do we represent this?	1.1 Describe how the Dalton model of an atom has changed over time because of the discovery of subatomic particles 1.2 Describe the structure of an atom as a nucleus containing protons and neutrons, surrounded by electrons in shells 1.3 Recall the relative charge and relative mass of: a) a proton b) a neutron c) an electron 1.4 Explain why atoms contain equal numbers of protons and electrons 1.5 Describe the nucleus of an atom as very small compared to the overall size of the atom 1.6 Recall that most of the mass of an atom is concentrated in the nucleus 1.7 Recall the meaning of the term mass number of an atom 1.8 Describe atoms of a given element as having the same number of protons in the nucleus and that this number is unique to that element 1.10 Calculate the numbers of protons, neutrons and electrons in atoms given the atomic number and mass number	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided based around the model used for the atom in the present day.
2. What is an isotope?	1.9 Describe isotopes as different atoms of the same element containing the same number of protons but different numbers of neutrons in their nuclei 1.11 Explain how the existence of isotopes results in relative atomic HT ONLY 1.12 Calculate the relative atomic mass of an element from the relative masses and abundances of its isotopes	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be a link with the extended answer question on atomic structure with this topic.
3. How can we use the periodic table to gain information on an elements atomic structure?	1.13 Describe how Mendeleev arranged the elements, known at that time, in a periodic table by using properties of these elements and their compounds 1.14 Describe how Mendeleev used his table to predict the existence and properties of some elements not then discovered 1.15 Explain that Mendeleev thought he had arranged elements in order of increasing relative atomic mass but this was not always true because of the relative abundance of isotopes of some pairs of elements in the periodic table 1.16 Explain the meaning of atomic number of an element in terms of position in the periodic table and number of protons in the nucleus 1.17 Describe that in the periodic table a. elements are arranged in order of increasing atomic number, in rows called periods b. elements with similar properties are placed in the same vertical columns called groups 1.18 Identify elements as metals or non-metals according to their position in the periodic table, explaining this division in terms of the atomic structures of the elements 1.19 Predict the electronic configurations of the first 20 elements in the periodic table as diagrams and in the form, for example 2.8.1 1.20 Explain how the electronic configuration of an element is related to its position in the periodic table	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. Students will use this information to predict the atomic structure and electronic configuration of elements.

Curriculum and Assessment Overview: Atomic structure and the periodic table

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
Atom	Small particles from which all substances are made. They are the smallest neutral part of an element that can take part in chemical reactions.	Relative Atomic Mass (RAM)	The mean mass of an atom relative to the mass of an atom of carbon-12, which is assigned a mass of 12. The RAM of an element is the mean relative mass of the isotopes in the element.
Relative Mass	The mass of a subatomic particle compared to the mass of a proton.	Prediction	What you think will happen in an experiment and why you think this.
Subatomic Particles	The smaller particles that make up atoms – protons, neutrons and electrons.	Group	A vertical column of elements in the periodic table. Elements in the same group generally have similar properties.
Atomic number	The number of protons in the nucleus of an atom (symbol *Z*). Also known as the proton number.	Inert	Does not react.
Mass number	The total number of protons and neutrons in the nucleus of an atom (symbol *A*). Also known as the nucleon number.	X-ray	Electromagnetic radiation that has a shorter wavelength than UV but longer than gamma rays.
A_r	Symbol for relative atomic mass (RAM).	Electron	Tiny particle with a negative charge that is found in shells around the nucleus of an atom.
Isotopes	Atoms of an element with the same number of protons (atomic number) but different mass numbers due to different numbers of neutrons.	Electron shell	Areas around a nucleus that can be occupied by electrons, usually drawn as circles. Also called an electron energy level.
Nuclear fission	The reaction in which the nucleus of a large atom, such as uranium, splits into two smaller nuclei.	Electronic configuration	The arrangement of electrons in shells around the nucleus of an atom.

Curriculum and Assessment Overview: Cells and Control

Dame Elizabeth Cadbury School

Department Name: **Science** **Year: 10**

Unit Topic: Biology Topic 2: Cells and Control

Composite Question: How do cells control our body?

Why this and why now? This unit builds on Biology topic 1 where we looked in detail at cells. We consider the importance of making more cells and they detail for how this happens. Next, we focus on the neurons which are in the nervous system.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do we make more cells?	2.1 Describe mitosis as part of the cell cycle, including the stages interphase, prophase, metaphase, anaphase and telophase and cytokinesis 2.2 Describe the importance of mitosis in growth, repair and asexual reproduction 2.3 Describe the division of a cell by mitosis as the production of two daughter cells, each with identical sets of chromosomes in the nucleus to the parent cell, and that this results in the formation of two genetically identical diploid body cells 2.4 Describe cancer as the result of changes in cells that lead to uncontrolled cell division 2.5 Describe growth in organisms, including: a) cell division and differentiation in animals b) cell division, elongation and differentiation in plants 2.6 Explain the importance of cell differentiation in the development of specialised cells 2.7 Demonstrate an understanding of the use of percentiles charts to monitor growth	Prior knowledge test at the start of the topic to review our knowledge of cells. End of topic assessment.
2. What are stem cells?	2.8 Describe the function of embryonic stem cells, stem cells in animals and meristems in plants 2.9 Discuss the potential benefits and risks associated with the use of stem cells in medicine	There is a longer answer question which focuses on different methods of contraception and an analysis of the effectiveness of each one. End of topic assessment.
3. How do signals get sent around our body?	2.13 Explain the structure and function of sensory receptors, sensory neurones, relay neurones in the CNS, motor neurones and synapses in the transmission of electrical impulses, including the axon, dendron, myelin sheath and the role of neurotransmitters 2.14 Explain the structure and function of a reflex arc including sensory, relay and motor neurones	End of topic assessment.

Curriculum and Assessment Overview: Cells and Control

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
anaphase	The stage of mitosis in which the separated chromosomes move away from each other.	**prophase**	The stage of mitosis in which the nucleus starts to break down and spindle fibres appear.
asexual reproduction	Producing new organisms from one parent only. These organisms are genetically identical to the parent.	**telophase**	The stage of mitosis in which the chromosomes arrive at opposite ends of the cell and the nucleus membrane reforms.
cell cycle	A sequence of growth and division that happens in cells. It includes interphase and mitosis, and leads to the production of two daughter cells that are identical to the parent cell.	**differentiation**	When a group of similar things, such as cells, become different in form from each other.
clone	Offspring from asexual reproduction. All the cells in a clone are genetically identical to each other and to the parent's cells.	**elongation**	When something gets longer (such as a cell in a plant root or shoot before it differentiates into a specialised cell).
daughter cell	New cell produced by cell division.	**meristem**	A small area of undifferentiated cells in a plant, such as near the shoot tips and root tips, where cells are dividing rapidly by mitosis.
diploid	A cell with two sets of chromosomes.	**metaphase**	The stage of mitosis when the chromosomes line up across the middle of the cell.
DNA replication	The copying of the DNA within a cell.	**mitosis**	The process of cells dividing to produce two daughter cells that are genetically identical to the parent.
haploid	A cell with one set of chromosomes.	**interphase**	The stage when the cell prepares itself for the process of cell division, and DNA replication takes place. The cell also makes more of its sub-cellular structures.

Curriculum and Assessment Overview: Forces

Department Name: **Science** **Year: 10**

Unit Topic: P2 - Forces

Composite Question: How are forces linked with motion?

Why this and why now? This topic builds on the fundamentals of physics from the P1 - Motion topic students have completed. The topic allows students to revisit the idea of resultant forces, and use this knowledge to begin to link to Newton's Laws of Motion, the differences between mass and weight, and the theory behind momentum.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do we calculate resultant forces? (Newton's First Law)	2.14 Recall Newton's first law and use it in the following situations: a) where the resultant force on a body is zero, i.e. the body is moving at a constant velocity or is at rest b) where the resultant force is not zero, i.e. the speed and/or direction of the body change(s)	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. What is centripetal force? (HIGHER ONLY)	**HT 2.20 Explain that an object moving in a circular orbit at constant speed has a changing velocity (qualitative only)** **HT 2.21 Explain that for motion in a circle there must be a resultant force known as a centripetal force that acts towards the centre of the circle**	**This will be tested as part of the MCQ end of topic test where you will be given individual feedback in the higher section of the test.**
3. How are mass and weight different?	2.16 Define weight, recall and use the following equation: weight (newton, N) = mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg) W=m×g 2.17 Describe how weight is measured 2.18 Describe the relationship between the weight of a body and the gravitational field strength 2.19 Core Practical: Investigate the relationship between force, mass and acceleration by varying the masses added to trolleys	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
4. How are force, mass and acceleration linked? (Newton's Second Law) **(HIGHER)**	2.15 Recall and use Newton's second law as: force (newton, N) = mass (kilogram, kg) × acceleration (metre per second squared, m/s^2) 2.23 Recall and apply Newton's third law to equilibrium situations F=m×a **HT 2.22 Explain that inertial mass is a measure of how difficult it is to change the velocity of an object (including from rest) and know that it is defined as the ratio of force over acceleration**	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. Students will also be given verbal feedback on how they have carried out the core practical. There will also be an extended answer question for which whole class feedback will be provided.
5. What is momentum? (Newton's Third Law) (HIGHER ONLY)	**HT 2.23 Recall and apply Newton's third law both to equilibrium situations and to collision interactions and relate it to the conservation of momentum in collisions** **2.24 Define momentum, recall and use the equation:** **momentum (kilogram metre per second, kg m/s) = mass (kilogram, kg) × velocity (metre per second, m/s)** **p=m×v**	**This will be tested as part of the MCQ end of topic test where you will be given individual feedback in the higher section of the test.**

Curriculum and Assessment Overview: Forces

	2.25 Describe examples of momentum in collisions	
6. What are the factors affecting stopping distance?	2.27 Explain methods of measuring human reaction times and recall typical results 2.28 Recall that the stopping distance of a vehicle is made up of the sum of the thinking distance and the braking distance 2.29 Explain that the stopping distance of a vehicle is affected by a range of factors including: a) the mass of the vehicle b) the speed of the vehicle c) the driver's reaction time d) the state of the vehicle's brakes e) the state of the road f) the amount of friction between the tyre and the road surface 2.30 Describe the factors affecting a driver's reaction time including drugs and distractions	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.
7. What is the danger of a large deceleration? **(HIGHER)**	Some HT 2.31 Explain the dangers caused by large decelerations and estimate the forces involved in typical situations on a public road 2.26 Use Newton's second law as: force (newton, N) = change in momentum (kilogram metre per second, kg m/s) ÷ time (second, s) F=((mv-mu))/t	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There is an additional opportunity for an extended answer question for which whole class feedback will be provided.

Curriculum and Assessment Overview: Forces

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
acceleration	A measure of how quickly the velocity of something is changing. It can be positive if the object is speeding up or negative if it is slowing down.	momentum	The mass of an object multiplied by its velocity. Momentum is a vector quantity, with units kilogram metres per second (kg m/s).
resultant force	The total force that results from two or more forces acting upon a single object. It is found by adding together the forces, taking into account their directions.	thinking distance	The distance travelled by a vehicle while the driver reacts.
speed	How fast something is moving. Often measured in metres per second (m/s), miles per hour (mph) or kilometres per hour (km/h).	stopping distance	The distance in which a car stops, which is the sum of the thinking and braking distances.
velocity	The speed of an object in a particular direction. Usually measured in metres per second (m/s).	stimulus	Something outside the body that can be detected by the body, such as a sight or sound.
mass	A measure of the amount of material there is in an object. The units are kilograms (kg).	response	The way the body reacts to a stimulus.
weight	The force pulling an object downwards. It depends upon the mass of the object and the gravitational field strength. The units are newtons (N).	work done	The energy transferred when a force acts through a distance to move an object or change its speed. It is calculated using the size of the force and the distance moved in the direction of the force.
equilibrium	When a situation is not changing because all the things affecting it balance out.	crumple zone	A vehicle safety device in which part of the vehicle is designed to crumple in a crash, reducing the force of the impact.
conservation of momentum	The total momentum of moving objects before a collision is the same as the total momentum afterwards, as long as no external forces are acting.	deceleration	Slowing down – a negative acceleration

Curriculum and Assessment Overview: Key Concepts in Biology

Department Name: **Science** **Year: 10**

Unit Topic: B1 Key Concepts in Biology

Composite Question: How do cell processes work?

Why this and why now? This topic builds on the basics learnt in KS3 about cells and movement of particles. The concepts covered in this topic provide key knowledge that links to all of the other topics you will cover in the GCSE course. A good understanding of this topic is essential as you will revisit it throughout the rest of KS4.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How are microscopes used in Biology?	Explain how changes in microscope technology, including electron microscopy, have enabled us to see cell structures and organelles with more clarity and detail than in the past and increased our understanding of the role of sub-cellular structures Demonstrate an understanding of number, size and scale, including the use of estimations and explain when they should be used "Demonstrate an understanding of the relationship between quantitative units in relation to cells, including: a milli (10^{-3}) b micro (10^{-6}) c nano (10^{-9}) d pico (10^{-12}) e calculations with numbers written in standard form (HT only) Core Practical: Investigate biological specimens using microscopes, including magnification calculations and labelled scientific drawings from observations	End of topic assessment.
2. What do cell organelles do?	Explain how the sub-cellular structures of eukaryotic cells are related to their functions, including: animal cells – nucleus, cell membrane, mitochondria and ribosomes Explain how the sub-cellular structures of eukaryotic cells are related to their functions, including: plant cells – nucleus, cell membrane, cell wall, chloroplasts, mitochondria, vacuole and ribosomes Explain how the sub-cellular structures of eukaryotic cells are related to their functions. Describe how specialised cells are adapted to their function, including: sperm cells – acrosome, haploid nucleus, mitochondria and tail Describe how specialised cells are adapted to their function, including: egg cells – nutrients in the cytoplasm, haploid nucleus and changes in the cell membrane after fertilisation Describe how specialised cells are adapted to their function, including: ciliated epithelial cells	End of topic assessment.
3. What are prokaryotes like?	Explain how the sub-cellular structures of prokaryotic cells are related to their functions, including: animal cells –cell membrane and ribosomes Explain how the sub-cellular structures of prokaryotic cells are related to their functions. Explain how the sub-cellular structures of prokaryotic cells are related to their functions, including: bacteria – chromosomal DNA, plasmid DNA, cell membrane, ribosomes and flagella	End of topic assessment.
4. How do enzymes work?	Explain the mechanism of enzyme action including the active site and enzyme specificity Explain how enzymes can be denatured due to changes in the shape of the active site Explain the effects of temperature, substrate concentration and pH on enzyme activity Core Practical: Investigate the effect of pH on enzyme activity Demonstrate an understanding of rate calculations for enzyme activity Explain the importance of enzymes as biological catalysts in the synthesis of carbohydrates, proteins and lipids and their breakdown into sugars, amino acids and fatty acids and glycerol	End of topic assessment.
5. How do substances move in and out of cells?	Explain how substances are transported into and out of cells, including by diffusion, osmosis and active transport Core Practical: Investigate osmosis in potatoes Calculate percentage gain and loss of mass in osmosis	Longer answer question on osmosis. End of topic assessment.

Curriculum and Assessment Overview: Key Concepts in Biology

Key Term	Definition	Key Term	Definition
aerobic respiration	A type of respiration in which oxygen is used to release energy from substances, such as glucose.	eukaryotic	A cell with a nucleus is eukaryotic. Organisms that have cells like this are also said to be eukaryotic.
mitochondrion	A sub-cellular structure (organelle) in the cytoplasm of eukaryotic cells, where aerobic respiration occurs. Plural is mitochondria.	vacuole	A storage space in cells. Plant cells have a large, permanent vacuole that helps to keep them rigid.
acrosome	A small vacuole in the tip of the head of a sperm cell, which contains enzymes.	prokaryotic	A cell with no nucleus is prokaryotic. Organisms such as bacteria, which have cells like this, are also said to be prokaryotic.
substrate	A substance that is changed during a reaction.	catalyst	A substance that speeds up the rate of a reaction, without itself being used up.
active site	The space in an enzyme where the substrate fits during an enzyme-catalysed reaction.	denatured	A denatured enzyme is one where the shape of the active site has changed so much that its substrate no longer fits and the reaction can no longer happen.
optimum temperature	The temperature at which an enzyme-catalysed reaction works fastest.	optimum pH	The pH at which an enzyme-catalysed reaction works fastest.
diffusion	When particles spread and mix with each other without anything moving them. Diffusion into and out of cells occurs for particles that are small enough to pass through the cell surface membrane.	osmosis	The overall movement of solvent molecules in a solution across a partially permeable membrane, from a dilute solution to a more concentrated one.

Curriculum and Assessment Overview: Motion

Department Name: **Science** **Year: 10**

Unit Topic: P1 Motion

Composite Question: How do we describe the movement of objects?

Why this and why now? This topic builds on the basics learnt in KS3, especially speed, distance and acceleration. This topic adds concepts such as scalars and vectors and well as graphs that show the motion of an object. As this is the first physics topic, key skills such as rearranging equations and correct units will also be introduced and reinforced throughout the unit.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What are the correct units of measurement for motion?	Recall and use the SI unit for physical quantities. Recall and use multiples and sub-multiples of units, including giga (G), mega (M), kilo (k), centi (c), milli (m), micro (μ) and nano (n) Be able to convert between different units, including hours to seconds Use significant figures and standard form where appropriate Explain that a scalar quantity has magnitude (size) but no specific direction Explain that a vector quantity has both magnitude (size) and a specific direction Explain the difference between vector and scalar quantities Recall vector and scalar quantities, including: a) displacement/distance, b) velocity/speed, c) acceleration, d) force, e) weight/mass, f) momentum, g) energy	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. How do we calculate and present different aspects of motion?	Recall that velocity is speed in a stated direction Recall and use the equations: a (average) speed (metre per second, m/s) = distance (metre, m) ÷ time (s), b distance travelled (metre, m) = average speed (metre per second, m/s) × time (s) Analyse distance/time graphs including determination of speed from the gradient Recall and use the equation: acceleration (metre per second squared, m/s2) = change in velocity (metre per second, m/s) ÷ time taken (second, s) Use the equation: (final velocity)2 ((metre/second)2, (m/s)2) – (initial velocity)2 ((metre/second)2, (m/s)2) = 2 × acceleration (metre per second squared, m/s2) × distance (metre, m) Analyse velocity/time graphs to: a) compare acceleration from gradients qualitatively, b) calculate the acceleration from the gradient (for uniform acceleration only), c) determine the distance travelled using the area between the graph line and the time axis (for uniform acceleration only) Describe a range of laboratory methods for determining the speeds of objects such as the use of light gates Recall some typical speeds encountered in everyday experience for wind and sound, and for walking, running, cycling and other transportation systems Recall that the acceleration, g, in free fall is 10 m/s^2 and be able to estimate the magnitudes of everyday accelerations	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. Equations and graphs of motion will be assessed in an extended question with whole class feedback given.

Curriculum and Assessment Overview: Motion

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
acceleration	A measure of how quickly the velocity of something is changing. It can be positive if the object is speeding up or negative if it is slowing down. Acceleration is a vector quantity.	vector quantity	A quantity that has both a size and a direction. Examples include force, velocity, displacement, momentum and acceleration.
displacement	The distance travelled in a particular direction. Displacement is a vector, distance is not.	velocity	The speed of an object in a particular direction. Usually measured in metres per second (m/s). Velocity is a vector, speed is not.
distance	How far something has travelled. Distance is a scalar, and has no direction.	weight	The force pulling an object downwards, it depends upon the mass of the object and the gravitational field strength. Weight is a vector.
force	At the simplest level a force is a push, pull or twist. Forces acting on an object can cause it to accelerate. Force is a vector quantity.	average speed	The speed worked out from the total distance travelled divided by the total time taken for a journey. speed = distance travelled /time
magnitude	The size of something, such as the size of a force or the measurement of a distance.	distance/time graph	A graph of the distance travelled against time for a moving object. The gradient of a line on a distance/time graph gives the speed.
mass	A measure of the amount of material that there is in an object. Mass is a scalar quantity.	scalar quantity	A quantity that has a magnitude (size) but not a direction. Examples include mass, distance, energy and speed.
momentum	A measure of motion, mass multiplied by velocity. Momentum is a vector quantity.	gradient	The steepness of a line on a graph in numbers. It is calculated by taking the vertical distance between two points and dividing by the horizontal distance between the same two points.

Curriculum and Assessment Overview: Motion

Department Name: **Science** **Year: 10**

Unit Topic: P1 Motion

Composite Question: How do we describe the movement of objects?

Why this and why now? This topic builds on the basics learnt in KS3, especially speed, distance and acceleration. This topic adds concepts such as scalars and vectors and well as graphs that show the motion of an object. As this is the first physics topic, key skills such as rearranging equations and correct units will also be introduced and reinforced throughout the unit.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What are the correct units of measurement for motion?	Recall and use the SI unit for physical quantities. Recall and use multiples and sub-multiples of units, including giga (G), mega (M), kilo (k), centi (c), milli (m), micro (μ) and nano (n) Be able to convert between different units, including hours to seconds Use significant figures and standard form where appropriate Explain that a scalar quantity has magnitude (size) but no specific direction Explain that a vector quantity has both magnitude (size) and a specific direction Explain the difference between vector and scalar quantities Recall vector and scalar quantities, including: a) displacement/distance, b) velocity/speed, c) acceleration, d) force, e) weight/mass, f) momentum, g) energy	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. How do we calculate and present different aspects of motion?	Recall that velocity is speed in a stated direction Recall and use the equations: a (average) speed (metre per second, m/s) = distance (metre, m) ÷ time (s), b distance travelled (metre, m) = average speed (metre per second, m/s) × time (s) Analyse distance/time graphs including determination of speed from the gradient Recall and use the equation: acceleration (metre per second squared, m/s2) = change in velocity (metre per second, m/s) ÷ time taken (second, s) Use the equation: (final velocity)2 ((metre/second)2, (m/s)2) – (initial velocity)2 ((metre/second)2, (m/s)2) = 2 × acceleration (metre per second squared, m/s2) × distance (metre, m) Analyse velocity/time graphs to: a) compare acceleration from gradients qualitatively, b) calculate the acceleration from the gradient (for uniform acceleration only), c) determine the distance travelled using the area between the graph line and the time axis (for uniform acceleration only) Describe a range of laboratory methods for determining the speeds of objects such as the use of light gates Recall some typical speeds encountered in everyday experience for wind and sound, and for walking, running, cycling and other transportation systems Recall that the acceleration, g, in free fall is 10 m/s^2 and be able to estimate the magnitudes of everyday accelerations	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. Equations and graphs of motion will be assessed in an extended question with whole class feedback given.

Curriculum and Assessment Overview: Motion

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
acceleration	A measure of how quickly the velocity of something is changing. It can be positive if the object is speeding up or negative if it is slowing down. Acceleration is a vector quantity.	vector quantity	A quantity that has both a size and a direction. Examples include force, velocity, displacement, momentum and acceleration.
displacement	The distance travelled in a particular direction. Displacement is a vector, distance is not.	velocity	The speed of an object in a particular direction. Usually measured in metres per second (m/s). Velocity is a vector, speed is not.
distance	How far something has travelled. Distance is a scalar, and has no direction.	weight	The force pulling an object downwards, it depends upon the mass of the object and the gravitational field strength. Weight is a vector.
force	At the simplest level a force is a push, pull or twist. Forces acting on an object can cause it to accelerate. Force is a vector quantity.	average speed	The speed worked out from the total distance travelled divided by the total time taken for a journey. speed = distance travelled /time
magnitude	The size of something, such as the size of a force or the measurement of a distance.	distance/time graph	A graph of the distance travelled against time for a moving object. The gradient of a line on a distance/time graph gives the speed.
mass	A measure of the amount of material that there is in an object. Mass is a scalar quantity.	scalar quantity	A quantity that has a magnitude (size) but not a direction. Examples include mass, distance, energy and speed.
momentum	A measure of motion, mass multiplied by velocity. Momentum is a vector quantity.	gradient	The steepness of a line on a graph in numbers. It is calculated by taking the vertical distance between two points and dividing by the horizontal distance between the same two points.

Curriculum and Assessment Overview: Key Concepts in Biology

Department Name: **Science** **Year: 10 Triple Science**

Unit Topic: B1 Key Concepts in Biology

Composite Question: How do cell processes work?

Why this and why now? This topic builds on the basics learnt in KS3 about cells and movement of particles. The concepts covered in this topic provide key knowledge that links to all of the other topics you will cover in the GCSE course. A good understanding of this topic is essential as you will revisit it throughout the rest of KS4.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How are microscopes used in Biology?	Explain how changes in microscope technology, including electron microscopy, have enabled us to see cell structures and organelles with more clarity and detail than in the past and increased our understanding of the role of sub-cellular structures Demonstrate an understanding of number, size and scale, including the use of estimations and explain when they should be used "Demonstrate an understanding of the relationship between quantitative units in relation to cells, including: a milli (10^{-3}) b micro (10^{-6}) c nano (10^{-9}) d pico (10^{-12}) e calculations with numbers written in standard form (HT only) Core Practical: Investigate biological specimens using microscopes, including magnification calculations and labelled scientific drawings from observations	End of topic assessment.
2. What do cell organelles do?	Explain how the sub-cellular structures of eukaryotic cells are related to their functions, including: animal cells – nucleus, cell membrane, mitochondria and ribosomes Explain how the sub-cellular structures of eukaryotic cells are related to their functions, including: plant cells – nucleus, cell membrane, cell wall, chloroplasts, mitochondria, vacuole and ribosomes Explain how the sub-cellular structures of eukaryotic cells are related to their functions. Describe how specialised cells are adapted to their function, including: sperm cells – acrosome, haploid nucleus, mitochondria and tail Describe how specialised cells are adapted to their function, including: egg cells – nutrients in the cytoplasm, haploid nucleus and changes in the cell membrane after fertilisation Describe how specialised cells are adapted to their function, including: ciliated epithelial cells	End of topic assessment.
3. What are prokaryotes like?	Explain how the sub-cellular structures of prokaryotic cells are related to their functions, including: animal cells –cell membrane and ribosomes Explain how the sub-cellular structures of prokaryotic cells are related to their functions. Explain how the sub-cellular structures of prokaryotic cells are related to their functions, including: bacteria – chromosomal DNA, plasmid DNA, cell membrane, ribosomes and flagella	End of topic assessment.
4. How do enzymes work?	Explain the mechanism of enzyme action including the active site and enzyme specificity Explain how enzymes can be denatured due to changes in the shape of the active site Explain the effects of temperature, substrate concentration and pH on enzyme activity Core Practical: Investigate the effect of pH on enzyme activity Demonstrate an understanding of rate calculations for enzyme activity Explain the importance of enzymes as biological catalysts in the synthesis of carbohydrates, proteins and lipids and their breakdown into sugars, amino acids and fatty acids and glycerol	End of topic assessment.
5. How do substances move in and out of cells?	Explain how substances are transported into and out of cells, including by diffusion, osmosis and active transport Core Practical: Investigate osmosis in potatoes Calculate percentage gain and loss of mass in osmosis	Longer answer question on osmosis. End of topic assessment.
6. How do we test for different food groups?	Core Practical: Investigate the use of chemical reagents to identify starch, reducing sugars, proteins and fats Explain how the energy contained in food can be measured using calorimetry	End of topic assessment.

Curriculum and Assessment Overview: Key Concepts in Biology

Key Term	Definition	Key Term	Definition
aerobic respiration	A type of respiration in which oxygen is used to release energy from substances, such as glucose.	eukaryotic	A cell with a nucleus is eukaryotic. Organisms that have cells like this are also said to be eukaryotic.
mitochondrion	A sub-cellular structure (organelle) in the cytoplasm of eukaryotic cells, where aerobic respiration occurs. Plural is mitochondria.	vacuole	A storage space in cells. Plant cells have a large, permanent vacuole that helps to keep them rigid.
acrosome	A small vacuole in the tip of the head of a sperm cell, which contains enzymes.	prokaryotic	A cell with no nucleus is prokaryotic. Organisms such as bacteria, which have cells like this, are also said to be prokaryotic.
substrate	A substance that is changed during a reaction.	catalyst	A substance that speeds up the rate of a reaction, without itself being used up.
active site	The space in an enzyme where the substrate fits during an enzyme-catalysed reaction.	denatured	A denatured enzyme is one where the shape of the active site has changed so much that its substrate no longer fits and the reaction can no longer happen.
optimum temperature	The temperature at which an enzyme-catalysed reaction works fastest.	optimum pH	The pH at which an enzyme-catalysed reaction works fastest.
diffusion	When particles spread and mix with each other without anything moving them. Diffusion into and out of cells occurs for particles that are small enough to pass through the cell surface membrane.	osmosis	The overall movement of solvent molecules in a solution across a partially permeable membrane, from a dilute solution to a more concentrated one.

Curriculum and Assessment Overview: Conservation of Energy

Department Name: **Science** **Year: 10**

Unit Topic: P3 – Conservation of Energy

Composite Question: Why should we conserve energy?

Why this and why now? This topic builds on the knowledge of energy that students have studied in KS3 in terms of storing, and transferring energy, and allows students to explore how energy changes in a system is related to doing work with forces (link to P2), how we can calculate efficiency and understanding the benefits/drawbacks to renewable and non-renewable energy.

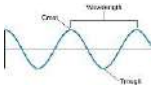
What am I Learning?	What do I need to know?	How will I be assessed?
1. How is energy stored and transferred?	3.3 Draw and interpret diagrams to represent energy transfers 3.4 Explain what is meant by conservation of energy 3.5 Analyse the changes involved in the way energy is stored when a system changes, including: a) an object projected upwards or up a slope b) a moving object hitting an obstacle c) an object being accelerated by a constant force d) a vehicle slowing down e) bringing water to a boil in an electric kettle 3.6 Explain that where there are energy transfers in a closed system there is no net change to the total energy in that system 3.8 Explain, using examples how in all system changes energy is dissipated so that it is stored in less useful ways.	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. Why do we use Sankey diagrams?	3.7 Explain that mechanical processes become wasteful when they cause a rise in temperature so dissipating energy in heating the surroundings 3.9 Explain ways of reducing unwanted energy transfer including through lubrication, thermal insulation 3.11 Recall and use the equation: efficiency=((useful energy transferred by the device))/((total energy supplied to the device)) 3.12 HT only: Explain how efficiency can be increased 3.9 Explain ways of reducing unwanted energy transfer including through lubrication, thermal insulation 3.10 Describe the effects of the thickness and thermal conductivity of the walls of a building on its rate of cooling qualitatively	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
3. How do we calculate changes in gravitational potential energy (GPE)?	3.1 Recall and use the equation to calculate the change in gravitational PE when an object is raised above the ground: change in gravitational potential energy (joule, J) = mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg) × change in vertical height (metre, m) $\Delta GPE=m\times g\times \Delta h$	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.

Curriculum and Assessment Overview: Conservation of Energy

4.	How do we calculate how much energy is associated with a moving object?	3.2 Recall and use the equation to calculate the amounts of energy associated with a moving object: kinetic energy (joule, J) = 0.5 × mass (kilogram, kg) × (speed)^2 ((metre/second)^2, (m/s)^2) $KE=(1/2)\times m\times v^2$	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.
5.	What are the benefits/drawbacks to renewable and non-renewable energy resources?	3.13 Describe the main energy sources available for use on Earth (including fossil fuels, nuclear fuel, bio-fuel, wind, hydro-electricity, the tides and the Sun), and compare the ways in which both renewable and non-renewable sources are used 3.14 Explain patterns and trends in the use of energy resources	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.

Curriculum and Assessment Overview: Conservation of Energy

Key Term	Definition	Key Term	Definition
chemical energy	A name used to describe energy when it is stored in chemical substances. Food, fuel and batteries all store chemical energy.	efficiency	A way of saying how much energy something wastes. A more efficient machine wastes less energy.
elastic potential energy	A name used to describe energy when it is stored in stretched or squashed things that can change back to their original shapes. Another name for 'strain energy'.	conduction	The way energy is transferred through solids by heating. Vibrations are passed on from particle to particle.
gravitational potential energy	A name used to describe energy when it is stored in objects in high places that can fall down.	convection	The movement of particles in a fluid (gas or liquid) depending on their temperature. Hotter, less dense regions rise, and cooler, denser regions sink.
kinetic energy	A name used to describe energy when it is stored in moving things.	infrared radiation	Another name for energy that travels by radiation. It can travel through transparent things and a vacuum or empty space.
law of conservation of energy	The idea that energy can never be created or destroyed, only transferred from one store to another.	climate change	Changes that will happen to the weather as a result of global warming, which is caused by the increase in the amount of carbon dioxide in the atmosphere.
Sankey diagram	A diagram showing energy transfers, where the width of each arrow is proportional to the amount of energy it represents.	renewable	An energy resource that will never run out (e.g. solar power).
system	A set of things being studied – for example a kettle, the water in it and its surroundings form a simple system.	non-renewable	Any energy resource that will run out because we cannot renew our supplies of it (e.g. oil).
dissipated	Spread out.	fossil fuel	A fuel formed from the dead remains of organisms over millions of years (e.g. coal, oil or natural gas).



Curriculum and Assessment Overview: Waves

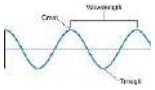
Department Name: **Science** **Year: 10**

Unit Topic: P4 Waves (Triple Science)

Composite Question: How do we describe waves and their propagation?

Why this and why now? This topic builds on the light, sound and waves topics you completed in KS3. It is really important for the later unit about the EM Spectrum (P5). In this topic you will build upon the basic properties of waves you have already learnt and use new vocabulary and mathematical relationships to describe more complex phenomena.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do we describe waves?	4.1 Recall that waves transfer energy and information without transferring matter 4.2 Describe evidence that with water and sound waves it is the wave and not the water or air itself that travels 4.3 Define and use the terms frequency and wavelength as applied to waves 4.4 Use the terms amplitude, period, wave velocity and wavefront as applied to waves 4.5 Describe the difference between longitudinal and transverse waves by referring to sound, electromagnetic, seismic and water waves	Prior learning checked at start of unit. New content assessed in end of topic test (with MMA). For some groups there is an extended answer question based upon longitudinal and transverse waves (with WCF).
2. How do we calculate different properties of waves?	4.6 Recall and use both the equations below for all waves: wave speed (metre/second, m/s) = frequency (hertz, Hz) ×wavelength (metre, m) $v = f \times \lambda$ wave speed (metre/second, m/s) = distance (metre, m) ÷ time (second, s) 4.7 Describe how to measure the velocity of sound in air and ripples on water surfaces 4.17 Core Practical: Investigate the suitability of equipment to measure the speed, frequency and wavelength of a wave in a solid and a fluid	End of topic test (with MMA).
3. How do waves behave?	4.10 Explain how waves will be refracted at a boundary in terms of the change of direction and speed (speed is HT only) HT ONLY 4.11 Recall that different substances may absorb, transmit, refract or reflect waves in ways that vary with wavelength	For some groups there is an extended answer question based upon refraction in water (with WCF). Content to also be tested with the end of topic test (with MMA).
4. How can we make use of waves?	4.8P Calculate depth or distance from time and wave velocity 4.9P Describe the effects of a) reflection, b) refraction, c) transmission, d) absorption of waves at material interfaces 4.12P Describe the processes which convert wave disturbances between sound waves and vibrations in solids, and a) explain why such processes only work over a limited frequency range b) use this to explain the way the human ear works 4.13P Recall that sound with frequencies greater than 20 000 hertz, Hz, is known as ultrasound 4.14P Recall that sound with frequencies less than 20 hertz, Hz, is known as infrasound 4.15P Explain uses of ultrasound and infrasound, including a) sonar, b) foetal scanning, c) exploration of the Earth's core 4.16P Describe how changes, if any, in velocity frequency and wavelength, in the transmission of sound waves from one medium to another are inter-related	End of topic test (with MMA).



Curriculum and Assessment Overview: Waves

Key Term	Definition	Key Term	Definition
amplitude	The size of vibrations or the maximum distance a particle moves away from its resting position when a wave passes.	interface	The boundary between two materials.
electromagnetic waves	A group of waves that all travel at the same speed in a vacuum, and are all transverse.	normal	An imaginary line at right angles to a surface where a ray of light hits it.
frequency	The number of vibrations (or the number of waves) per second.	refraction	The change in direction when waves go from one medium to another.
hertz (Hz)	The unit for frequency. One hertz is one wave per second.	ultrasound	Sound waves with a frequency above 20 000 Hz, which is too high for the human ear to detect.
longitudinal wave	A wave where the particles vibrate in the same direction as the wave is travelling.	infrasound	Sound waves with a frequency below 20 Hz, which is too low for the human ear to detect.
medium	Any substance through which something travels.	transverse wave	A wave where the vibrations are at right angles to the direction the wave is travelling.
period	The time taken for one complete wave to pass a point. It is measured in seconds.	velocity	The speed of an object in a particular direction. Usually measured in metres per second (m/s).
seismic waves	Vibrations in the rocks of the Earth caused by earthquakes or explosions. There are transverse and longitudinal seismic waves.	wave	A way of transferring energy or information. Many waves travel when particles pass on vibrations.
sound waves	Vibrations in the particles of a solid, liquid or gas, which are detected by our ears and 'heard' as sounds. Sound waves are longitudinal waves.	wavelength	The distance between a point on one wave and the same point on the next wave.

Curriculum and Assessment Overview: Cells and Control

Department Name: **Science** **Year: 10 Triple Science**

Unit Topic: Biology Topic 2: Cells and Control

Composite Question: How do cells control our body?

Why this and why now? This unit builds on Biology topic 1 where we looked in detail at cells. We consider the importance of making more cells and they detail for how this happens. Next, we focus on the neurons which are in the nervous system and consider the structure and function of the brain within the central nervous system.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do we make more cells?	2.1 Describe mitosis as part of the cell cycle, including the stages interphase, prophase, metaphase, anaphase and telophase and cytokinesis 2.2 Describe the importance of mitosis in growth, repair and asexual reproduction 2.3 Describe the division of a cell by mitosis as the production of two daughter cells, each with identical sets of chromosomes in the nucleus to the parent cell, and that this results in the formation of two genetically identical diploid body cells 2.4 Describe cancer as the result of changes in cells that lead to uncontrolled cell division 2.5 Describe growth in organisms, including: a) cell division and differentiation in animals b) cell division, elongation and differentiation in plants 2.6 Explain the importance of cell differentiation in the development of specialised cells 2.7 Demonstrate an understanding of the use of percentiles charts to monitor growth	Prior knowledge test at the start of the topic to review our knowledge of cells. End of topic assessment.
2. What are stems cells?	2.8 Describe the function of embryonic stem cells, stem cells in animals and meristems in plants 2.9 Discuss the potential benefits and risks associated with the use of stem cells in medicine	There is a longer answer question which focuses on different methods of contraception and an analysis of the effectiveness of each one. End of topic assessment.
3. How do signals get sent around our body?	2.13 Explain the structure and function of sensory receptors, sensory neurones, relay neurones in the CNS, motor neurones and synapses in the transmission of electrical impulses, including the axon, dendron, myelin sheath and the role of neurotransmitters 2.14 Explain the structure and function of a reflex arc including sensory, relay and motor neurones	End of topic assessment.
4. Which organs link to the nervous system?	2.10B Describe the structures and functions of the brain including the cerebellum, cerebral hemispheres and medulla oblongata. 2.11B Explain how the difficulties of accessing brain tissue inside the skull can be overcome by using CT scanning and PET scanning to investigate brain function. 2.12B Explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system, including spinal injuries and brain tumours.	End of topic assessment.

Curriculum and Assessment Overview: Cells and Control

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Key Term	Definition	Key Term	Definition
anaphase	The stage of mitosis in which the separated chromosomes move away from each other.	**prophase**	The stage of mitosis in which the nucleus starts to break down and spindle fibres appear.
asexual reproduction	Producing new organisms from one parent only. These organisms are genetically identical to the parent.	**telophase**	The stage of mitosis in which the chromosomes arrive at opposite ends of the cell and the nucleus membrane reforms.
cell cycle	A sequence of growth and division that happens in cells. It includes interphase and mitosis, and leads to the production of two daughter cells that are identical to the parent cell.	**differentiation**	When a group of similar things, such as cells, become different in form from each other.
clone	Offspring from asexual reproduction. All the cells in a clone are genetically identical to each other and to the parent's cells.	**elongation**	When something gets longer (such as a cell in a plant root or shoot before it differentiates into a specialised cell).
daughter cell	New cell produced by cell division.	**meristem**	A small area of undifferentiated cells in a plant, such as near the shoot tips and root tips, where cells are dividing rapidly by mitosis.
diploid	A cell with two sets of chromosomes.	**metaphase**	The stage of mitosis when the chromosomes line up across the middle of the cell.
DNA replication	The copying of the DNA within a cell.	**mitosis**	The process of cells dividing to produce two daughter cells that are genetically identical to the parent.
haploid	A cell with one set of chromosomes.	**interphase**	The stage when the cell prepares itself for the process of cell division, and DNA replication takes place. The cell also makes more of its sub-cellular structures.

Curriculum and Assessment Overview: Bonding

Department Name: **Science** **Year: 10**

Unit Topic: C5, 6 & 7 - Bonding

Composite Question: How do elements form larger structure through bonds?

Why this and why now? This topic adds detail and understanding to knowledge from KS3, and is fundamental as it is the foundation required for the whole of chemistry in KS4. The model of the atom will be built upon and students will develop a deeper understanding on how compounds are bonded together whilst linking these to the properties of specific compounds.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do metals bond with non-metals?	Explain how ionic bonds are formed by the transfer of electrons between atoms to produce cations and anions, including the use of dot and cross diagrams. Recall that an ion is an atom or group of atoms with a positive or negative charge. Calculate the numbers of protons, neutrons and electrons in simple ions given the atomic number and mass number. Explain the properties of ionic compounds limited to: a) high melting points and boiling points, in terms of forces between ions b) whether or not they conduct electricity as solids, when molten and in aqueous solution	MCQ test with whole class feedback as well as an extended question on this topic.
2. How are covalent bonds formed?	Explain how a covalent bond is formed when a pair of electrons is shared between two atoms. Explain the properties of typical covalent, simple molecular compounds. Recall that graphite and diamond are different forms of carbon and that they are examples of giant covalent substances. Describe the structures of graphite and diamond. Explain, in terms of structure and bonding, why graphite is used to make electrodes and as a lubricant, whereas diamond is used in cutting tools. Explain the properties of fullerenes including C_{60} and graphene in terms of their structures and bonding.	MCQ test with whole class feedback as well as an extended question on this topic.
3. How do metals bond with each other and what are the models of bonding?	Explain the properties of metals, including malleability and the ability to conduct electricity. Explain why elements and compounds can be classified as: ionic, simple molecular (covalent), giant covalent, metallic and how the structure and bonding of these types of substances results in different physical properties, including relative melting point and boiling point, relative solubility in water and ability to conduct electricity (as solids and in solution)	MCQ test with whole class feedback as well as an extended question on this topic.

Curriculum and Assessment Overview: Bonding

Key Term	Definition	Key Term	Definition
ion	Atom or group of atoms with an electrical charge. Atoms become positively charged ions if they lose electrons and negatively charged if they gain electrons.	**ionic bond**	Strong electrostatic force of attraction between oppositely charged ions.
electrostatic force	Force of attraction between oppositely charged particles, and force of repulsion between particles with the same charge.	**ionic compound**	Substance containing ions, formed by the loss and gain of electrons between two or more elements.
aqueous solution	A solution in which water is the solvent.	**anode**	The positive electrode.
cathode	The negative electrode.	**covalent bond**	The bond formed when a pair of electrons is shared between two atoms.
dot and cross diagram	Diagram, to explain what happens when a bond is formed, which uses dots and crosses to represent the electrons of different atoms.	**double bond**	The bond formed when two pairs of electrons are shared between the same two atoms.
intermolecular force	A weak force of attraction between molecules.	**polymer**	A long-chain molecule made by joining many smaller molecules (monomers) together.
delocalised electron	An electron that is free to move and can carry an electrical current.	**fullerene**	A simple molecule in which each carbon atom is covalently bonded to three other carbon atoms, forming spheres or tube shapes.
covalent, giant molecular structure	Three-dimensional lattice of carbon atoms linked by covalent bonds.	**graphene**	An allotrope of carbon consisting of a sheet that is one atom thick, with atoms arranged in a honeycomb shape.
metallic bonding	The type of bonding found in metals. We can think of it as positively charged ions in a 'sea' of negatively charged electrons.	**malleable**	A substance that can be hammered or rolled into shape without shattering.

Curriculum and Assessment Overview: Atomic structure and the periodic table

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Department Name: **Science** **Year: 10**

Unit Topic: C3+4 Atomic Structure and the Periodic Table

Composite Question: What can the periodic table tell us about the atomic structure of elements?

Why this and why now? This topic adds detail and understanding to knowledge from KS3, and is fundamental as it is the foundation required for the whole of chemistry in KS4. The model of the atom will be studied and combined with the knowledge of isotopes and how we can use the periodic table to predict the atomic structures of elements.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is atomic structure and how do we represent this?	1.1 Describe how the Dalton model of an atom has changed over time because of the discovery of subatomic particles 1.2 Describe the structure of an atom as a nucleus containing protons and neutrons, surrounded by electrons in shells 1.3 Recall the relative charge and relative mass of: a) a proton b) a neutron c) an electron 1.4 Explain why atoms contain equal numbers of protons and electrons 1.5 Describe the nucleus of an atom as very small compared to the overall size of the atom 1.6 Recall that most of the mass of an atom is concentrated in the nucleus 1.7 Recall the meaning of the term mass number of an atom 1.8 Describe atoms of a given element as having the same number of protons in the nucleus and that this number is unique to that element 1.10 Calculate the numbers of protons, neutrons and electrons in atoms given the atomic number and mass number	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided based around the model used for the atom in the present day.
2. What is an isotope?	1.9 Describe isotopes as different atoms of the same element containing the same number of protons but different numbers of neutrons in their nuclei 1.11 Explain how the existence of isotopes results in relative atomic HT ONLY 1.12 Calculate the relative atomic mass of an element from the relative masses and abundances of its isotopes	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be a link with the extended answer question on atomic structure with this topic.
3. How can we use the periodic table to gain information on an elements atomic structure?	1.13 Describe how Mendeleev arranged the elements, known at that time, in a periodic table by using properties of these elements and their compounds 1.14 Describe how Mendeleev used his table to predict the existence and properties of some elements not then discovered 1.15 Explain that Mendeleev thought he had arranged elements in order of increasing relative atomic mass but this was not always true because of the relative abundance of isotopes of some pairs of elements in the periodic table 1.16 Explain the meaning of atomic number of an element in terms of position in the periodic table and number of protons in the nucleus 1.17 Describe that in the periodic table a. elements are arranged in order of increasing atomic number, in rows called periods b. elements with similar properties are placed in the same vertical columns called groups 1.18 Identify elements as metals or non-metals according to their position in the periodic table, explaining this division in terms of the atomic structures of the elements 1.19 Predict the electronic configurations of the first 20 elements in the periodic table as diagrams and in the form, for example 2.8.1 1.20 Explain how the electronic configuration of an element is related to its position in the periodic table	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. Students will use this information to predict the atomic structure and electronic configuration of elements.

Curriculum and Assessment Overview: Atomic structure and the periodic table

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Key Term	Definition	Key Term	Definition
Atom	Small particles from which all substances are made. They are the smallest neutral part of an element that can take part in chemical reactions.	Relative Atomic Mass (RAM)	The mean mass of an atom relative to the mass of an atom of carbon-12, which is assigned a mass of 12. The RAM of an element is the mean relative mass of the isotopes in the element.
Relative Mass	The mass of a subatomic particle compared to the mass of a proton.	Prediction	What you think will happen in an experiment and why you think this.
Subatomic Particles	The smaller particles that make up atoms – protons, neutrons and electrons.	Group	A vertical column of elements in the periodic table. Elements in the same group generally have similar properties.
Atomic number	The number of protons in the nucleus of an atom (symbol *Z*). Also known as the proton number.	Inert	Does not react.
Mass number	The total number of protons and neutrons in the nucleus of an atom (symbol *A*). Also known as the nucleon number.	X-ray	Electromagnetic radiation that has a shorter wavelength than UV but longer than gamma rays.
A_r	Symbol for relative atomic mass (RAM).	Electron	Tiny particle with a negative charge that is found in shells around the nucleus of an atom.
Isotopes	Atoms of an element with the same number of protons (atomic number) but different mass numbers due to different numbers of neutrons.	Electron shell	Areas around a nucleus that can be occupied by electrons, usually drawn as circles. Also called an electron energy level.
Nuclear fission	The reaction in which the nucleus of a large atom, such as uranium, splits into two smaller nuclei.	Electronic configuration	The arrangement of electrons in shells around the nucleus of an atom.

Curriculum and Assessment Overview: States of Matter and Separation Techniques

Department Name: **Science** **Year: 10**

Unit Topic: C1 & C2 States of Matter and Separation Techniques

Composite Question: How do we define and refine substances?

Why this and why now? This topic builds on content first started at the beginning of year 7 and developed throughout KS3. This unit will strengthen these concepts and enable more complex topics (such as the fractional distillation of oil and production of a sample of a pure salt) in later units to be understood.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How do we describe and explain the properties of solids, liquids and gases?	Describe the arrangement, movement and the relative energy of particles in each of the three states of matter: solid, liquid and gas Recall the names used for the interconversions between the three states of matter, recognising that these are physical changes: contrasted with chemical reactions that result in chemical changes Explain the changes in arrangement, movement and energy of particles during these interconversions Predict the physical state of a substance under specified conditions, given suitable data	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. What are mixtures and how do we separate them?	Interpret melting point data to distinguish between pure substances which have a sharp melting point and mixtures which melt over a range of temperatures Explain the types of mixtures that can be separated by using the following experimental techniques: a simple distillation b fractional distillation c filtration d crystallisation e paper chromatography Describe an appropriate experimental technique to separate a mixture, knowing the properties of the components of the mixture Describe paper chromatography as the separation of mixtures of soluble substances by running a solvent (mobile phase) through the mixture on the paper (the paper contains the stationary phase), which causes the substances to move at different rates over the paper Interpret a paper chromatogram: a to distinguish between pure and impure substances b to identify substances by comparison with known substances c to identify substances by calculation and use of Rf values	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will be a core practical (to include distillation and chromatography) in this unit which you will have to complete. Separation techniques will be assessed in an extended question with whole class feedback given.
3. How do we make clean drinking water?	You will need to know how the techniques you have learnt about earlier in the unit can be used to produce potable water in desalination plants.	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. Desalination will also be assessed using an extended question where whole class feedback will be given.

Curriculum and Assessment Overview: States of Matter and Separation Techniques

Key Term	Definition	Key Term	Definition
compound	A substance that can be split into simpler substances, because it contains the atoms of two or more elements joined together.	solvent	The liquid in which a solute dissolve to make a solution.
element	A substance made up of only atoms with the same number of protons in the nucleus.	chromatography	A technique for separating the components of a mixture – for example different food colouring agents.
mixture	Two or more substances jumbled together but not joined to each other. The substances in many mixtures can be separated from each other.	stationary phase	The surface through which the solvent and dissolved substances move in chromatography.
crystallisation	Separating the solute from a solution by evaporating the solvent.	mobile phase	In paper chromatography, the solvent that moves along the paper carrying the dissolved samples with it.
distillation	The process of separating a liquid from a mixture by evaporating the liquid and then condensing it (so that it can be collected).	Rf value	The ratio of the distance travelled by the solute on a chromatogram (measured from the centre of the spot) to the distance travelled by the solvent under the same conditions. The values for different substances can be used to identify them.
filtration	Using a filter to separate insoluble substances from a liquid.	filtrate	Solution passing through a filter.
insoluble	Describes a substance that cannot be dissolved in a certain liquid.	precipitate	Insoluble substance formed when two soluble substances react together.
solute	Substance that dissolves in a liquid to make a solution.	sedimentation	The process in which rock grains and insoluble substances sink to the bottom of a liquid.

Curriculum and Assessment Overview: Materials and Reversible Reactions

Department Name: **Science** **Year: 11**

Unit Topic: C10 Electrolytic processes C11 Obtaining Materials & C12 Reversible Reactions

Composite Question: How can raw materials needed for modern society be gathered?

Why this and why now? You previously learned about the basics of the reactivity series in KS3, based on the ability for some metals to take the place of others. This knowledge can now be taken and stretched to think about where the base metals for many applications are extracted. You will also currently be learning about Electrolysis which links directly to the processes you will mention here, contributing to stronger in subject links. Finally – for all the metals that we need so much of, you will be able to explain why typical extraction practices you have previously learned are not necessarily the best option in the modern day. This topic will provide you with a in depth understanding of the process of electrolysis. This topic will then lead you onto future topics which explore how finite raw materials are extracted from ores and how it relates to current world issues such as recycling and sustainability.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is a displacement Reaction?	4.1 Deduce the relative reactivity of some metals, by their reactions with water, acids and salt solutions 4.2 HT Explain displacement reactions as redox reactions, in terms of gain or loss of electrons 4.3 Explain the reactivity series of metals (potassium, sodium, calcium, magnesium, aluminium, (carbon), zinc, iron, (hydrogen), copper, silver, gold) in terms of the reactivity of the metals with water and dilute acids and that these reactions show the relative tendency of metal atoms to form cations	End of topic test.
2. What is an ore, and how can I get metals out of them?	4.4 Recall that: a) most metals are extracted from ores found in the Earth's crust b) unreactive metals are found in the Earth's crust as the uncombined elements 4.7 Explain why the method used to extract a metal from its ore is related to its position in the reactivity series and the cost of the extraction process, illustrated by: a) heating with carbon (including iron) b) electrolysis (including aluminium) (knowledge of the blast furnace is not required) 4.8 HT Evaluate alternative biological methods of metal extraction (bacterial and phytoextraction) 4.2 Explain displacement reactions as redox reactions, in terms of gain or loss of electrons 4.5 Explain oxidation as the gain of oxygen and reduction as the loss of oxygen 4.6 Recall that the extraction of metals involves reduction of ores 4.9 Explain how a metal's relative resistance to oxidation is related to its position in the reactivity series 4.10 Evaluate the advantages of recycling metals, including economic implications and how recycling can preserve both the environment and the supply of valuable raw materials 4.11 Describe that a life-cycle assessment for a product involves consideration of the effect on the environment of obtaining the raw materials, manufacturing the product,	End of topic test. You will also complete an extended question for which you will received whole class feedback.

Curriculum and Assessment Overview:
Materials and Reversible Reactions

	using the product and disposing of the product when it is no longer useful 4.12 Evaluate data from a life cycle assessment of a product	
3. What is electrolysis?	3.22 Recall that electrolytes are ionic compounds in the molten state or dissolved in water 3.23 Describe electrolysis as a process in which electrical energy, from a direct current supply, decomposes electrolytes 3.24 Explain the movement of ions during electrolysis, in which: a. positively charged cations migrate to the negatively charged cathode b. negatively charged anions migrate to the positively charged anode 3.27 Write half equations for reactions occurring at the anode and cathode in electrolysis 3.28 Explain oxidation and reduction in terms of loss or gain of electrons 3.29 Recall that reduction occurs at the cathode and that oxidation occurs at the anode in electrolysis reactions 3.31 Core Practical: Investigate the electrolysis of copper sulfate solution with inert electrodes and copper electrodes	End of topic test (combined with topics C11 & C12)
4. What are the products of electrolysis?	3.25 Explain the formation of the products in the electrolysis, using inert electrodes, of some electrolytes, including: a. copper chloride solution b. sodium chloride solution c. sodium sulfate solution d. water acidified with sulfuric acid e. molten lead bromide (demonstration) 3.26 Predict the products of electrolysis of other binary, ionic compounds in the molten state 3.30 Explain the formation of the products in the electrolysis of copper sulfate solution, using copper electrodes, and how this electrolysis can be used to purify copper	End of topic test (combined with topics C11 & C12). You will also complete an extended question for which you will received whole class feedback.
5. Why can some reactions go backwards?	4.13 Recall that chemical reactions are reversible, the use of the symbol ⇌ in equations and that the direction of some reversible reactions can be altered by changing the reaction conditions 4.14 Explain what is meant by dynamic equilibrium 4.17 HT ONLY Predict how the position of a dynamic equilibrium is affected by changes in: a) temperature b) pressure c) concentration	End of topic test. You may also complete an extended question on hydrogen as a fuel for which you will receive whole class feedback.
6. Who was Fritz Haber?	4.15 Describe the formation of ammonia as a reversible reaction between nitrogen (extracted from the air) and hydrogen (obtained from natural gas) and that it can reach a dynamic equilibrium 4.16 Recall the conditions for the Haber process as: a) temperature 450 °C b) pressure 200 atmospheres c) iron catalyst	End of topic test.

Curriculum and Assessment Overview: Materials and Reversible Reactions

Key Term	Definition	Key Term	Definition
Reduction	The process in which a species gains electrons. / The process in which a species loses oxygen.	**Reversible**	A process that can take place in a forwards or backwards direction
Oxidation	The process in which a species loses electrons. / The process in which a species gains oxygen.	**Conditions**	Factors including temperature, surface area and others that are important to control in a chemical process
Electrolysis	Using electricity to chemically separate an ionic compound into its elements.		
Displacement	A redox reaction in which a more reactive species takes the place of a less reactive species in a compound		
Reactivity Series	A list of metallic elements in order of their reactivity in descending order.		
Ore	A mineral / rock that contains a high enough proportion of metal content to be financially viable to extract.		
Phytomining	A process in which plants are used to extract metals from low grade ores.		
Bioleaching	A process in which bacteria extract metals from an ore by creating a leachate solution		

Curriculum and Assessment Overview: Acids and Alkalis

Department Name: **Science** **Year: 11**

Unit Topic: C8 Acids and Alkalis

Composite Question: What are acids and alkalis and how do they react?

Why this and why now? This topic builds on the chemical reactions of acids and alkalis topics in KS3. At KS4 we will further our understanding of acids, alkalis and bases. This will include specific reactions as well as a core practical work. Word and symbol equations will be required along with specific terminology and knowledge of salts and gases produced in reactions.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What are acids, bases, alkalis and salts?	3.1 Recall that acids in solution are sources of hydrogen ions and alkalis in solution are sources of hydroxide ions 3.2 Recall that a neutral solution has a pH of 7 and that acidic solutions have lower pH values and alkaline solutions higher pH values 3.3 Recall the effect of acids and alkalis on indicators, including litmus, methyl orange and phenolphthalein HT ONLY 3.4 Recall that the higher the concentration of hydrogen ions in an acidic solution, the lower the pH; and the higher the concentration of hydroxide ions in an alkaline solution, the higher the pH 3.9 Recall that a base is any substance that reacts with an acid to form a salt and water only	Properties of ethanoic acid extended answer question (with WCF). Other content tested in end of topic test (with MMA).
2. How do these chemicals react?	3.11 Explain the general reactions of aqueous solutions of acids with: a) metals b) metal oxides c) metal hydroxides d) metal carbonates to produce salts 3.13 Describe a neutralisation reaction as a reaction between an acid and a base 3.15 Explain why, if soluble salts are prepared from an acid and an insoluble reactant: a) excess of the reactant is added b) the excess reactant is removed c) the solution remaining is only salt and water	Tested in end of topic test (with MMA).
3. What are the outcomes of these reactions?	3.10 Recall that alkalis are soluble bases 3.11 Explain the general reactions of aqueous solutions of acids with: a) metals b) metal oxides c) metal hydroxides d) metal carbonates to produce salts 3.12 Describe the chemical test for: a) hydrogen b) carbon dioxide (using limewater) 3.14 Explain an acid-alkali neutralisation as a reaction in which hydrogen ions (H+) from the acid react with hydroxide ions (OH–) from the alkali to form water 3.16 Explain why, if soluble salts are prepared from an acid and a soluble reactant: a) titration must be used b) the acid and the soluble reactant are then mixed in the correct proportions c) the solution remaining, after reaction, is only salt and water 3.18 Describe how to carry out an acid-alkali titration, using burette, pipette and a suitable indicator, to prepare a pure, dry salt 3.17 Core Practical: Investigate the preparation of pure, dry hydrated copper sulfate crystals starting from copper oxide including the use of a water bath 3.6 Core Practical: Investigate the change in pH on adding powdered calcium hydroxide or calcium oxide to a fixed volume of dilute hydrochloric acid	Solubility tested in extended answer question (with WCF). Other content tested in end of topic test (with MMA).

	3.19 Recall the general rules which describe the solubility of common types of substances in water: a) all common sodium, potassium and ammonium salts are soluble b) all nitrates are soluble c) common chlorides are soluble except those of silver and lead d) common sulfates are soluble except those of lead, barium and calcium e) common carbonates and hydroxides are insoluble except those of sodium, potassium and ammonium 3.20 Predict, using solubility rules, whether or not a precipitate will be formed when named solutions are mixed together, naming the precipitate if any 3.21 Describe the method used to prepare a pure, dry sample of an insoluble salt	
4. What does pH mean?	3.5 Recall that as hydrogen ion concentration in a solution increases by a factor of 10, the pH of the solution decreases by 1 3.7 Explain the terms dilute and concentrated, with respect to amount of substances in solution 3.8 Explain the terms weak and strong acids, with respect to the degree of dissociation into ions	Tested in end of topic test (with MMA).

Curriculum and Assessment Overview: Acids and Alkalis

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Key Term	Definition	Key Term	Definition
acid	A solution with a pH of less than 7 and that contains an excess of hydrogen (H^+) ions. Acids turn litmus red.	neutralize	To make a solution neither acidic nor alkaline. During neutralization a base reacts with an acid, forming a salt and water.
alkali	A solution with a pH of more than 7 and that contains an excess of hydroxide (OH^-) ions. Alkalis turn litmus blue.	dissociate	To split up or separate into different parts. For example, acid molecules dissociate into H+ ions and negative ions when they dissolve in water
indicator	A substance that changes colour depending on the pH of a solution	salt	An ionic compound produced by a neutralization reaction.
neutral	A substance that is neither an acid nor an alkali. Neutral solutions have a pH of 7 and the same concentrations of hydrogen (H^+) and (OH^-) ions.	titration	Method used to mix acids and alkalis in the correct proportions to produce a solution containing only salt and water. It can be used to find the concentration of an acid or an alkali.
pH scale	A numerical scale up to 14 that measures the acidity or alkalinity of a solution based on the concentrations of hydrogen (H^+) and (OH^-) ions.	effervescence	Fizzing or a stream of bubbles produced during a reaction.
base	Any substance, soluble or insoluble, that neutralizes an acid, forming a salt and water only.	oxidation	A reaction in which a substance gains oxygen or in which an atom or ion loses electrons.
precipitate	An insoluble product formed when solutions of two soluble reactants are mixed.	reduction	A reaction in which a substance loses oxygen or in which an atom or ion gains electrons.
strong acid	An acidic solute that dissociates completely into ions when it dissolves.	spectator ions	These are ions that do not change during a reaction
weak acid	An acidic solute that does not dissociate completely into ions when it dissolves.		

Curriculum and Assessment Overview: Plants and photosynthesis

Department Name: **Science** **Year: 11**

Unit Topic: B6 Plants and Photosynthesis

Composite Question: Why are green plants so important to us?

Why this and why now? Photosynthesis is the most important biochemical process on Earth. Most living beings depend on it directly or indirectly. Knowledge about photosynthesis enables us to understand how the world functions as an ecosystem and how photosynthesis acts as a bridge between the non-living and living worlds. This topic links to aspects of biology met at KS3 and earlier in the GCSE course. You will build on your knowledge of plant cell structure and function to look at how cells are specialized to enable the plant to perform the key process – photosynthesis. You will investigate the reaction in detail, looking at how, when and why it happens. Your knowledge of enzymes will help you to explain how temperature affects the reaction

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is photosynthesis?	Describe photosynthetic organisms as the main producers of food and therefore biomass. Describe photosynthesis in plants and algae as an endothermic reaction that uses light energy to react carbon dioxide and water to produce glucose and oxygen. Explain the structure and function of the stomata. Explain the effect of temperature, light intensity and carbon dioxide concentration as limiting factors on the rate of photosynthesis. Explain the interactions of temperature, light intensity and carbon dioxide concentration in limiting the rate of photosynthesis. Explain how the rate of photosynthesis is directly proportional to light intensity and inversely proportional to the distance from a light source, including the use of the inverse square law calculation. Core practical: Investigate the effect of light intensity on the rate of photosynthesis	Prior learning checked at start of unit. New content assessed in end of topic test (with MMA).
2. How are water, minerals and sugars transported through the plant?	Explain how the structures of the xylem and phloem are adapted to their function in the plant Revisit the idea of how substances are transported into and out of cells (seen in B1) Explain how water and mineral ions are transported through the plant by transpiration, including the structure and function of the stomata Describe how sucrose is transported around the plant by translocation Explain the effect of environmental factors on the rate of water uptake by a plant, to include light intensity, air movement and temperature Demonstrate an understanding of rate calculations for transpiration	There is an extended answer question based on transpiration and translocation (with WCF). Content will be tested with the end of topic test (with MMA).

Curriculum and Assessment Overview: Plants and photosynthesis

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Curriculum and Assessment Overview: Plants and photosynthesis

Key Term	Definition	Key Term	Definition
cellulose	Plant cell walls are made of tough cellulose, which support the cell and allow it to keep its shape.	limiting factor	A single factor that, when in short supply, can limit the rate of a process such as photosynthesis.
chloroplast	A green disc containing chlorophyll, found in plant cells. This is where the plant makes glucose through photosynthesis.	active transport	The movement of particles across a cell membrane from a region of lower concentration to a region of higher concentration (*against* the concentration gradient). This process requires energy.
gas exchange	A process in which one gas diffuses across a membrane and another gas diffuses in the opposite direction.	concentration gradient	The difference between two concentrations.
glucose	The sugar produced by photosynthesis and needed for respiration.	diffusion	The random movement and spreading of particles. There is a net (overall) diffusion of particles from regions of higher concentration to regions of lower concentration.
guard cell	A pair of guard cells open and close plant stomata.	osmosis	The overall movement of *solvent* molecules in a solution across a partially permeable membrane, from a dilute solution to a more concentrated one.
palisade cell	Tall, column-shaped cell near the upper surface of a plant leaf.	root hair cell	A cell found on the surface of plant roots that has a large surface area to absorb water and dissolved mineral salts quickly from the soil.
photosynthesis	A series of enzyme-catalysed reactions carried out in the green parts of plants. Carbon dioxide and water combine to form glucose. This process requires energy transferred by light.	translocation	The transport of sugars (mainly sucrose) and other soluble compounds in the phloem tissue of a plant.
sucrose	The type of sugar found in the phloem of plants and used as table sugar.	transpiration	The flow of water into a root, up the stem and out of the leaves.

Curriculum and Assessment Overview: Nuclear Radiation

Department Name: **Science** **Year: 11**

Unit Topic: P6 – Nuclear Radiation

Composite Question: What is nuclear radiation?

Why this and why now? This topic builds on the knowledge of the atomic model, isotopes, and waves in order to explain how isotopes may become unstable and lead to the process of radioactive decay. It is important to understand the 3 types of radioactive decay including what they are, how it occurs, and the effects of each of them. This will lead on to how we can calculate the half-life of radioactive isotopes, allowing students to understand the length of time a material could be radioactive for.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is the atomic model?	6.1: Describe an atom as a positively charged nucleus, consisting of protons and neutrons, surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with almost all of the mass in the nucleus 6.2: Recall the typical size (order of magnitude) of atoms and small molecules 6.17: Describe how and why the atomic model has changed over time including reference to the plum pudding model and Rutherford alpha particle scattering leading to the Bohr model 6.3: Describe the structure of nuclei of isotopes using the terms atomic (proton) number and mass (nucleon) number and using symbols in the format using symbols in the standard format where atomic mass is the top number and atomic number is the bottom number 6.4: Recall that the nucleus of each element has a characteristic positive charge, but that isotopes of an element differ in mass by having different numbers of neutrons 6.5: Recall the relative masses and relative electric charges of protons, neutrons, electrons and positrons 6.6: Recall that in an atom the number of protons equals the number of electrons and is therefore neutral	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.
2. How do electrons move between energy levels?	6.7: Recall that in each atom its electrons orbit the nucleus at different set distances from the nucleus 6.8: Explain that electrons change orbit when there is absorption or emission of electromagnetic radiation	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
3. What are ions, and isotopes?	6.9: Explain how atoms may form positive ions by losing outer electrons	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
4. What types of radiation are there and how do they happen?	6.10: Recall that alpha, β– (beta minus), β+ (positron), gamma rays and neutron radiation are emitted from unstable nuclei in a random process 6.11: Recall that alpha, β– (beta minus), β+ (positron) and gamma rays are ionising radiations	

Curriculum and Assessment Overview: Nuclear Radiation

	6.15: Recall that an alpha particle is equivalent to a helium nucleus, a beta particle is an electron emitted from the nucleus and a gamma ray is electromagnetic radiation 6.16: Compare alpha, beta and gamma radiations in terms of their abilities to penetrate and ionize 6.18: Describe the process of β– decay (a neutron becomes a proton plus an electron) 6.19: Describe the process of β+ decay (a proton becomes a neutron plus a positron) 6.20: Explain the effects on the atomic (proton) number and mass (nucleon) number of radioactive decays (α, β, γ and neutron emission) 6.21: Recall that nuclei that have undergone radioactive decay often undergo nuclear rearrangement with a loss of energy as gamma radiation	
5. How can we write nuclear equations, and how do we calculate half-life?	6.22: Use given data to balance nuclear equations in terms of mass and charge 6.23: Describe how the activity of a radioactive source decreases over a period of time 6.24: Recall that the unit of activity of a radioactive isotope is the Becquerel, Bq 6.25: Explain that the half-life of a radioactive isotope is the time taken for half the undecayed nuclei to decay or the activity of a source to decay by half 6.26: Explain that it cannot be predicted when a particular nucleus will decay but half-life enables the activity of a very large number of nuclei to be predicted during the decay process 6.27: Use the concept of half-life to carry out simple calculations on the decay of a radioactive isotope, including graphical representations	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
6. What are the sources of background radiation?	6.12: Explain what is meant by background radiation 6.13: Describe the origins of background radiation from Earth and space 6.14: Describe methods for measuring and detecting radioactivity limited to photographic film and a Geiger–Müller tube	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.

Curriculum and Assessment Overview: Nuclear Radiation

Key Term	Definition	Key Term	Definition
atom	The smallest neutral part of an element that can take part in chemical reactions.	background radiation	Ionising radiation that is around us all the time from a number of sources. Some background radiation is naturally occurring, but some comes from human activities.
electron	A tiny particle with a negative charge and very little mass.	cosmic rays	Charged particles with a high energy that come from stars, neutron stars, black holes and supernovae.
subatomic particle	A particle that is smaller than an atom, such as a proton, neutron or electron.	alpha particle	A particle made of two protons and two neutrons, emitted as ionising radiation from some radioactive isotopes.
atomic number	The number of protons in the nucleus of an atom. It is also known as the proton number.	beta particle	A particle of radiation emitted from the nucleus of a radioactive atom when it decays. It is an electron.
isotope	Atoms of an element with the same number of protons (atomic number) but different mass numbers due to different numbers of neutrons.	decay (radioactive)	When an unstable nucleus changes by giving out ionising radiation to become more stable.
mass number	The total number of protons and neutrons in the nucleus of an atom. It is also known as the nucleon number.	gamma ray	A high-frequency electromagnetic wave emitted from the nucleus of a radioactive atom.
electromagnetic radiation	A form of energy transfer, including radio waves, microwaves, infrared, visible light, ultraviolet, X-rays and gamma rays.	nuclear equation	An equation representing a change in an atomic nucleus due to radioactive decay. The atomic numbers and mass numbers must balance.
ion	An atom or group of atoms with an electrical charge due to the gain or loss of electrons.	half-life	The average time taken for half of the radioactive nuclei in a sample of radioactive material to have decayed. It is also the time taken for the activity of a source to fall to half its value.

Curriculum and Assessment Overview: Rates of Reaction

Department Name: **Science** **Year: 11**

Unit Topic: C14 – Rates of Reaction

Composite Question: How can rates of reaction be influenced?

Why this and why now? Students will be using their knowledge from KS3 in order to construct balanced chemical equations, ionic equations with the inclusion of state symbols. This will be built upon in order to explain energy changes in chemical reactions, and how factors such as temperature, concentration, surface area and catalysts influence the rate of reaction.

What am I Learning?	What do I need to know?	How will I be assessed?
1. How can we determine rate of reaction?	7.2 Suggest practical methods for determining the rate of a given reaction 7.5 Interpret graphs of mass, volume or concentration of reactant or product against time	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
2. What factors affect rate of reaction?	7.3 Explain how reactions occur when particles collide and that rates of reaction are increased when the frequency and/or energy of collisions is increased 7.4 Explain the effects on rates of reaction of changes in temperature, concentration, surface area to volume ratio of a solid and pressure (on reactions involving gases) in terms of frequency and/or energy of collisions between particles	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
3. How can we investigate reaction rates? (CORE PRACTICAL)	7.1 Core Practical: Investigate the effects of changing the conditions of a reaction on the rates of chemical reactions by: a) measuring the production of a gas (in the reaction between hydrochloric acid and marble chips) b) observing a colour change (in the reaction between sodium thiosulfate and hydrochloric acid)	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided on power.
4. How do catalysts work?	7.6 Describe a catalyst as a substance that speeds up the rate of a reaction without altering the products of the reaction, being itself unchanged chemically and in mass at the end of the reaction 7.7 Explain how the addition of a catalyst increases the rate of a reaction in terms of activation energy 7.8 Recall that enzymes are biological catalysts and that enzymes are used in the production of alcoholic drinks	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.

Curriculum and Assessment Overview: Rates of Reaction

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Key Term	Definition	Key Term	Definition
product	A substance formed in a reaction.	exothermic	A type of reaction in which energy is transferred to the surroundings from the reactants. The products have less stored energy than the reactants have.
rate	How quickly something happens.	active site	The space in an enzyme where the substrate fits during an enzyme-catalysed reaction.
reactant	A substance used up in a chemical reaction.	catalyst	A substance that increases the rate of a reaction without itself being used up.
variable	A factor that can change.	denatured	An enzyme in which the shape of the active site has changed so much that its substrate no longer fits and the reaction can no longer happen.
activation energy	The minimum amount of energy needed to start a reaction.	enzyme	A protein produced by living organisms that acts as a catalyst to increase the rate of a reaction.
endothermic	A type of reaction in which energy from the surroundings is transferred to the products. The products have more stored energy than the reactants have.	protein	A polymer made up of amino acids.
reaction profile	A diagram to show how the energy stored in substances changes during a chemical reaction.	substrate	A substance that is changed during a reaction.

Curriculum and Assessment Overview: Health and Disease

Department Name: **Science** **Year: 11**

Unit Topic: B5 Health, Disease and the Development of Medicines

Composite Question: What is health and how to we maintain it?

Why this and why now? This topic adds detail and understanding to knowledge from KS3. The cause of communicable and non-communicable diseases will be studied and combined with knowledge about cells to discuss the immune system and the development of medicines.

What am I Learning?	What do I need to know?	How will I be assessed?
1. What is health and disease?	5.1 Describe health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, as defined by the World Health Organization (WHO) 5.2 Describe the difference between communicable and non-communicable diseases 5.3 Explain why the presence of one disease can lead to a higher susceptibility to other diseases 5.4 Describe a pathogen as a disease-causing organism, including viruses, bacteria, fungi and protists. 5.5 Describe some common infections, including: a) cholera (bacteria) causes diarrhoea b) tuberculosis (bacteria) causes lung damage c) Chalara ash dieback (fungi) causes leaf loss and bark lesions d) malaria (protists) causes damage to blood and liver e) HIV (virus) destroys white blood cells, leading to the onset of AIDS f) stomach ulcers caused by Helicobacter (bacteria) g) Ebola (virus) causes haemorrhagic fever 5.8 Explain how sexually transmitted infections (STIs) are spread and how this spread can be reduced or prevented, including: a) Chlamydia (bacteria) b) HIV (virus) 5.23 Describe that many non-communicable human diseases are caused by the interaction of a number of factors, including cardiovascular diseases, many forms of cancer, some lung and liver diseases and diseases influenced by nutrition 5.24 Explain the effect of lifestyle factors on non-communicable diseases at local, national and global levels, including: a) exercise and diet on obesity and malnutrition, including BMI and waist : hip calculations, using the BMI equation. b) alcohol on liver diseases c) smoking on cardiovascular diseases 5.25 Evaluate some different treatments for cardiovascular disease, including: a) life-long medication b) surgical procedures c) lifestyle changes	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will be an extended question (with whole class feedback) based on communicable and non-communicable disease.
2. How does our body protect against and fight disease?	5.12 Describe how the physical barriers and chemical defences of the human body provide protection from pathogens, including: a) physical barriers, including mucus, cilia and skin b) chemical defence, including lysozymes and hydrochloric acid	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.
3. How can we support our immune system?	5.13 Explain the role of the specific immune system of the human body in defence against disease, including: a) exposure to pathogen b) the antigens trigger an immune response which causes the production of antibodies c) the antigens also trigger production of memory lymphocytes d) the role of memory lymphocytes in the secondary response to the antigen 5.14 Explain the body's response to immunisation using an inactive form of a pathogen 5.16 Explain that antibiotics can only be used to treat bacterial infections because they inhibit cell processes in the bacterium but not the host organism 5.20 Describe that the process of developing new medicines, including antibiotics, has many stages, including discovery, development, preclinical and clinical testing	This will be tested as part of the MCQ end of topic test where you will be given individual feedback.

Curriculum and Assessment Overview: Health and Disease

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Key Term	Definition	Key Term	Definition
health	A state of complete physical, social and mental well-being.	physical barrier	A structure that stops something from entering a certain area. For example, the body has physical barriers, such as the skin, that stop microbes from getting inside the body.
communicable disease	A disease caused by a pathogen that can be passed from an infected individual to others. Also called an infectious disease.	antibody	A protein produced by lymphocytes. It attaches to a specific antigen on a microorganism and helps to destroy it.
non-communicable disease	A disease that cannot be passed from individuals to those around them. Examples include inherited diseases and some diseases caused by lifestyle.	antigen	A protein on the surface of a cell. White blood cells are able to recognise pathogens because of their antigens.
pathogen	A microorganism that causes a communicable disease.	lymphocyte	A type of white blood cell that produces antibodies.
cirrhosis	A disease of the liver, often caused by drinking a large amount of ethanol (alcohol) over a long period of time.	vaccine	A mixture containing weakened or inactive pathogens, or antigens from the pathogen. When put into the body it causes an immune response.
cardiovascular disease	A disease in which the heart or circulatory system does not function properly.	secondary response	A much more rapid, and larger, production of antibodies to a pathogen when it infects the body again.
white blood cell	A type of blood cell that forms part of the body's defence system against disease.	memory lymphocyte	A lymphocyte that remains in the blood for a long time after an infection or vaccination.
chemical defence	The use of chemical compounds to defend against attacks. Examples include lysozyme and hydrochloric acid.	immunisation	Giving a vaccine that causes an immune response without the person becoming ill, and which will make the person immune to the pathogen.

Curriculum and Assessment Overview: Health and Disease

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Curriculum and Assessment Overview: Masses and Moles

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Department Name: **Science** **Year: 11**

Unit Topic: C9 Masses and Moles

Composite Question: How do we know how much of a reactant is needed?

Why this and why now? This topic builds on the knowledge of atomic number and mass introduced in KS3 and developed earlier in KS4. By combining these concepts with conservation of mass and ratio (from Maths), the concept of empirical formula and moles are developed. These principles and the calculations involved will then be used in all areas of the chemistry units in KS4.

What am I Learning?	What do I need to know?	How will I be assessed?
1. Formula mass and empirical formulae.	1.43 Calculate relative formula mass given relative atomic masses 1.44 Calculate the formulae of simple compounds from reacting masses or percentage composition and understand that these are empirical formulae 1.45 Deduce: a) the empirical formula of a compound from the formula of its molecule b) the molecular formula of a compound from its empirical formula and its relative molecular mass 1.46 Describe an experiment to determine the empirical formula of a simple compound such as magnesium oxide 1.47 Explain the law of conservation of mass applied to: a) a closed system including a precipitation reaction in a closed flask b) a non-enclosed system including a reaction in an open flask that takes in or gives out a gas 1.48 Calculate masses of reactants and products from balanced equations, given the mass of one substance HT 1.52 Explain why, in a reaction, the mass of product formed is controlled by the mass of the reactant which is not in excess HT 1.53 Deduce the stoichiometry of a reaction from the masses of the reactants and products	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.
2. Concentration.	1.49 Calculate the concentration of solutions in g dm^{-3}	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.
3. Moles and stoichiometry	1.50 Recall that one mole of particles of a substance is defined as: a) the Avogadro constant number of particles (6.02 × 1023 atoms, molecules, formulae or ions) of that substance b) a mass of 'relative particle mass' g 1.51 Calculate the number of: a) moles of particles of a substance in a given mass of that substance and vice versa b) particles of a substance in a given number of moles of that substance and vice versa c) particles of a substance in a given mass of that	This will be tested as part of the MCQ end of topic test where you will be given individual feedback. There will also be an extended answer question for which whole class feedback will be provided.

	substance and vice versa HT 1.52 Explain why, in a reaction, the mass of product formed is controlled by the mass of the reactant which is not in excess HT 1.53 Deduce the stoichiometry of a reaction from the masses of the reactants and products	

Curriculum and Assessment Overview: Masses and Moles

Dame Elizabeth Cadbury School

Key Term	Definition	Key Term	Definition
empirical formula	The formula showing the simplest whole number ratio of atoms of each element in a compound.	closed system	When substances cannot enter or leave an observed environment, e.g. a stoppered test tube.
molecular formula	The formula showing the actual number of atoms of each element in a molecule of a compound.	law of conservation of mass	The idea that mass is never lost or gained during a chemical reaction or physical change.
relative formula mass	The sum of the relative atomic masses of all the atoms in a formula.	non-enclosed system	When substances can enter or leave an observed environment e.g. stoppered test tube
concentration	The amount of a solute dissolved in a certain volume of solvent.	Avogadro constant	This is the number of particles in one mole of a substance (6.02 ×1023 mol−1).
solute	A substance that dissolves in a liquid to make a solution.	limiting reactant	The reactant that determines the amount of product formed in a chemical reaction. Any other reactants will be present in excess.
solvent	Describes the liquid in which a substance dissolves to make a solution.	mole	The mass of a mole of a substance is the relative formula mass expressed in grams.
precipitate	An insoluble substance that is formed when two soluble substances react together in solution.	stoichiometry	The molar ratio of the reactants and products in a chemical reaction.