

Year 7	Autumn Term	Spring Term	Summer Term
<b>Focus</b>	<b>Gravity, Speed, Particle Model, Separating Mixtures, Cells, Movement</b>	<b>Energy Transfer, Energy Costs, Metals &amp; Non-metals, Acids &amp; alkalis, Plant Reproduction, Human Reproduction</b>	<b>Voltage, Resistance &amp; Current, Interdependence, Variation, Sound &amp; Light</b>
<b>Description</b>	<p><b>Gravity</b> Explain unfamiliar observations where weight changes, draw force diagrams for problems involving gravity, deduce how gravity varies dependent on mass and distance, compare your weight on Earth with your weight on different planets using the formula</p> <p><b>Skill:</b> Use a formula to calculate weight from mass</p> <p><b>Keywords</b> <b>Weight:</b> The force of gravity on an object (N). <b>Non-contact force:</b> One that acts without direct contact. <b>Mass:</b> The amount of stuff in an object (kg). <b>Gravitational field strength, g:</b> The force from gravity on 1 kg (N/kg). <b>Field:</b> The area where other objects feel a gravitational force.</p> <p><b>Speed</b> Illustrate a journey with changing speed on a distance-time graph and label changes in motion</p> <p>Describe how the speed of an object varies when measured by observers that are not moving or moving relative to the object</p> <p><b>Skill:</b> Use formula speed = distance/time or distance-time graph calculations</p>	<p><b>Energy Transfer</b> Describe how the energy of an object depends on its speed, temperature, height or whether it is stretched or compressed, show how energy is transferred between energy stores in real life examples, calculate the useful energy and the amount dissipated, given values of input and output energy, explain how energy is dissipated in a range of situations</p> <p><b>Keywords</b> <b>Thermal energy store:</b> Filled when an object is warmed up. <b>Chemical energy store:</b> Emptied during chemical reactions when energy is transferred to the surroundings. <b>Kinetic energy store:</b> Filled when an object speeds up. <b>Gravitational potential energy store:</b> Filled when an object is raised. <b>Elastic energy store:</b> Filled when a material is stretched or compressed. <b>Dissipated:</b> Become spread out wastefully.</p> <p><b>Energy Costs</b> Compare the amounts of energy transferred by different foods and activities, compare the energy usage and cost of running different household appliances, explain the advantages &amp; disadvantages of different energy resources, represent the energy transfers from a renewable or non-renewable resource to an electrical device</p> <p><b>Skill:</b> calculate the cost of home energy usage using the formula cost = power (KW) x time (h) x price (KWh)</p>	<p><b>Current</b> Describe how current changes in series &amp; parallel circuits when components are changed, use circuit diagrams to build circuits, describe what happens when charged objects are held close to each other or touching, use a sketch to show a charged object</p> <p><b>Keywords</b> <b>Negatively charged:</b> An object that has gained electrons as a result of the charging process. <b>Positively charged:</b> An object that has lost electrons as a result of the charging process. <b>Electrons:</b> Tiny particles which are part of atoms and carry a negative charge. <b>Charged up:</b> When materials are rubbed together, electrons move from one surface to the other. <b>Electrostatic force:</b> Non-contact force between two charged objects. <b>Current:</b> Flow of electric charge, in amperes (A). <b>In series:</b> If components in a circuit are on the same loop. <b>In parallel:</b> If some components are on separate loops. <b>Field:</b> The area where other objects feel an electrostatic force.</p> <p><b>Voltage &amp; Resistance</b> Draw a circuit diagram to show how voltage can be measured in a simple circuit, use the idea of energy to explain how voltage &amp; resistance affect the way components work, calculate resistance using voltage and current values, use an analogy to explain why</p>

### Keywords

**Speed:** How much distance is covered in how much time.

**Average speed:** The overall distance travelled divided by overall time for a journey.

**Relative motion:** Different observers judge speeds differently if they are in motion too, so an object's speed is relative to the observer's speed.

**Acceleration:** How quickly speed increases or decreases.

### Particle Model

Explain observations about gas pressure, Explain the properties of solids, liquids & gases based on the arrangement and movement of particles, explain changes in state in relation to energy in particles, draw particle diagrams to show diffusion, changes in pressure & state

### Keywords

**Particle:** A very tiny object such as an atom or molecule, too small to be seen with a microscope.

**Particle model:** A way to think about how substances behave in terms of small, moving particles.

**Diffusion:** The process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer.

**Gas pressure:** Caused by collisions of particles with the walls of a container.

**Density:** How much matter there is in a particular volume, or how close the particles are.

**Evaporate:** Change from liquid to gas at the surface of a liquid, at any

### Keywords

**Power:** How quickly energy is transferred by a device (watts).

**Energy resource:** Something with stored energy that can be released in a useful way.

**Non-renewable:** An energy resource that cannot be replaced and will be used up.

**Renewable:** An energy resource that can be replaced and will not run out. Examples are solar, wind, waves, geothermal and biomass.

**Fossil fuels:** Non-renewable energy resources formed from the remains of ancient plants or animals. Examples are coal, crude oil and natural gas.

### Metals & Non-Metals

Describe an oxidation, displacement or metal-acid reaction using word equations, use particle diagrams to represent oxidation, displacement & metal-acid reactions, identify an unknown chemical from its physical and chemical properties, place an unfamiliar metal into the reactivity series based on information about its reactions

### Keywords

**Metals:** Shiny, good conductors of electricity and heat, malleable and ductile, and usually solid at room temperature.

**Non-metals:** Dull, poor conductors of electricity and heat, brittle and usually solid or gaseous at room temperature.

**Displacement:** Reaction where a more reactive metal takes the place of a less reactive metal in a compound.

**Oxidation:** Reaction in which a substance combines with oxygen.

**Reactivity:** The tendency of a substance to undergo a chemical reaction.

part of a circuit has a higher resistance

**Skill:** Calculate resistance using a formula  
resistance = voltage/current

### Keywords

**Potential difference (voltage):** The amount of energy shifted from the battery to the moving charge, or from the charge to circuit components, in volts (V).

**Resistance:** A property of a component, making it difficult for charge to pass through, in ohms ( $\Omega$ ).

**Electrical conductor:** A material that allows current to flow through it easily, and has a low resistance.

**Electrical insulator:** A material that does not allow current to flow easily, and has a high resistance.

### Interdependence

Describe how a species' population changes as its predators or prey population changes, explain the effects of environmental changes and toxic materials on a species' population, combined food chains to form a food web, explain issues with human food supplies in terms of insect pollinators.

### Keywords

**Food web:** Shows how food chains in an ecosystem are linked.

**Food chain:** Part of a food web, starting with a producer, ending with a top predator.

**Ecosystem:** The living things in a given area and their non-living environment.

**Environment:** The surrounding air, water and soil where an organism lives.

**Population:** Group of the same species living in an area.

temperature.

**Boil:** Change from liquid to a gas of all the liquid when the temperature reaches boiling point.

**Condense:** Change of state from gas to liquid when the temperature drops to the boiling point.

**Melt:** Change from solid to liquid when the temperature rises to the melting point.

**Freeze:** Change from liquid to a solid when the temperature drops to the melting point.

**Sublime:** Change from a solid directly into a gas.

### Separating Mixtures

Explain how substances dissolve using the particle model, use the solubility curve of a solute to explain observations about solutions, obtain evidence from chromatography to identify unknown substances in a mixture, choose the most suitable technique to separate out a mixture of substances.

**Skills:** use separation techniques, calculate R<sub>f</sub> value in chromatography

### Keywords

**Solvent:** A substance, normally a liquid, that dissolves another substance.

**Solute:** A substance that can dissolve in a liquid.

**Dissolve:** When a solute mixes completely with a solvent.

**Solution:** Mixture formed when a solvent dissolves a solute.

**Soluble (insoluble):** Property of a substance that will (will not) dissolve in a

### Acids & Alkalis

Identify the best indicator to distinguish between solutions of different pH, using data provided, use data & observations to determine the pH of a solution and explain what this shows, explain how neutralisation reactions are used in a range of situations, describe a method to make a neutral solution from an acid & alkali

### Keywords

**pH:** Scale of acidity and alkalinity from 0 to 14. Indicators: Substances used to identify whether unknown solutions are acidic or alkaline.

**Base:** A substance that neutralises an acid – those that dissolve in water are called alkalis.

**Concentration:** A measure of the number of particles in a given volume.

### Plant Reproduction

Describe the main steps when a plant reproduces successfully, identify parts of a flower and link their structure to their function, suggest how a plant carried out seed dispersal based on the features of its fruit or seed, explain why seed dispersal is important to survival of the parent plant and its offspring

### Keywords

**Pollen:** Contains the plant male sex cells found on the stamens.

**Ovules:** Female sex cells in plants found in the ovary.

**Pollination:** Transfer of pollen from the male part of the flower to the female part of the flower on the same or another plant.

**Fertilisation:** Joining of a nucleus from a male and female sex cell.

**Seed:** Structure that contains the embryo of a new plant.

**Producer:** Green plant or algae that makes its own food using sunlight.

**Consumer:** Animal that eats other animals or plants.

**Decomposer:** Organism that breaks down dead plant and animal material so nutrients can be recycled back to the soil or water.

### Variation

Explain whether characteristics are inherited, environmental or both, plot bar charts or line graphs to show discontinuous and continuous data, explain how variation helps a particular species in changing environment, explain how characteristics of a species are adapted to particular environmental conditions.

### Keywords

**Species:** A group of living things that have more in common with each other than with other groups.

**Variation:** The differences within and between species.

**Continuous variation:** Where differences between living things can have any numerical value.

**Discontinuous variation:** When differences between living things can only be grouped into categories.

### Sound

Explain observations where sound is reflected, transmitted or absorbed by different media, explain observations of how sound travels using the idea of a longitudinal wave, describe the amplitude & frequency of a wave from a diagram or oscilloscope picture, use drawings of waves to describe how sound waves change with volume or pitch

### Keywords

liquid.

**Solubility:** Maximum mass of solute that dissolves in a certain volume of solvent. Pure substance: Single type of material with nothing mixed in.

**Mixture:** Two or more pure substances mixed together, whose properties are different to the individual substances.

**Filtration:** Separating substances using a filter to produce a filtrate (solution) and residue.

**Distillation:** Separating substances by boiling and condensing liquids.

**Evaporation:** A way to separate a solid dissolved in a liquid by the liquid turning into a gas.

**Chromatography:** Used to separate different coloured substances.

### Cells

Explain why multicellular organisms need organs systems to keep their cells alive, explain terms cell, tissue, organ & organ system with examples, explain how to use a microscope to compare different types of cells, describe organelles found in a range of cells: specialised animal & plant cells & bacteria

**Skill:** Use a light microscope to view and draw cells

### Keywords

**Cell:** The unit of a living organism, contains parts to carry out life processes.

**Uni-cellular:** Living things made up of one cell.

**Multi-cellular:** Living things made up of many types of cell.

**Tissue:** Group of cells of one type.

**Organ:** Group of different tissues

**Fruit:** Structure that the ovary becomes after fertilisation, which contains seeds.

**Carpel:** The female part of the flower, made up of the stigma where the pollen lands, style and ovary.

### Human Reproduction

Explain which substances are passed between mother and foetus, use a diagram to describe the stages in the development of a foetus from the production of egg cells to birth, describe causes of low fertility in male and female reproductive systems, identify key events on a diagram of the menstrual cycle

### Keywords

**Food web:** Shows how food chains in an ecosystem are linked.

**Food chain:** Part of a food web, starting with a producer, ending with a top predator.

**Ecosystem:** The living things in a given area and their non-living environment.

**Environment:** The surrounding air, water and soil where an organism lives.

**Population:** Group of the same species living in an area.

**Producer:** Green plant or algae that makes its own food using sunlight.

**Consumer:** Animal that eats other animals or plants.

**Decomposer:** Organism that breaks down dead plant and animal material so nutrients can be recycled back to the soil or water.

**Vibration:** A back and forth motion that repeats.

**Longitudinal wave:** Where the direction of vibration is the same as that of the wave.

**Volume:** How loud or quiet a sound is, in decibels (dB).

**Pitch:** How low or high a sound is. A low (high) pitch sound has a low (high) frequency.

**Amplitude:** The maximum amount of vibration, measured from the middle position of the wave, in metres.

**Wavelength:** Distance between two corresponding points on a wave, in metres.

**Frequency:** The number of waves produced in one second, in hertz.

**Vacuum:** A space with no particles of matter in it.

**Oscilloscope:** Device able to view patterns of sound waves that have been turned into electrical signals.

**Absorption:** When energy is transferred from sound to a material.

**Auditory range:** The lowest and highest frequencies that a type of animal can hear.

**Echo:** Reflection of sound waves from a surface back to the listener.

### Light

Use ray diagrams of eclipses to describe what is seen by observers in different places, explain observations where coloured lights are mixed or objects are viewed in different lights, use ray diagrams to describe how light passes through transparent materials, explain how lenses may be used to correct vision

**Skill:** Construct ray diagrams to show light reflects and refracts

### Keywords

**Incident ray:** The incoming ray. Reflected

working together to carry out a job.

**Diffusion:** One way for substances to move into and out of cells.

**Structural adaptations:** Special features to help a cell carry out its functions.

**Cell membrane:** Surrounds the cell and controls movement of substances in and out.

**Nucleus:** Contains genetic material (DNA) which controls the cell's activities.

**Vacuole:** Area in a cell that contains liquid, and can be used by plants to keep the cell rigid and store substances.

**Mitochondria:** Part of the cell where energy is released from food molecules.

**Cell wall:** Strengthens the cell. In plant cells it is made of cellulose.

### **Movement**

Explain how a physical property of part of the skeleton relates to its function, explain why some organs contain muscle tissue, explain how antagonistic muscles produce movement around a joint, use a diagram to predict the result of a muscle contraction or relaxation

### **Keywords**

**Joints:** Places where bones meet.

**Bone marrow:** Tissue found inside some bones where new blood cells are made.

**Ligaments:** Connect bones in joints.

**Tendons:** Connect muscles to bones.

**Cartilage:** Smooth tissue found at the end of bones, which reduces friction between them.

**Antagonistic muscle pair:** Muscles working in unison to create movement.

ray: The outgoing ray.

**Normal line:** From which angles are measured, at right angles to the surface.

**Angle of reflection:** Between the normal and reflected ray. Angle of incidence: Between the normal and incident ray.

**Refraction:** Change in the direction of light going from one material into another.

**Absorption:** When energy is transferred from light to a material.

**Scattering:** When light bounces off an object in all directions.

**Transparent:** A material that allows all light to pass through it.

**Translucent:** A material that allows some light to pass through it.

**Opaque:** A material that allows no light to pass through it.

**Convex lens:** A lens that is thicker in the middle which bends light rays towards each other.

**Concave lens:** A lens that is thinner in the middle which spreads out light rays.

**Retina:** Layer at the back of the eye with light detecting cells and where an image is formed.

Year 8	Autumn Term	Spring Term	Summer Term
<b>Focus</b>	<b>Contact Forces, Pressure, Periodic Table, Elements &amp; The Atom, Breathing &amp; Digestion</b>	<b>Electromagnets, Magnetism, Heating &amp; Cooling, Chemical Energy, Types of Reactions, Respiration &amp; Photosynthesis</b>	<b>Work, Wave Properties &amp; Effects, Climate, Earth Resources, Evolution &amp; Inheritance</b>
<b>Description</b>	<p><b>Contact Forces</b> Explain whether an object in an unfamiliar situation is in equilibrium, describe factors that affect the size of frictional and drag forces, describe how materials behave when they are stretched or squashed.</p> <p><b>Keywords</b> <b>Equilibrium:</b> State of an object when opposing forces are balanced. <b>Deformation:</b> Changing shape due to a force. <b>Linear relationship:</b> When two variables are graphed and show a straight line which goes through the origin, and they can be called directly proportional. <b>Newton:</b> Unit for measuring forces (N). <b>Resultant force:</b> Single force which can replace all the forces acting on an object and have the same effect. <b>Friction:</b> Force opposing motion which is caused by the interaction of surfaces moving over one another. It is called 'drag' if one is a fluid. <b>Tension:</b> Force extending or pulling apart. <b>Compression:</b> Force squashing or pushing together. <b>Contact force:</b> One that acts by direct contact.</p> <p><b>Pressure</b> Use diagrams to explain observations of fluids in terms of unequal pressure. Explain why objects either sink/float depending upon their weight &amp; the up</p>	<p><b>Electromagnets</b> Use diagram to explain how electromagnets are made and how to change its strength. Explain the choice of electromagnets or permanent magnets for a device in terms of their properties.</p> <p><b>Keywords</b> <b>Electromagnet:</b> A non-permanent magnet turned on and off by controlling the current through it. <b>Solenoid:</b> Wire wound into a tight coil, part of an electromagnet. <b>Core:</b> Soft iron metal which the solenoid is wrapped around.</p> <p><b>Magnetism</b> Use the idea of field lines to show how the direction or strength of the field around a magnet varies. Explain observations about navigation using Earth's magnetic field.</p> <p><b>Keywords</b> <b>Magnetic force:</b> Non-contact force from a magnet on a magnetic material. <b>Permanent magnet:</b> An object that is magnetic all of the time. <b>Magnetic poles:</b> The ends of a magnetic field, called north-seeking (N) and south-seeking poles (S).</p> <p><b>Heating &amp; cooling</b> Explain observations about changing temperature in terms of energy transfer. Describe how an object's temperature changes over time when it is heated/cooled. Explain how thermal insulation works eg,</p>	<p><b>Work</b> Draw diagram to explain how a lever makes a job easier. Compare the work needed to move objects different distances.</p> <p><b>Keywords</b> <b>Work:</b> The transfer of energy when a force moves an object, in joules. <b>Lever:</b> A type of machine which is a rigid bar that pivots about a point. <b>Input force:</b> The force you apply to a machine. <b>Output force:</b> The force that is applied to the object moved by the machine. <b>Displacement:</b> The distance an object moves from its original position. <b>Deformation:</b> When an elastic object is stretched or squashed, which requires work.</p> <p><b>Wave properties and effects</b> Describe the properties of different longitudinal and transverse waves. Use the wave model to explain reflection, absorption and transmission of a wave. For effects: explain the differences in the damage done to living cells by light and other waves, in terms of their frequency. Explain how audio equipment converts sound into a changing pattern of electric current.</p> <p><b>Keywords</b> <b>Waves:</b> Vibrations that transport energy from place to place without transporting matter. <b>Transverse wave:</b> Where the direction of vibration is perpendicular to that of the wave. <b>Transmission:</b> Where waves travel through</p>

thrust acting on them. Explain the effects of forces are different because of differences in the area.

#### Maths skill:

Use formula to calculate fluid pressure/stress on a surface.

#### Keywords

**Fluid:** A substance with no fixed shape, a gas or a liquid.

**Pressure:** The ratio of force to surface area, in  $N/m^2$ , and how it causes stresses in solids.

**Upthrust:** The upward force that a liquid or gas exerts on a body floating in it.

**Atmospheric pressure:** The pressure caused by the weight of the air above a surface.

#### Periodic Table

Describe trend in physical properties. Describe the reaction of an unfamiliar Group 1 or 7 element. Use data in physical properties to estimate a missing value for an element. Look at patterns in chemical reactions to predict the behaviour of an element in a group.

#### Keywords

**Periodic table:** Shows all the elements arranged in rows and columns.

**Physical properties:** Features of a substance that can be observed without changing the substance itself.

**Chemical properties:** Features of the way a substance reacts with other substances.

**Groups:** Columns of the periodic table.

**Periods:** Rows of the periodic table.

conduction, convection and radiation. Sketch diagrams to show convection currents.

#### Keywords

**Thermal conductor:** Material that allows heat to move quickly through it. **Thermal insulator:** Material that only allows heat to travel slowly through it.

**Temperature:** A measure of the motion and energy of the particles.

**Thermal energy:** The quantity of energy stored in a substance due to the vibration of its particles.

**Conduction:** Transfer of thermal energy by the vibration of particles.

**Convection:** Transfer of thermal energy when particles in a heated fluid rise.

**Radiation:** Transfer of thermal energy as a wave.

#### Types of reactions

Explain if reaction is an example of combustion or thermal decomposition. Predict the products of the combustion or thermal decomposition of a given reactant (show as word equation). Explain observations about mass in a chemical or physical change. Use particle diagrams to show what happens in a reaction.

#### Skill

Write word equations from information about chemical reactions.

#### Keywords

**Fuel:** Stores energy in a chemical store which it can release as heat.

**Chemical reaction:** A change in which a new substance is formed.

**Physical change:** One that changes the physical properties of a substance, but no new

a medium rather than be absorbed or reflected.

#### Earth Resources

Explain why recycling of some materials is particularly important. Describe how Earth's resources are turned into useful materials/recycled. Justify the choice of extraction method for a metal, given data about reactivity. Suggest factors to see whether extraction of a metal is practical.

#### Keywords

**Natural resources:** Materials from the Earth which act as raw materials for making a variety of products.

**Mineral:** Naturally occurring metal or metal compound.

**Ore:** Naturally occurring rock containing sufficient minerals for extraction.

**Extraction:** Separation of a metal from a metal compound.

**Recycling:** Processing a material so that it can be used again. **Electrolysis:** Using electricity to split up a compound into its elements.

#### Climate

Use a diagram to show how carbon is recycled in the environment and through living things. Describe how human activities affect the carbon cycle. Describe how global warming can impact on climate and local weather patterns.

#### Keywords

**Global warming:** The gradual increase in surface temperature of the Earth.

**Fossil fuels:** Remains of dead organisms that are burned as fuels, releasing carbon dioxide.

	<p><b>Elements and the atom</b> Name compounds using chemical formulae. Name the elements present and their relative proportions. Represent atoms, molecules and elements, mixtures and compounds using particle diagrams. Use observations from chemical reactions to decide if an unknown substance is an element or a compound.</p> <p><b>Keywords</b> <b>Elements:</b> What all substances are made up of, and which contain only one type of atom. <b>Atom:</b> The smallest particle of an element that can exist. <b>Molecules:</b> Two to thousands of atoms joined together. Most non-metals exist either as small or giant molecules. <b>Compound:</b> Pure substances made up of two or more elements strongly joined together. <b>Chemical formula:</b> Shows the elements present in a compound and their relative proportions. <b>Polymer:</b> A molecule made of thousands of smaller molecules in a repeating pattern. Plastics are man-made polymers, starch is a natural polymer.</p> <p><b>Breathing</b> Explain how exercise, smoking and asthma affect the gas exchange system. Explain how the parts of gas exchange system are adapted to their function. Explain how changes in volume and pressure inside the chest move gases in and out of the lungs.</p>	<p>substance is formed. <b>Reactants:</b> Substances that react together, shown before the arrow in an equation. <b>Products:</b> Substances formed in a chemical reaction, shown after the reaction arrow in an equation. <b>Conserved:</b> When the quantity of something does not change after a process takes place.</p> <p><b>Respiration</b> Use word equations to describe aerobic and anaerobic respiration. Explain how specific activities involve aerobic or anaerobic respiration.</p> <p><b>Keywords</b> <b>Aerobic respiration:</b> Breaking down glucose with oxygen to release energy and producing carbon dioxide and water. <b>Anaerobic respiration (fermentation):</b> Releasing energy from the breakdown of glucose without oxygen, producing lactic acid (in animals) and ethanol and carbon dioxide (in plants and microorganisms).</p> <p><b>Photosynthesis</b> Describe ways in which plants obtain resources for photosynthesis. Explain why other organisms are dependent on photosynthesis. Sketch a line graph to show how the rate of photosynthesis is affected by changing conditions. Use a word equation for photosynthesis.</p> <p><b>Keywords</b> <b>Fertilisers:</b> Chemicals containing minerals that plants need to build new tissues. <b>Photosynthesis:</b> A process where plants and algae turn carbon dioxide and water into glucose and release oxygen. <b>Chlorophyll:</b> Green pigment in plants and</p>	<p><b>Carbon sink:</b> Areas of vegetation, the ocean or the soil, which absorb and store carbon. <b>Greenhouse effect:</b> When energy from the sun is transferred to the thermal energy store of gases in Earth's atmosphere.</p> <p><b>Evolution</b> Look at evidence to explain why a species has become extinct or adapted to changing conditions. Discuss if a species changing over time supports natural selection. Explain how a lack of biodiversity can affect an ecosystem. Describe how preserving biodiversity can provide useful products and services for humans.</p> <p><b>Keywords</b> <b>Population:</b> Group of organisms of the same kind living in the same place. <b>Natural selection:</b> Process by which species change over time in response to environmental changes and competition for resources. <b>Extinct:</b> When no more individuals of a species remain. <b>Biodiversity:</b> The variety of living things. It is measured as the differences between individuals of the same species, or the number of different species in an ecosystem. <b>Competition:</b> When two or more living things struggle against each other to get the same resource. <b>Evolution:</b> Theory that the animal and plant species living today descended from species that existed in the past.</p> <p><b>Inheritance</b> Use diagram to show the relationship between DNA, chromosomes and genes, to show how genes are inherited. Explain how a change in the DNA (mutation) may affect</p>
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**Keywords**

**Breathing:** The movement of air in and out of the lungs. Trachea (windpipe): Carries air from the mouth and nose to the lungs.

**Bronchi:** Two tubes which carry air to the lungs. Bronchioles: Small tubes in the lung.

**Alveoli:** Small air sacs found at the end of each bronchiole. Ribs: Bones which surround the lungs to form the ribcage.

**Diaphragm:** A sheet of muscle found underneath the lungs. Lung volume: Measure of the amount of air breathed in or out.

**Digestion**

Talk about possible health effects of unbalanced diet. Calculate food requirements for a healthy diet. Describe how organs and tissues involved in digestion are adapted for their role. Describe the events that take place in order to turn a meal into simple food molecules inside a cell.

**Keywords**

**Enzymes:** Substances that speed up the chemical reactions of digestion.

**Dietary fibre:** Parts of plants that cannot be digested, which helps the body eliminate waste.

**Carbohydrates:** The body's main source of energy. There are two types: simple (sugars) and complex (starch). Lipids (fats and oils): A source of energy. Found in butter, milk, eggs, nuts.

**Protein:** Nutrient your body uses to build new tissue for growth and repair. Sources are meat, fish, eggs, dairy products, beans, nuts and seeds.

algae which absorbs light energy.

**Stomata:** Pores in the bottom of a leaf which open and close to let gases in and out.

an organism and its future offspring. Explain why offspring from the same parents look similar but are not identical.

**Keywords**

**Inherited characteristics:** Features that are passed from parents to their offspring.

**DNA:** A molecule found in the nucleus of cells that contains genetic information.

**Chromosomes:** Thread-like structures containing tightly coiled DNA.

**Gene:** A section of DNA that determines an inherited characteristic.

	<p><b>Stomach:</b> A sac where food is mixed with acidic juices to start the digestion of protein and kill microorganisms.</p> <p><b>Small intestine:</b> Upper part of the intestine where digestion is completed and nutrients are absorbed by the blood.</p> <p><b>Large intestine:</b> Lower part of the intestine from which water is absorbed and where faeces are formed.</p> <p><b>Gut bacteria:</b> Microorganisms that naturally live in the intestine and help food break down.</p>		
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Year group	Chemistry	Biology	Physics
<p><b>Focus</b> <b>GCSE Science</b></p>	<ul style="list-style-type: none"> <li>• <b>Atomic Structure and the periodic table, separating mixtures</b></li> <li>• <b>Atmosphere &amp; tests for gases</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Cell Biology</b></li> <li>• <b>Infection &amp; Disease</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Energy</b></li> <li>• <b>Atomic Structure &amp; Radiation</b></li> </ul>
<p><b>Year 9</b></p>	<p><b>Key content: Atomic Structure and the periodic table</b></p> <p>Models of the atom, plum pudding model, nuclear model, The periodic table and how it has changed, Properties of Group 1, Group 7 and Group 0 elements, reactivity, isotopes, drawing atoms using mass &amp; atomic numbers, elements, compounds &amp; mixtures, alloys, formulations, pure substances, chromatography.</p> <p><b>Equation to be memorised:</b></p> <p><math>R_f = \frac{\text{distance dye travels}}{\text{Distance solvent travels}}</math></p> <p><b>Assessment:</b></p> <p>End of topic test</p> <p><b>Key content: Atmosphere &amp; tests for gases</b></p> <p>Evolution of the Earth's atmosphere, global warming &amp; Carbon Footprint, Carbon capture &amp; reduction of Carbon</p>	<p><b>Key content: Cell Biology</b></p> <p>Cell structure, the light microscope, using a light microscope, primitive cells (prokaryotic and eukaryotic cells), cell division, cell differentiation, cancer, stem cells, uses of stem cells, cells at work - aerobic respiration, anaerobic respiration, fermentation</p> <p><b>Equation to be memorised:</b></p> <p>Image = actual x magnification</p> <p><b>Assessment:</b></p> <p>End of topic test</p> <p><b>Key content: Health &amp; Infection</b></p> <p>Risk factors, communicable &amp; non-communicable diseases, pathogens, transmission methods, bacterial, viral &amp; fungal infections, symptoms and treatment, malaria (vectors), natural barriers to pathogens, white blood cells &amp; immunity, vaccinations, antibiotics &amp; resistance, drug testing &amp; clinical trials</p>	<p><b>Key content: Energy.</b></p> <p>Potential energy, kinetic energy, elastic potential energy, work done and energy transfer, power, specific heat capacity and required practical, dissipation of energy, energy efficiency, using energy resources, global energy supplies.</p> <p><b>Equations to be memorised:</b></p> <p>GPE = mass x force of gravity x height</p> <p>KE = <math>\frac{1}{2}</math> x mass x velocity<sup>2</sup></p> <p>Work done = force x distance</p> <p>Energy transferred = power x time</p> <p>Energy efficiency = <math>\frac{\text{use energy output}}{\text{Total energy input}}</math></p> <p><b>Assessment:</b></p> <p>End of topic test</p>

Year group	Chemistry	Biology	Physics
	<p>footprint, fuels &amp; air pollution, acid rain, global dimming, tests for gases</p> <p><b>Assessment:</b></p> <p>End of topic test</p>	<p><b>Assessment:</b></p> <p>End of topic test</p>	<p><b>Key content: Atomic Structure &amp; Radiation</b></p> <p>Structure of the atom, properties of alpha, beta &amp; gamma radiation, calculating half-life, background radiation, dangers of radiation, contamination &amp; irradiation, medical uses of radiation, X rays</p> <p><b>Assessment:</b></p> <p>End of topic test</p>

Year group	Chemistry	Biology	Physics
<p><b>Focus</b></p> <p><b>GCSE Science</b></p>	<ul style="list-style-type: none"> <li>• <b>Bonding</b></li> <li>• <b>Energy Changes</b></li> <li>• <b>Organic Chemistry</b></li> <li>• <b>Chemistry calculations</b></li> <li>• <b>Chemical Change</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Homeostasis</b></li> <li>• <b>Types of movement</b></li> <li>• <b>Plants &amp; Photosynthesis</b></li> <li>• <b>Ecology</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Electricity</b></li> <li>• <b>Particle Model</b></li> <li>• <b>Forces I</b></li> <li>• <b>Forces II</b></li> </ul>
<p><b>Year 10</b></p>	<p><b>Key content: Bonding</b></p> <p>Ionic, covalent &amp; metallic bonding, properties of ionic structures (salts), simple covalent molecules and giant covalent structures (diamond, graphite, fullerenes), types of polymers &amp; their properties, alloys</p> <p><b>Triple Science:</b> As above and nanoparticles properties &amp; uses</p> <p>End of Topic Assessment</p> <p><b>Key content: Energy changes</b></p> <p>Exothermic &amp; endothermic reactions, energy profiles, Required practical: reactivity &amp; exothermic reactions, bond energies</p> <p>Triple Science: As above and fuel Cells &amp; batteries</p> <p>End of Topic Assessment</p>	<p><b>Key content: Homeostasis</b></p> <p>Homeostasis, the nervous system, the brain, reflex arc, endocrine system, menstrual cycle, fertility treatments &amp; contraception, glucose regulation &amp; diabetes, negative feedback</p> <p><b>Triple Science:</b> As above and the structure of the eye, eye defects &amp; solutions, kidney structure &amp; function, kidney failure &amp; treatments, thermoregulation</p> <p>End of Topic Assessment</p> <p><b>Key content: Types of Movement</b></p> <p>Diffusion, active transport, osmosis, required practical: effect of a range of concentrations of a solution on osmosis</p> <p>End of Topic Assessment</p> <p><b>Key content: Plants &amp; Photosynthesis</b></p>	<p><b>Key content: Electricity</b></p> <p>Electric current, series &amp; parallel circuits, required practical – components and their I-V characteristics, required practical – resistance in a wire, control circuits &amp; thermistors, electricity in the home, transmitting electricity, power &amp; energy transfers, calculating power</p> <p>Triple Science: As above &amp; electric fields, static electricity</p> <p>Equations that need to be memorised:</p> <p>Potential difference/Voltage = current x resistance</p> <p>Charge flow = current x time</p> <p>Power = potential difference x current</p> <p>Power = current<sup>2</sup>x resistance</p> <p>Midpoint &amp; End of Topic Assessment</p> <p><b>Key content: Particle Model</b></p> <p>Density, required practical – calculating</p>

Year group	Chemistry	Biology	Physics
	<p><b>Key content:</b> Organic Chemistry</p> <p>Crude oil, fractional distillation, naming and drawing alkanes, properties of different hydrocarbon fractions, tests for alkanes &amp; alkenes, chemical cracking, combustion &amp; incomplete combustion, uses of alkenes</p> <p>Triple Science: As above and reactions with &amp; properties of: alkenes, alcohols, carboxylic acids, esters, condensation &amp; addition polymers, DNA, starch, cellulose</p> <p><b>End of Topic Assessment</b></p> <p><b>Key content:</b> Chemistry Calculations</p> <p>Calculating relative formula mass, percentage purity, moles, Avogadro's number, converting masses into moles &amp; calculating masses of reactants &amp; products, concentration of solutions</p> <p>Triple Science: As above and percentage yield, atom economy, amounts of substances in volumes of gas</p>	<p>Word &amp; chemical equations for photosynthesis, leaf structure, comparing photosynthesis to respiration, discovery of photosynthesis, testing a leaf for starch, required practical: effect of light on the rate of photosynthesis, limiting factors, stomata, increasing food production – greenhouses &amp; hydroponics, transpiration &amp; factors affecting transpiration, translocation, plants &amp; minerals, uptake and functions of minerals in plants, surface area:volume</p> <p>Triple Science: As above and plant disease and defences, auxins, plant hormones &amp; uses, effect of light &amp; gravity on seed growth</p> <p><b>Mid-point &amp; End of Topic Assessment</b></p> <p><b>Key content:</b> Ecology</p> <p>Ecosystems, biotic &amp; abiotic factors, trophic levels, predator-prey relationships, competition, plant &amp; animal adaptations, required practical: sampling with line transect, water &amp; mineral recycling, Carbon cycle, land use, global warming, waste management, life cycle assessment &amp; recycling, pollution, biodiversity</p> <p>Triple Science: As above and required practical - investigating decay &amp; the effect</p>	<p>density of regular &amp; irregular shapes, changes of state, internal energy, latent heat, particle motion in gases</p> <p>Triple Science: As above and required practical – reducing energy loss</p> <p>Equation to be memorised:</p> <p>Density = mass/volume</p> <p><b>End of Topic Assessment</b></p> <p><b>Key content:</b> Forces I</p> <p>Forces, speed, acceleration, distance-time graphs, velocity-time graphs, motion calculations, mass &amp; weight, resultant forces &amp; motion, force, mass, acceleration, required practical – acceleration of an object,</p> <p>Triple Science: As above</p> <p>Equations to be memorised:</p> <p>Distance = speed x time</p> <p>Force = mass x acceleration</p> <p>Weight = mass x force of gravity</p> <p>Acceleration = change in velocity/time taken</p> <p><b>End of Topic Assessment</b></p>

Year group	Chemistry	Biology	Physics
	<p>End of Topic Assessment</p> <p><b>Key content:</b> Chemistry Change</p> <p>Reactivity, acids, bases &amp; alkalis, reactions with acids &amp; metal oxides, metal carbonates &amp; metals, neutralisation reactions, strong &amp; weak acids, soluble salts, required practical: preparing a sample of a dry, soluble salt</p> <p>End of Topic Assessment</p> <p>Revision &amp; End of Year Test</p>	<p>of temperature on the rate of decay</p> <p>End of Topic Assessment</p> <p>Revision &amp; End of Year Test</p>	<p><b>Key content:</b> Forces II</p> <p>Momentum, road safety, springs, extension of a spring, Hooke's Law, required practical – extension of a spring, pressure in a fluid, atmospheric pressure</p> <p>Triple Science: As above and moments, levers &amp; gears</p> <p>Equations to be memorised:</p> <p>Momentum = mass x velocity</p> <p>Triple Science</p> <p>Moment of a force = force x distance (normal to the direction of the force)</p> <p>End of Topic Assessment</p> <p>Revision &amp; End of Year Test</p>

Year group	Chemistry	Biology	Physics
<p style="text-align: center;"><b>Focus</b></p> <p style="text-align: center;"><b>GCSE Science</b></p>	<ul style="list-style-type: none"> <li>• Organic Chemistry</li> <li>• Chemical Analysis</li> <li>• Atmosphere</li> <li>• Sustainable Development</li> <li>• Revision of: Atomic Structure</li> <li>Bonding</li> <li>Chemical Calculations</li> <li>Energy change</li> <li>Reaction rates</li> </ul>	<ul style="list-style-type: none"> <li>• Endocrine System</li> <li>• Genetics</li> <li>• Variation &amp; Evolution</li> <li>• Ecology in Action</li> <li>• Revision of: Cell Biology</li> <li>Photosynthesis</li> <li>Moving and Changing Materials</li> <li>Infection &amp; Response</li> </ul>	<ul style="list-style-type: none"> <li>• Waves</li> <li>• Electromagnetism</li> <li>• Triple Science – Space</li> <li>• Revision of: Energy</li> <li>Electricity</li> <li>Particle Model</li> <li>Atomic Structure &amp; Radiation</li> </ul>
<p style="text-align: center;"><b>Year 11</b></p>	<p><b>Key content:</b> Organic Chemistry</p> <p>Crude oil, fractional distillation, naming and drawing alkanes, properties of different hydrocarbon fractions, tests for alkanes &amp; alkenes, chemical cracking, combustion &amp; incomplete combustion, uses of alkenes</p> <p>Triple Science: As above and reactions with &amp; properties of: alkenes, alcohols, carboxylic acids, esters, condensation &amp; addition polymers, DNA, starch, cellulose</p> <p><b>Key content: Chemical Analysis</b></p> <p><b>Key content:</b> Organic Chemistry</p> <p>Pure substances, formulations,</p>	<p><b>Key content: Endocrine System</b></p> <p>Endocrine system, menstrual cycle, fertility treatments &amp; contraception, glucose regulation &amp; diabetes, negative feedback</p> <p><b>Triple Science:</b> As above and kidney structure &amp; function, kidney failure &amp; treatments, thermoregulation</p> <p><b>Key content: Genetics</b></p> <p>DNA &amp; genes, human genome, Meiosis, Asexual &amp; sexual reproduction, genetics &amp; genetic crosses, genetic disorders</p> <p>Triple Science: As above and structure of DNA, proteins &amp; their synthesis,</p>	<p><b>Key content: Waves</b></p> <p>Transverse &amp; longitudinal waves, wave speed calculation, required practical – measuring wavelength, frequency and speed of waves in a ripple tank &amp; waves in a solid, reflection &amp; refraction, electromagnetic spectrum, wave fronts, required practical – IR investigation with difference surfaces, microwaves, radio &amp; microwave communication, Gamma &amp; X rays, UV &amp; IR</p> <p>Triple Science: As above and required practical – measuring refraction and reflection of light, sound waves, ultrasound, seismic waves, colour, lenses, images &amp; magnification, emission &amp; absorption of IR, temperature of the Earth</p>

Year group	Chemistry	Biology	Physics
	<p>chromatography, Required practical – Paper chromatography &amp; inks, test for gases</p> <p>Triple Science: Flames test analysis, precipitation tests for metal ions, test for anions, instrumental methods, flame emission spectroscopy, required practical – use chemical tests to identify ions in an unknown compound</p> <p>Equation to be memorised:</p> <p><math>R_f = \frac{\text{distance dye moves}}{\text{Distance that solvent moves}}</math></p> <p>Distance that solvent moves</p> <p><b>Key content:</b> Atmosphere</p> <p>Evolution of the Earth's atmosphere, global warming &amp; Carbon Footprint, Carbon capture &amp; reduction of Carbon footprint, fuels &amp; air pollution, acid rain, global dimming</p> <p>Triple Science: As above</p> <p><b>Key content:</b> Sustainable development</p> <p>Potable water, required practical – analysis &amp; purification of water samples</p>	<p>mutations, Gregor Mendel</p> <p><b>Key content:</b> Variation &amp; Evolution</p> <p>Theory of evolution by natural selection, variation, Fossil evidence for evolution, Lamarck vs Darwin, Antimicrobial resistance, selective breeding, producing new plant varieties, genetic engineering of insulin and other examples, GM crops, ethics of GM, classifying organisms, extinction &amp; survival</p> <p>Triple Science: As above and Darwin &amp; Wallace, speciation, cloning</p> <p><b>Key content:</b> Ecology</p> <p>Ecosystems, biotic &amp; abiotic factors, trophic levels, predator-prey relationships, competition, plant &amp; animal adaptations, required practical: sampling with line transect, water &amp; mineral recycling, Carbon cycle, land use, global warming, waste management, life cycle assessment &amp; recycling, pollution, biodiversity</p> <p>Triple Science: As above and required practical - investigating decay &amp; the effect of temperature on the rate of decay</p>	<p><b>Key content: Electromagnetism</b></p> <p>Magnetism &amp; magnetic forces, compasses &amp; magnetic fields, solenoids, calculating the force on a conductor, electric motors</p> <p>Triple Science: As above and loudspeakers, generators, transformers</p> <p>Triple Science: Space</p> <p>The solar system, orbits, sun &amp; stars, life cycle of stars, how elements are formed, red shift, gravity</p> <p>Revision of previously taught topics</p> <p><b>Key content: Energy.</b></p> <p>Potential energy, kinetic energy, elastic potential energy, work done and energy transfer, power, specific heat capacity and required practical, dissipation of energy, energy efficiency, using energy resources, global energy supplies.</p> <p><b>Equations to be memorised:</b></p> <p>GPE = mass x force of gravity x height</p>

Year group	Chemistry	Biology	Physics
	<p>from different sources, waste water treatment, bioleaching &amp; phytomining, life cycle assessment &amp; recycling, reducing use of resources</p> <p>Triple Science: As above and corrosion &amp; prevention, alloys, ceramics, polymers &amp; composites, Haber Process, Production &amp; use of fertilisers</p> <p>Revision of previous topics:</p> <p><b>Key content: Atomic Structure and the periodic table</b></p> <p>Models of the atom, plum pudding model, nuclear model, The periodic table and how it has changed, Properties of Group 1, Group 7 and Group 0 elements, reactivity, isotopes, drawing atoms using mass &amp; atomic numbers, elements, compounds &amp; mixtures, alloys</p> <p><b>Key content: Bonding</b></p> <p>Ionic, covalent &amp; metallic bonding, properties of ionic structures (salts), simple covalent molecules and giant covalent structures (diamond, graphite,</p>	<p>Revision of previous topics:</p> <p><b>Key content: Cell Biology</b></p> <p>Cell structure, the light microscope, using a light microscope, primitive cells(prokaryotic and eukaryotic cells), cell division, cell differentiation, cancer, stem cells, uses of stem cells, cells at work-aerobic respiration, anaerobic respiration, fermentation</p> <p><b>Equation to be memorised:</b></p> <p>Image = actual x magnification</p> <p>Triple Science: As above and growing organisms, testing new antibiotics, required practical – investigating disinfectants</p> <p><b>Key content: Photosynthesis</b></p> <p>Word &amp; chemical equations for photosynthesis, leaf structure, comparing photosynthesis to respiration, discovery of photosynthesis, testing a leaf for starch, required practical: effect of light on the rate of photosynthesis, limiting factors, stomata, increasing food production – greenhouses &amp; hydroponics, stomata, transpiration, translocation, surface</p>	<p><math>KE = \frac{1}{2} \times \text{mass} \times \text{velocity}^2</math></p> <p>Work done = force x distance</p> <p>Energy transferred = power x time</p> <p>Energy efficiency = <u>use energy output</u> Total energy input</p> <p>Triple Science: As above</p> <p><b>Key content: Electricity</b></p> <p>Electric current, series &amp; parallel circuits, required practical – components and their I-V characteristics, required practical – resistance in a wire, control circuits &amp; thermistors, electricity in the home, transmitting electricity, power &amp; energy transfers, calculating power</p> <p>Triple Science: As above &amp; electric fields, static electricity</p> <p>Equations that need to be memorised:</p> <p>Potential difference/Voltage = current x resistance</p> <p>Charge flow = current x time</p>

Year group	Chemistry	Biology	Physics
	<p>fullerenes), types of polymers &amp; their properties, alloys</p> <p>Triple Science: As above and nanoparticles properties &amp; uses</p> <p><b>Key content:</b> Chemistry Calculations</p> <p>Calculating relative formula mass, percentage purity, moles, Avogadro's number, converting masses into moles &amp; calculating masses of reactants &amp; products, concentration of solutions</p> <p>Triple Science: As above and percentage yield, atom economy, amounts of substances in volumes of gas</p> <p><b>Key content: Energy changes</b></p> <p>Exothermic &amp; endothermic reactions, energy profiles, Required practical: reactivity &amp; exothermic reactions, bond energies</p> <p>Triple Science: As above and fuel Cells &amp; batteries</p> <p><b>Key content: Rates of Reaction &amp;</b></p>	<p>area:volume</p> <p>Triple Science: As above</p> <p><b>Key content: Moving &amp; Changing Materials</b></p> <p>Osmosis, required practical – osmosis &amp; change in mass in potato chips, diffusion, active transport, enzymes &amp; factors affecting enzyme activity, required practical – effect of pH on amylase activity, digestion, required practical - testing for different food groups, exchange surfaces, plants &amp; minerals, circulatory system, heart &amp; blood vessels, blood, cardiovascular disease &amp; treatments, gas exchange</p> <p>Triple Science: As above</p> <p><b>Key content: Infection &amp; Response</b></p> <p>Risk factors, communicable &amp; non-communicable diseases, pathogens, transmission methods, bacterial, viral &amp; fungal infections, symptoms and treatment, malaria (vectors), natural barriers to pathogens, white blood cells &amp;</p>	<p>Power = potential difference x current</p> <p>Power = current<sup>2</sup>x resistance</p> <p><b>Key content:</b> Particle Model</p> <p>Density, required practical – calculating density of regular &amp; irregular shapes, changes of state, internal energy, latent heat, particle motion in gases</p> <p>Triple Science: As above and required practical – reducing energy loss</p> <p>Equation to be memorised:</p> <p>Density = mass/volume</p> <p><b>Key content: Atomic Structure &amp; Radiation</b></p> <p>Structure of the atom, properties of alpha, beta &amp; gamma radiation, calculating half-life, background radiation, dangers of radiation, contamination &amp; irradiation, medical uses of radiation, X rays</p> <p>Triple Science: As above and nuclear fission &amp; fusion</p>

Year group	Chemistry	Biology	Physics
	<p><b>Equilibrium</b></p> <p>Measuring rates of reaction, calculating rates of reaction, factors affecting rates of reaction, required practical – measuring rate of reaction by loss of mass, collection of gas &amp; formation of precipitates, collision theory, catalysts, reversible reactions &amp; energy changes, equilibrium, factors affecting the equilibrium position, Le Chatelier's Principle, measuring the gradient of a tangent line on a graph</p> <p>Triple Science: As above</p>	<p>immunity, vaccinations, antibiotics &amp; resistance, drug testing &amp; clinical trials</p> <p>Triple Science: As above and monoclonal antibodies, plant diseases &amp; defences</p>	