CURRICULUM OVERVIEW - SCIENCE

Biology	Chemistry	Physics

YR 7	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	Particles & their behaviour The particle model States of matter Diffusion **Chapter 1 assessment** Elements, atoms & compounds Elements Atoms	Elements, atoms & compounds Compounds Chemical formulae **Chapter 2 assessment** Reactions Chemical reactions Word equations Exothermic & endothermic **Chapter 3 assessment**	Cells Observing cells Plant vs animal cells Specialised cells **Chapter 1 assessment** Structure & function of body systems Gas Exchange Skeleton Movement: joints & muscles **Chapter 2 assessment**	Reproduction in plants & animals Reproductive systems Fertilisation & implantation Development of a Foetus Flowers and pollination Fertilisation & germination **Chapter 3 assessment**	Forces Squashing & stretching Drag forces & friction Forces at a distance **Chapter 1 assessment** Sound Waves Sound Loudness & pitch **Chapter 2 assessment**	Light Light Reflection Refraction **Chapter 3 assessment** Space The Solar System The Earth The Moon **Chapter 4 assessment**
Key new knowledge	**The Particle Model:** Know the properties of different states of matter (solid, liquid, gas) in terms of the particle model, including gas pressure **States of matter:** Know the three different states (solid, liquid, gas) Describe the different changes of state (melting, freezing, condensing, boiling, evaporating) Know the arrangement,	**Compounds:** Define a compound Describe differences between elements, atoms and compounds Use molecule diagrams **Chemical formulae:** Recognise chemical symbols and formulae for elements and compounds Know how to give chemical formulae from given atoms and labelled molecule diagrams	**Observing cells:** Define a cell as the building blocks of lfe Know how to use a microscope to observe cells **Plant vs animal cells:** Discuss the similartities and differences between plant and animal cells List the components of plant and animal cells and their functions Recognise a plant and animal cell diagram	**Reproductive systems:** Understand reproduction in humans. Label and explain the structure and function of the male and female reproductive systems **Fertilisation & implantation:** Define the male and female gametes (sex cells) Understand the process of fertilisation and the steps for	**Squashing & stretching:** Know forces associated with deforming objects Describe Hooke's Law **Drag forces & friction:** Know forces associated with rubbing and friction between surfaces Describe resistance to motion of air and water Give examples of how drag forces and friction can be reduced **Forces at a distance:**	**Light:** Know how light waves travel through a vacuum Understand the transmission of light through materials: absorption, reflection at a surface Understand the light year as a unit of astronomicasl distance **Reflection:** Understand diffuse scattering and specular reflection at a surface

	separation and movement of particles in the three states **Diffusion:** Define diffusion in terms of the particle model State the three factors that affect diffusion **Elements & atoms:** Define elements and atoms Describe differences between elements and atoms Recognise chemical symbols for elements	**Chemical reactions:** Define a chemical reaction Know the difference between chemical reactions and physical changes Know that chemical reactions are the rearrangement of atoms Describe a catalyst **Word equations:** Represent chemical reactions using formulae and equations Identify reactants and products in given chemical equations **Endothermic & exothermic:** Describe combustion (burning), thermal decomposition, oxidation, and displacement reactions	Use a microscope to view plant and animal cells **Specialised cells:** State the functions and adapatations of specialised cells e.g. red blood cells, sperm cells, egg cells, nerve cells **Skeleton:** Know the structure and function of the human skeleton State why we need a skeleton Label the main bones in the skeleton **Movement: joints & muscles:** Understand the interaction between skeleton and muscles, including the measurement of force exerted by different muscles Understand the function of muscles and examples of antagonistic muscles	implantation to happen **Development of a foetus:** Define gestation Understand the effect of maternal lifestyle on the foetus through the placenta Describe the stages in the process of birth **Flowers & pollination:** Describe and label the structure of a flower Know the process of reproduction in plants and wind and insect pollination **Fertilisation & germination:** Understand the process of fertilisation in plants Know about seed and fruit formation Describe the steps in germination	Know that force is measured in newtons Give examples of non-contact forces: gravity acting at a distance on Earth and in space Calculate weight using the equation **Waves:** Describe different types of waves Know features of waves and their behaviours **Sound:** Know that sound needs a medium to travel Understand that sound is produced by vibrations of objects **Loudness & pitch:** Define frequency Know that frequency of soundwaves is measured in hertz (Hz)	**Refraction:** Understand the use of ray model to explasin the refraction of light and action of convex lens in focusing **The Solar System:** Name the planets in the solar system Understand our sun is a star in our solar system **The Earth:** Understand the seasons and the Earths tilt, day length at different times of year, in different hemispheres **The Moon:** Understand the phases of the moon Know why we see the phases of the moon

Assessments	End of chapter test – kerboodle smart activate Retrieval tasks Questioning	End of chapter test – kerboodle smart activate	End of chapter test – kerboodle smart activate	End of chapter test – kerboodle smart activate	End of chapter test – kerboodle smart activate	End of chapter test – kerboodle smart activate

YR 8	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	Health & Lifestyle Nutrients Food Tests Digestive System Drugs & alcohol Smoking **Chapter 1 assessment** Biological Processes Photosynthesis Plant minerals Aerobic & anaerobic respiration **Chapter 2 assessment**	Ecosystems Food chains & webs Ecosystems Competition Adapting to change **Chapter 3 assessment** Inheritance Variation Inheritance Extinction **Chapter 4 assessment**	The Periodic Table Physical & chemical properties of metals and non-metals Groups and periods **Chapter 1 assessment** Separation Techniques Pure substances Mixtures Solutions Evaporation & distillation Chromatography **Chapter 2 assessment**	The Earth The Earth & its atmosphere The Rock Cycle The Carbon Cycle Climate change Recycling **Chapter 3 assessment**	Electricity & magnetism Circuits and current Potential difference Resistance Series & parallel Electromagnets **Chapter 1 assessment** Energy Food and fuels Energy resources Energy adds up Energy & power **Chapter 2 assessment**	Motion & pressure Speed Motion graphs Pressure in gases Pressure in liquids Pressure on solids **Chapter 3 assessment**
Key new knowledge	**Nutrients:** Understand the content of a healthy human diet Give examples of carbohydrates, lipids, proteins, vitamins, minerals, fibre and water and explain why each is needed **Food tests:** Know the positive result of simple food tests for starch, sugars, protein and lipids. **Digestive system:** Know the tissues and organs of the human digestive system	**Food chains & webs:** Understand the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops Construct a food chain and food web **Ecosystems:** Define the terms; habitat, community and ecosystem Understand how different organisms exist within an ecosystem **Competition:** Understand the variation between species and individuals	**Physical & chemical properties of metals and non-metals:** Understand the periodic table; periods and groups; metals and non-metals Know the properties of metals and non-metals Understand the varying physical and chemical properties of different elements **Groups and periods:** Understand the principles underpinning the Mendeleev periodic table Recognise how patterns in reactions can be	**The Earth & its atmosphere:** Know the composition of the Earth Understand the structure of the Earth Understand the composition of the atmosphere **The Rock Cycle:** Understand the rock cycle and the formation of igneous, sedimentary, and metamorphic rocks **The Carbon Cycle:** Understand the production of carbon dioxide by human	**Circuits & current:** Know that electric current is measured in amps, Draw circuit diagrams Use ammeters to measure current in a simple circuit **Potential difference:** Know that potential difference is measured in volts Measure potential difference in a circuit **Resistance:** Know that resistance is measured in ohms	**Speed:** Understand speed and the quantitative relationship between average speed, distance, and time Calculate average speed **Motion graphs:** Understand the representation of a journey on a distance-time graph Plot motion graphs from given data **Pressure in gases:** Know that atmospheric pressure decreases with increase of height, as

	Know the adaptations of the tissues and organs to function Know how the digestive system digests food **Drugs & smoking:** Understand the effects of recreational drugs on behaviour, health, and life processes **Photosynthesis:** Know the reactants in, and products of, photosynthesis, and a word summary for photosynthesis Understand the dependence of almost all life on Earth on the ability of photosynthetic organisms **Plant minerals:** Understand that plants make carbohydrrates in their leaves by photosynthesis Understand that plants get minerals and water from the soil via their roots	of the same species meaning some organisms compete more successfully than others **Adapting to change:** Understand changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce **Variation:** Know the differences between species and give examples of inherited and environmental variation **Inheritance:** Understand hereditary is the process by which genetic information is transmitted from one generation to the next Give examples of inherited charactertics **Extinction:** Understand factors that may lead to extinction Know the importance of maintaining biodiversity and the use of gene banks to	predicted with reference to the periodic table **Pure substances:** Understand the concept of a pure substance Know how to identify pure substances **Mixtures:** Define a mixture as something which contains two or more substances Know the difference between mixtures and compounds **Solutions:** Define solution, solute, solvent, and dissolve Understand mixtures and dissolving. **Evaporation & distillation:** Know simple techniques for separating mixtures Explain how evaporation works Use distillation to separate mixtures **Chromatography:**	activity and the impact on the climate **Climate change:** Define climate change Give examples of ways climate change can be prevented **Recycling:** Know the Earth is a source of limited resources and the efficacy of recycling Give the advantages and disadvantages of recycling	Understand the differences in resistance between conducting and insulating components Investigate the resistance of a wire **Series and parallel:** Know the difference between series and parallel circuits Know how current varies in series and parallel circuits **Electromagnets:** Know the magnetic effect of a current Change the strength of electromagnets **Food and fuels:** Understand comparing energy values of different foods – from labels Investigate energy in food **Energy resources:** Understand fuels and energy resources Give examples of renewable and non-renewable energy resources	weight of air above decreases with height **Pressure in liquids:** Know that pressure in liquids increases with depth Know why some objects float and some sink **Pressure on solids:** Know that pressure measured by ratio of force over area – acting normal to any surface Calculate pressure Give examples of situations where high and low pressures are useful

	Aerobic & anaerobic respiration: Know that aerobic respiration in living organisms ebnables all the other chemical processes necessary for life Understand the process of anaerobic respiration in humans and microorganisms Give the word summary for aerobic and anaerobic respiration Know the reactants and products formed in aerobic and anaerobic respiration	preserve hereditary material	To analyse chromatograms Use chromatography to separate substances in a mixture		**Energy adds up:** Understand other processes that involve energy transfer Understand energy as a quantity that can be quantified and calculated Know how to compare the starting with the final conditions of a system **Energy and power:** Comparing power ratings of appliances in watts Understand domestic fuel bills, fuel cost and use Calculate power and energy	
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YR 9	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Content	Cells Plant and animal cells Cell specialisation Diffusion Prokaryotic cells **Chapter 1 assessment** Cell Systems Cells to organ systems Digestive system & enzymes Respiratory system & gas exchange Circulatory system **Chapter 2 assessment**	Variation & Natural Selection Natural selection & resistant bacteria Maintaining biodiversity Ecosystems **Chapter 3 assessment** Particle model & state change The particle model States of matter Sublimation Energy transfer **Chapter 1 assessment**	Atoms & the Periodic Table The development of the periodic table Inside atoms Elements, compound & mixtures Electronic structure Bonding **Chapter 2 assessment**	Chemical Changes Conservation of mass Energy in chemical reactions Exothermic & endothermic **Chapter 3 assessment** Forces & Motion Forces & interactions Mass, weight & fields Balanced & unbalanced Resultant forces **Chapter 1 assessment**	Energy Energy stores Energy transfers Conservation & dissipation Efficiency **Chapter 2 assessment** Waves, sound & light Wave properties Reflection & refraction Light & colour The electromagnetic spectrum **Chapter 3 assessment**	Electricy & Magnetism Static electricity & charge Current, potential difference & resistance Series and parallel Magnetism Alternating current & The National Grid **Chapter 4 assessment**
Key new knowledge	**Plant & animal cells:** Know that cells are the fundamental unit of living organisms Know the functions of the cell wall, cell membrane, cytoplasm, mitochondria, nucleus, vacuole, and chloroplasts Know the similarities and differences between animal and plant cells **Cell specialisation:** Know the adaptations of specialised animal and plant cells	**Natural selection & resistant bacteria:** Know how antibiotic resistant bacteria evolve Understand the process of natural selection How do species evolve in terms of natural selection **Maintaining biodiversity:** know the importance of biodiversity understand positive and negative human interactions with ecosystems	**The development of the periodic table:** Know the contributions of different scientists to the development of the periodic table **Inside atoms:** Understand the structure of an atom Know how to use models and analogies **Elements, compounds, and mixtures:** Know how the uses of elements, compounds, and mixtures depend on their properties Use ratios to determine chemical formulae	**Conservation of mass:** Understand and apply the idea of conservation of mass **Energy in chemical reactions:** Know about energy changes in combustion reactions Know how to analyse results and make conclusions **Exothermic and endothermic:** Interpret observations and date to decide if a change is exothermic or endothermic	**Energy stores:** Know how ideas about energy have changed Think about situations in terms of energy stores **Energy transfers:** Understand different rates of thermal energy transfer and how to investigate them **Conservation & dissipation:** Use energy conservation and dissipation in energy analyses Know how to reduce dissipation	**Static electricity & charge:** Separation of positive or negative charges when objects are rubbed together The idea of electric field, forces acting across the space between objects not in contact **Current, potential difference & resistance:** know the difference between current, potential difference, and resistance using models and ideas about fields

	Diffusion: Understand the role of diffusion in the movement of materials in and between cells **Prokaryotic cells:** Define a prokaryotic & eukaryotic cell Know the main sub-cellular structures of prokaryotic and eukaryotic cells **Digestive system & enzymes:** Know the tissues and organs of the digestive system Define an enzyme **Respiratory system & gas exchange:** Know the structure and functions of the gas exchange system in humans Understand the mechanism of breathing to move air in and out of the lungs Know the impact of exercise, asthma, and smoking on the	**Ecosystems:** Understand how organisms affect, and are affected by, their environment, including the accumulation of toxic materials Give some biotic and abiotic factors that affect communities **The particle model:** Explain properties of a substance in its three states Know about evidence for the particle model – Brownian motion **States of matter:** Interpret data Know the movement, arrangement, and separation of particles in foam and aerosols **Sublimation:** Interpret sublimation data in air fresheners Use the particle model to explain applications of sublimation **Energy transfer:**	**Electronic structure:** Draw the electronic structures of the atoms of the first 18 elements of the periodic table Use scientific knowledge to make predictions **Bonding:** Understand ionic and covalent bonding Draw dot and cross diagrams for ionic and covalent substances	**Forces and interactions:** Use Newton's Third Law to explain how forces arise, and change motion **Mass, weight, & fields:** Understand the link between forces and fields, and do calculations Know about systemic and random errors **Balanced and unbalanced forces:** Understand equilibrium and circular motion in terms of forces **Resultant forces:** Use ideas about vectors and scalers to calculate resultant forces	**Efficiency:** Understand what is meant by efficient and calculate efficiency **Wave properties:** Understand properties of waves including seismic waves **Reflection & refraction:** Use ray diagrams to explain illusions caused by reflection and refraction Use reflection and refraction to explain how telescopes and curved mirrors work **Light & colour:** Understand how ideas about light have changed, and explain the link between the colours of the spectrum, primary, and secondary colours. **The electromagnetic spectrum:** Know the waves of the lectromagnetic spectrum, and describe how and why some of them are dangerous.	**Series & parallel:** Know some of the uses of series and parallel circuits, and how they're used to sense the environment **Magnetism:** Explore the magnetic fields of permanent and induced magnets, and the Earth's magnetic field using a compass **Alternating current & the National Grid:** Know how transformers are used in the national grid and the reasons for their use

	human gas exchange system **<u>Circulatory system:</u>** Know the hierarchial organisation of multicellular organisms Understand the relationship between the structure and functions of the human circulatory system	Measure energy changes in chemical reactions Understand the changes of state of matter in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces				
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