KS3 Curriculum – Science

The Ramsey Academy

	Autumn Term														Spring Term											Summer Term													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Year 7	**Topic:** Key investigation skills Cells, tissues and systems Sexual reproduction							**Topic:** Sexual reproduction Muscles bones and breathing Ecosystems Mixtures and Separation							**Topic:** Mixtures and Separation Acids and Alkali Particle model							**Topic:** Particle model Atoms, elements and molecules					**Topic:** Energy Current and electricity							**Topic:** Forces Breathing and respiration						
	Declarative Knowledge: Cells are the basic units of life. Animal cells: nucleus, cytoplasm, cell membrane. Plant cells also have a cell wall, chloroplasts and vacuole. Tissue → Organ → Organ System → Organism. Digestive system breaks down food and absorbs nutrients. Sexual reproduction involves two parents. Sperm + Egg = Fertilisation. Fertilised egg = Zygote. Zygote → Embryo → Foetus → Baby. Puberty causes physical and emotional changes.							**Declarative Knowledge:** Skeleton supports, protects and helps movement. Tendons connect muscle to bone. Ligaments connect bone to bone. Muscles work in antagonistic pairs. Joints allow movement. Habitat, where an organism lives. Community, all populations in an area. Producer makes own food. Consumer eats other organisms. Food chains show energy transfer. Energy is lost at each stage.							**Declarative Knowledge:** Mixtures are not chemically joined. Solute dissolves in a solvent to form a solution. Filtration separates insoluble solids. Evaporation recovers dissolved solids. Distillation separates liquids. Chromatography separates dissolved substances. Acids: pH < 7 Neutral: pH = 7 Alkalis: pH > 7 Universal indicator shows pH. Neutralisation: Acid + Alkali → Salt + Water.							**Declarative Knowledge:** All matter is made of particles. Solids: particles vibrate in fixed positions. Liquids: particles move past each other. Gases: particles move freely. Heating increases particle movement. Changes of state: melting, freezing, boiling, condensation. Atoms are the building blocks of matter. Element = one type of atom. Compound = different atoms chemically joined. Elements are arranged in the periodic table. Mixtures can be separated physically.					**Declarative Knowledge:** Energy cannot be created or destroyed. Energy is transferred between stores. Stores include kinetic, thermal and chemical. Fuels store chemical energy. Insulation reduces unwanted energy transfer. Current flows in a complete circuit. Current is measured in amperes (A). Cells provide energy. Conductors allow current to flow. Insulators resist current flow. Series circuits have one loop.							**Declarative Knowledge:** A force is a push or pull and measured in newtons (N). Gravity is a non-contact force. Friction and air resistance oppose motion. Balanced forces, no change in motion. Unbalanced forces, accelerate. Aerobic Respiration releases energy and needs oxygen. Lungs carry out gas exchange. Oxygen enters; Carbon dioxide leaves the blood. The diaphragm helps breathing and Exercise increases breathing rate.						
	Non-Declarative Knowledge: Use a microscope safely. Prepare and observe cell slides. Identify plant and animal cell structures. Label male and female reproductive systems. Sequence fertilisation to birth. Explain changes during puberty.							**Non-Declarative Knowledge:** Identify major bones and muscles. Describe how antagonistic muscles work. Interpret joint movement diagrams. Construct food chains and food webs. Identify producers and consumers. Interpret ecosystem data.							**Non-Declarative Knowledge:** Choose suitable separation techniques. Carry out filtration and evaporation. Interpret chromatography results. Use indicators safely. Measure pH. Predict products of neutralisation.							**Non-Declarative Knowledge:** Draw particle models for solids, liquids and gases. Explain changes of state using particles. Interpret heating and cooling graphs. Distinguish between elements, compounds and mixtures. Use chemical symbols. Build simple particle diagrams.					**Non-Declarative Knowledge:** Identify energy stores and transfers. Draw energy transfer diagrams. Evaluate methods of reducing energy loss. Construct simple series circuits. Draw circuit symbols. Measure current in a circuit. Troubleshoot broken circuits.							**Non-Declarative Knowledge:** Measure forces using a Newton meter. Draw force arrows. Interpret balanced and unbalanced force diagrams. Investigate friction and air resistance Label the respiratory system. Explain inhalation and exhalation. Describe gas exchange in the lungs. Compare aerobic and anaerobic respiration. Measure breathing rate. Interpret breathing rate data.						
	Assessment: End of topic assessment x2							**Assessment:** End of topic assessment x2 End of term assessment							**Assessment:** End of topic assessment x2							**Assessment:** End of topic assessment x2 End of term assessment							**Assessment:** End of topic assessment x2							**Assessment:** End of topic assessment x2						
	Curriculum Connection: KS2 Topic- Animals Including Humans: Knowledge of body systems becomes more detailed and linked to cells, organs and organ systems							**Curriculum Connection:** KS2 Topic- Animals Including Humans **and** Living Things & Their Habitats: Knowledge of body systems becomes more detailed and linked to cells, organs and organ systems **and** Food chains, habitats, biodiversity and adaptation are developed into food webs and ecosystems.							**Curriculum Connection:** KS2 topic- Properties and Changes of Materials **and** States of Matter: Observing materials develops into explaining behaviour using particle theory **and** Particle arrangements explain solids, liquids, gases and changes of state.							**Curriculum Connection:** KS2 topic- Properties and Changes of Materials **and** States of Matter: Observing materials develops into explaining behaviour using particle theory **and** Particle arrangements explain solids, liquids, gases and changes of state.							**Curriculum Connection:** KS2 topic- Electricity: Simple circuits develop into current, voltage and resistance							**Curriculum Connection:** KS2 topic- Forces and Magnets: Forces become balanced forces, friction, air resistance and resultant forces Planet movement leads to understanding seasons, day/night and gravity **and** Knowledge of body systems becomes more detailed and linked to cells, organs and organ systems						

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	Topic: Light Energy transfer Earth and space							**Topic:** Earth and space Fluids Periodic Table							**Topic:** Periodic Table Metals and uses Combustion						**Topic:** Plants and reproduction Unicellular organisms					**Topic:** Unicellular organisms Breathing and respiration Food and nutrition							**Topic:** Food and nutrition Genetics and evolution						
Year 8	**Declarative Knowledge:** Light travels in straight lines. Reflection occurs when light bounces off a surface. Angle of incidence = angle of reflection. Refraction occurs when light changes direction. White light contains all colours of the visible spectrum. Convex lenses focus light. Earth is part of the Solar System. The Sun is a star. Planets orbit the Sun. Earth rotates every 24 hours. Earth orbits the Sun every 365.25 days. Seasons are caused by Earth's tilted axis. The Moon orbits Earth. Gravity keeps planets in orbit.							**Declarative Knowledge:** Earth has 4 layers: crust, mantle, outer core, inner core. Tectonic plates move on the mantle. Earthquakes and volcanoes occur at plate boundaries. Resources can be renewable or non-renewable. Fossil fuels are non-renewable. Recycling helps conserve resources. Sustainable development protects resources for the future. Liquids and gases are fluids. Pressure acts in all directions. Pressure increases with depth. Upthrust acts against gravity. Density affects floating and sinking. Streamlining reduces drag.							**Declarative Knowledge:** Elements are arranged by atomic number. Metals are on the left side. Non-metals are on the right side. Group 1 contains reactive metals. Group 7 contains reactive non-metals. Elements in the same group have similar properties. Metals conduct electricity and heat. Copper is used in electrical wiring. Aluminium is lightweight and corrosion-resistant. Iron rusts in water and oxygen. Alloys are mixtures that improve properties. Steel is stronger than pure iron. Combustion is a reaction with oxygen. Fuels store chemical energy. Burning releases heat and light energy. Complete combustion produces carbon dioxide and water. Incomplete combustion can produce carbon monoxide. Fire needs fuel, oxygen and heat.						**Declarative Knowledge:** Respiration releases energy from food. Aerobic respiration requires oxygen. Glucose + Oxygen → Carbon Dioxide + Water + Energy. Anaerobic respiration occurs without oxygen. Anaerobic respiration releases less energy. Oxygen debt can occur after exercise. Unicellular organisms consist of one cell. Bacteria are unicellular. Microorganisms can be helpful or harmful. Yeast is used in fermentation. Some microorganisms cause disease. Microscopes are used to observe microorganisms.					**Declarative Knowledge:** The lungs are adapted for gas exchange. Oxygen moves from alveoli into the blood. Carbon dioxide moves from the blood into the lungs. The diaphragm and rib muscles control breathing. Exercise increases breathing rate. Smoking damages the lungs Carbohydrates provide energy. Proteins are used for growth and repair. Fats provide energy and insulation. Vitamins and minerals keep the body healthy. Digestion breaks large food molecules into smaller soluble molecules. Enzymes speed up digestion. The small intestine absorbs nutrients into the blood.							**Declarative Knowledge:** Genes are sections of DNA. DNA is found in chromosomes. Humans have 23 pairs of chromosomes. Variation can be genetic or environmental. Fertilisation combines DNA from two parents. Biodiversity = variety of living things. Extinction = when a species dies out.						
	Non-Declarative Knowledge: Draw ray diagrams. Measure angles of reflection. Investigate refraction. Model day and night. Explain seasons. Interpret Solar System diagrams.							**Non-Declarative Knowledge:** Label Earth's layers. Interpret tectonic plate maps. Evaluate renewable and non-renewable resources. Measure pressure. Explain floating and sinking. Investigate drag and streamlining.							**Non-Declarative Knowledge:** Locate elements in the periodic table. Identify metals and non-metals. Compare groups of elements. Test metal properties. Explain why metals are used for specific purposes. Investigate rusting. Identify combustion reactions. Carry out safe burning experiments. Use the fire triangle.						**Non-Declarative Knowledge:** Compare aerobic and anaerobic respiration. Write the word equation for aerobic respiration. Interpret exercise data. Use a microscope correctly. Observe microorganisms. Explain useful and harmful microbes.					**Non-Declarative Knowledge:** Model gas exchange in the lungs. Measure breathing rate. Explain breathing movements. Test foods for nutrients. Interpret food labels. Explain the role of enzymes.							**Non-Declarative Knowledge:** Interpret inheritance diagrams. Classify variation as genetic or environmental. Use family trees and variation data. Explain selective breeding.						
	Assessment: End of topic assessment x2							**Assessment:** End of topic assessment x2 End of term assessment							**Assessment:** End of topic assessment x2						**Assessment:** End of topic assessment x2 End of term assessment					**Assessment:** End of topic assessment x2							**Assessment:** End of topic assessment x2						
	Curriculum Connection: KS2 Topic - Light - Reflection is developed into refraction, lenses and ray diagrams. Earth and Space- Planet movement leads to understanding seasons, day/night and gravity							**Curriculum Connection:** KS2 Topic - States of Matter article arrangements explain solids, liquids, gases and changes of state.							**Curriculum Connection:** KS2 Topic - Properties and Changes of Materials: Observing materials develops into explaining behaviour using particle theory.						**Curriculum Connection:** KS2 Topic - Living Things & Their Habitats and Plants Food chains, habitats, biodiversity and adaptation are developed into food webs and ecosystems. Plant structure, transport and photosynthesis are explored in greater depth					**Curriculum Connection:** KS2 Topic - Living Things & Their Habitats; Animals Including Humans: Food chains, habitats, biodiversity and adaptation are developed into food webs and ecosystems. Knowledge of body systems becomes more detailed and linked to cells, organs and organ systems.							**Curriculum Connection:** KS2 Topic - Evolution and Inheritance: Adaptation and evolution are extended through genes, chromosomes and DNA.						

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	Topic: Cell structure and transport Cell Division Atomic structure							**Topic:** Periodic table Molecules and matter							**Topic:** Molecules and matter Organisation and Digestive system Organising Animals and plants						**Topic:** Bonding Chemical calculations					**Topic:** Conservation and dissipation of energy Energy transfer by heating							**Topic:** Energy resources Communicable Diseases						
Year 9	**Declarative Knowledge:** Cells are the basic units of life. Mitosis produces identical cells. Stem cells can differentiate. Bacteria are prokaryotes. Mitosis produces genetically identical cells. Mitosis is used for growth and repair. Chromosomes contain genetic information. Stem cells can differentiate into specialised cells. All matter is made of atoms. Atoms contain protons, neutrons and electrons. Protons are positive, neutrons are neutral, electrons are negative. Isotopes have different numbers of neutrons.							**Declarative Knowledge:** Elements are arranged by atomic number. Metals are on the left; non-metals on the right. Elements in the same group have similar properties. The periodic table is used to predict properties. Matter is made of particles. Solids, liquids and gases have different particle arrangements. Heating increases particle movement. Changes of state occur when energy is transferred. Density = mass in a given volume.							**Declarative Knowledge:** Enzymes speed up digestion. The digestive system breaks down food. The small intestine absorbs nutrients. The heart pumps blood around the body. Cells form tissues. Tissues form organs. Organs form organ systems. Xylem transports water in plants. Phloem transports sugars in plants.						**Declarative Knowledge:** Atoms bond by ionic, covalent or metallic bonding. Ionic bonding involves electron transfer. Covalent bonding involves shared electrons. Metallic bonding involves delocalised electrons. Bonding determines a substance's properties. Equations must be balanced. Mass is conserved in reactions. Mr = total relative mass of a substance. Moles measure the amount of substance. A limiting reactant stops the reaction when used up. Yield is the amount of product made. Atom economy measures how much useful product is produced.					**Declarative Knowledge:** Energy is transferred between stores. Energy cannot be created or destroyed. Power is the rate of energy transfer. Efficiency reduces energy waste. Energy transfers by conduction, convection and radiation. Metals are good conductors. Dark surfaces absorb heat best. Insulation reduces heat loss.							**Declarative Knowledge:** Energy resources are renewable or non-renewable. Fossil fuels are non-renewable. Renewable resources include wind, solar and hydroelectric. Energy choices affect the environment. Pathogens cause disease. Pathogens include bacteria, viruses and fungi. White blood cells defend the body. Vaccination helps prevent disease. Antibiotics kill bacteria, not viruses.						
	Non-Declarative Knowledge: Use a microscope safely. Identify cell structures. Compare plant, animal and bacterial cells. Sequence stages of mitosis. Explain the role of stem cells. Interpret chromosome diagrams. Draw and label atomic structure diagrams. Calculate numbers of protons, neutrons and electrons. Compare atoms and isotopes.							**Non-Declarative Knowledge:** Locate elements in the periodic table. Identify groups and periods. Predict properties from an element's position. Draw particle models. Explain changes of state. Calculate density. Interpret heating and cooling graphs.							**Non-Declarative Knowledge:** Describe the pathway of food through the digestive system. Interpret enzyme investigations. Label the heart and digestive organs. Identify tissues, organs and organ systems. Explain transport in xylem and phloem. Interpret plant transport diagrams.						**Non-Declarative Knowledge:** Draw ionic and covalent bonding diagrams. Identify bond types from formulas. Relate bonding to properties. Balance chemical equations. Calculate Mr values. Calculate moles, yield and atom economy.					**Non-Declarative Knowledge:** Draw energy transfer diagrams. Calculate efficiency. Identify useful and wasted energy transfers. Compare conduction, convection and radiation. Explain methods of insulation. Interpret thermal energy investigations.							**Non-Declarative Knowledge:** Compare renewable and non-renewable resources. Evaluate energy resource choices. Analyse environmental impacts. Identify different pathogens. Interpret disease transmission data. Evaluate vaccination and antibiotic use.						
	Assessment: End of topic assessment x2							**Assessment:** End of topic assessment x2 End of term assessment							**Assessment:** End of topic assessment x2						**Assessment:** End of topic assessment x2 End of term assessment					**Assessment:** End of topic assessment x2							**Assessment:** End of topic assessment x2						
	Curriculum Connection: B1- 7A,7B,8D B2- 7B,8B,9A C1– 7H,8F							**Curriculum Connection:** C2- 7H,8F,8G P6- 7G, 8I							**Curriculum Connection:** B3- 7A,8A B4- 7A,8B						**Curriculum Connection:** C3- 8F,8G,7H, C1, C2 C4- C1,7H					**Curriculum Connection:** P1- 7I,7J,8K,8L P2- 8K, P1							**Curriculum Connection:** P3- 7I, 8K, P1, P2 B5- 8D B1						