Curriculum Map

Subject: Science KS3

Year: 8

	Autumn				Spring		
Content Knowledge	**Introduction to Science Project:** • Lab safety • Variables • Tables • Method writing • Accuracy, reliability, precision • Graphs and tables • Types of error **Knowledge:** Identify the control, independent and dependent variables. Identify risks within the lab and how to minimise these. How to write a scientific method. How accurate, reliable and precise results are. Plot line graphs from data. Describe different types of errors	**8A Food and Nutrition:** • Energy from food • Nutrient tests • Balanced diets • Mechanical digestion • Chemical digestion • Absorption **Knowledge:** Describe why we need protein, carbohydrates, fats, vitamins and minerals in our diet. Identify the 4 nutrients Tests. Explain the benefits of a balanced diet. Identify parts of the digestive system and their function. Explain how enzymes and bacteria help with digestion. Explain the importance of surface area in the body.	**8E Combustion:** • Fuels • Complete and Incomplete Combustion • Oxidation • Fire extinguishers • Acid rain • Global warming **Knowledge:** Identify the products and reactants using a word equation. Explain using the law of conservation of mass why mass is never gained or lost in a chemical reaction. Recognise hazard symbols. Explain how incomplete combustion occurs. Describe the greenhouse effect and how carbon dioxide helps increase it.	**8I Fluids:** • Solids, liquids and gases volumes and compressibility • Calculating density • Changing states • Pressure • Floating • Drag forces **Knowledge:** Use the particle model to explain diffusion, expanding, contracting, and density. Use the formula relating mass, density, and volume. Explain how chemical changes are different from physical changes. Describe how gas pressure can be increased. Explain why an object can float. Describe the causes of drag forces.	**8C Respiration:** • Aerobic and anaerobic respiration • Breathing • Gas exchange • Effects of smoking • Effects of exercise **Knowledge:** Recall why we need food and oxygen. Describe what happens when we inhale and exhale. Explain how the lungs are adapted for efficient gas exchange. Describe the effects of exercise on the body. Describe how gas exchange occurs in other organisms. Describe what happens in anaerobic respiration in humans.	**8F&G The Periodic Table and Metals:** • Dalton's atomic model • Mendeleev's periodic table • Compounds and formulae • Chemical reactions • Metals • Catalysts • Corrosion and rusting • Reactivity **Knowledge:** Identify elements by their names and symbols. Describe how the periodic table is arranged. Recognise the elements in a chemical formula. Describe some chemical or physical changes. Relate the uses of different elements to their physical and chemical properties. Explain methods to prevent rusting. Describe the reactions of acids with metals.	**8J Light:** • Light waves • transparent, opaque and translucent • Reflection • Refraction • Ray Diagrams • Cameras • Eyes • Colour **Knowledge:** Compare light and sound waves. Describe what happens to light when it hits different surfaces. Compare specular reflection and diffuse reflection. Describe how light changes direction at the interface of two different substances. Label the different parts of an eye. Describe how a filter is used to make coloured light.

Skills	• Identify the control, independent and dependent variables • Write a scientific method. • Identify risks in the lab and write a risk assessment • Compare the accuracy, reliability and precision of results. • Plot data on line graphs and draw a line of best fit • Dividing and drawing the axis of a line graph on graph paper	• Use a formula to calculate the area of a rectangle • Calculating surface area • Test for the four nutrients in food • Use vocabulary to add strength to arguments to create bias.	• Identify the products and reactants using a word equation. • Write the equation describing oxidation reactions of metals and non-metals. • Recognise hazard symbols. • Identify independent, dependent, and control variables. • Explain how to keep control variables the same.	• Link back to 7G&H Particles topic to recall solid, liquid and gas particle models. • Use the formula relating mass, density, and volume. • Rearrange the formula to find volume or mass • Calculate the density of an object from measurements	• Use a model to explain how lungs expand and contract. • Plot data on line graphs and draw a line of best fit • Dividing and drawing the axis of a line graph on graph paper • Use scientific equipment to demonstrate that respiration is happening. • Investigate the extent of muscle fatigue from anaerobic respiration	• Use a model to describe an atom, an element and a compound. • Draw a diagram of a compound from a chemical formula. • Identify reactants and products in word equations. • Investigate if changes are chemical or physical. • Link back to 8E Combustion to write word equations. • Evaluate how a method can be made more reliable	• Investigate the angles of reflection and incidence. • Labelling ray diagrams of reflection and refraction. • Use a model to explain how converging lenses work. • Sheep Eye Dissection to identify structures in the eye. • Label a scientific diagram of the eye. • Presentation skills
Key Questions	What are control, independent and dependent variables? What risks are there in a lab? How can we minimise these risks? How accurate, precise and reliable are your results? What can you conclude from a graph? What types of error would you incur in an experiment?	Why do we need protein, carbohydrates, fats, vitamins and minerals in our diet? How do we test for nutrients? What are the benefits of a balanced diet? How do adverts persuade us to eat certain foods? How is food moved through the digestive system? How do enzymes and bacteria help with digestion?	What is formed when hydrocarbons burn? Why is mass never gained or lost in a chemical reaction? Why do different types of fires need to be put out in different ways? How does complete and incomplete combustion occur? What causes acid rain? What causes global warming?	How can you use the particle model to explain diffusion, expanding, contracting, and density? How do you calculate density? How are chemical changes different from physical changes? How can gas pressure be increased? Why can certain objects float? What are the causes of drag forces?	Why do we need food and oxygen? What happens when we inhale and exhale? How can you demonstrate that respiration has occurred? How are the lungs adapted for efficient gas exchange? What happens to our lungs if we smoke? What are the effects of exercise on the body? How does gas exchange occur in other organisms? What happens in anaerobic respiration in humans?	How do we identify elements by their names and symbols? How is the periodic table arranged? What elements are in a chemical formula? What are chemical or physical changes? How do the uses of different elements relate to their physical and chemical properties? What are the methods to prevent rusting? What happens when you react acids with metals?	How are light and sound waves similar? What happens to light when it hits different surfaces? What is specular reflection and diffuse reflection? How does light change direction at the interface of two different substances? What are the different parts of the eye? How is a filter used to make coloured light?
Assessment	End of chapter assessed project ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks

Literacy/numeracy/SMSC/Character	**Key words:** observation, practical, investigate, cooperation, hypothesis, prediction, record, analyse, conclusion, method, independent variable, dependent variable, control variable, repeat, accurate, mean, range, graph, axis, scale, line of best fit, accuracy, precision, reliability, validity. **Numeracy:** taking measurements using scientific equipment. Calculating mean and range of results. Calculating scales on a graph. **SMSC:** Studying the scientific method and how scientists collaborate to share and test ideas.	**Key words:** nutrients, carbohydrates, fats, proteins, vitamins, minerals, starch, sugars, oils, lipids, fibre, constipation, Benedict's, biuret's, iodine, emulsion, balanced diet, malnutrition, deficiency disease, night blindness, scurvy, rickets, anaemia, salivary glands, liver, digestive system, indigestion, saliva, digestive juice, small intestine, absorbed, gullet, stomach, large intestine, faeces, anus, elimination, egestion, bacteria, enzymes, catalysts **Numeracy:** taking measurements using scientific equipment. **SMSC:** Students consider what constitutes a healthy diet. Develop an understanding of the use of bias in advertising and how to consider the validity of claims. Students are introduced to deficiencies and their causes.	**Key words:** fuel, combustion, pollution, word equations, reactants, products, fossil fuels, hydrocarbons, oxidation, non-metals, metals, metal oxides, law of conservation of mass, exothermic, thermometer, fire triangle, hazard symbol, fire extinguishers, complete combustion, incomplete combustion, carbon monoxide, soot, impurities, sulphur dioxide **Numeracy**: Using the law of the conservation of mass to balance equations. **SMSC:** Identify the hazards in extinguishing different types of fires. Appreciate the dangers in oil fires. Understand how rain can erode buildings. Students develop an understanding of how everyday processes contribute to global warming and the effects this has on the environment.	**Key words:** states of matter, solids, compress, liquids, gases, particle theory, particle model, diffusion, Brownian motion, expanding, contracting, density, mass, volume, metre, grams, centimetre, melting, freezing, changes of state, sublimation, chemical changes, physical changes, melting point, evaporate, boiling point, boiling, water vapour, condenses, freezing point, pure, pressure, drag. **Numeracy:** Use the formula relating mass, density, and volume. Taking measurements. **SMSC:** Students gain an appreciation that all matter is made up of particles and how these interact to explain different processes. Appreciation for the complexity of forces and how they interact.	**Key words:** Respiration, products, reactants, breathing, breathing rate, ventilation, inhalation, exhalation, alveoli, mucus, tar, nicotine, cilia, carbon monoxide, limewater, hydrogen carbonate, gill, photosynthesis, stomata, lactic acid, anaerobic respiration, excess post-exercise oxygen consumption (EPOC), oxygen debt **Numeracy:** taking measurements using scientific equipment. Comparison of inhaled and exhaled air composition. **SMSC:** Students develop an understanding of how to use experiments and demonstrate theories and explain observations using scientific terminology. Develop an appreciation of how our bodies function.	**Key words:** matter, atoms, element, compounds, periodic table, groups, periods, chemical properties, ratio, chemical formula, melting point, boiling point, flexible, shiny, conductors, strong, ductile, catalyst, Reliable, Repeatable, reproducible, Corrosion, Rusting, pure, alloy. **Numeracy:** taking readings and measurements. **SMSC:** Encouraging a sense of fascination in learning about how atoms make up all matter and behave differently in the world around them. Problem solving skills are developed through their work in preventing rusting.	**Key words:** source, opaque, shadow, vacuum, rays, transparent, transmitted, reflected, absorbed, translucent, scattered, image, specular reflection, diffuse reflection, incident ray, normal, reflected ray, mirror, angle of incidence, angle of reflection, interface, converging lens, camera, sensor, retina, pupil, iris, rod cells, cone cells, primary colours, secondary colours, spectrum, dispersion, filters **Numeracy:** measuring angles using a protractor. taking measurements using scientific equipment. **SMSC:** Students consider different conditions affecting the eye and how these can be managed to make peoples life easier. Developing an amazement with understanding how we see light and coloured objects.
Enrichment opportunities and futures	KS3 Science Club Science Museum Zoo Trip Visits from outside presenters Science Competitions Science Week						

	Summer				
Content Knowledge	**8D Unicellular Organisms:** ● Unicellular ● Diffusion ● Fungi ● Bacteria ● Growth ● Disease ● Decomposers **Knowledge:** Identify organisms that are unicellular and multicellular. Explain why a virus is not a living thing. Use a knowledge of particles to explain how materials enter and leave unicellular organisms by diffusion. Describe how yeast multiply by budding. Identify the basic parts of a bacterial cell. Describe and explain a population growth curve. Explain the importance of decomposers.	**8K Energy Transfers:** ● Thermal energy ● Evaporation ● Conduction ● Convection ● Radiation ● Conductors and insulators ● Efficiency ● Payback time **Knowledge:** Explain how energy and temperature are different. Recall the effect of evaporation on the temperature of the remaining liquid. Describe how energy is transferred in conduction, convection and radiation. Explain ways of reducing energy transfer. Use the formula relating power, energy and time. Calculate energy efficiencies. Calculate the cost of electricity.	**8L Earth and Space:** ● Seasons ● Orbits ● Phases of the Moon ● Stars and planets ● Magnetic Fields ● Electromagnets ● Gravity **Knowledge:** Explain how the tilt of the Earth causes seasons. Explain why we see the different phases of the moon. Recall the order of the planets and that they move around the Sun. State the difference between a star and planets. Explain how a compass works. How an electromagnet can be useful. Explain that weight changes in space but mass remains the same.	**8B Plants and their Reproduction:** ● Biodiversity ● Sexual and asexual reproduction ● Parts of the flower ● Pollinations ● Fertilisation ● Seed dispersal ● Germination ● Photosynthesis ● Sampling **Knowledge:** Explain why preserving biodiversity is important. Compare sexual and asexual reproduction. Link the structures of a flower to their functions. Give examples of ways plants can be pollinated. Describe the events that occur after pollination leading to an embryo. Explain what different resources are needed for germination. Describe the conditions needed for plants to carry out photosynthesis. Describe the lifecycle of a plant. Explain why we sample.	**8X Waves:** ● Transverse ● Longitudinal ● Electromagnetic Spectrum ● Speed of waves ● Sound waves **Knowledge:** Label a transverse wave with amplitude and wavelength. Label a longitudinal wave with compression and rarefaction. Relate frequency to pitch and amplitude to volume. Describe what happens to the wavelength, energy and frequency as you go along the EM spectrum. Use the equation $c=\lambda f$. Know that sound waves are longitudinal waves made by a vibrating source.

Skills	• Identify organisms that are unicellular and multicellular. • Label a scientific diagram of a cell with the key features. • Link back to 7G&H Particles to explain diffusion • Demonstrate the process of diffusion using potato and iodine. • Method writing • Identify variables, complete a results table.	• Use the formula relating power, energy and time. • Calculate energy efficiencies. • State the variables in an experiment • Describe a systematic error and a random error. • Carry out an experiment with precision and accuracy • Investigate how sweating cools us down.	• Drawing scientific diagrams • Predict and draw what the moon looks like from the earth in eight positions of the moon's orbit. • Demonstrating and drawing magnetic Field lines • Presenting arguments	• Test leaves to demonstrate photosynthesis have occured. • Seed Dissection to identify key features. • Link the structures of a flower and explain how they are adapted to their functions. • Prepare slides of pollen to study and determine seed dispersal method. • Use Quadrats to investigate distribution of daisies and dandelions	• Be able to convert between units of measurement. • Use the equation $c=\lambda f$ • Presenting ideas and providing feedback to peers • • Relate frequency to pitch and amplitude to volume • Draw and label scientific diagrams of waves
Key Questions	What are unicellular and multicellular organisms? Why is a virus not a living thing? How do materials move into and out of cells? How does yeast multiply? What are the basic features of a cell? What is a population growth curve and what does it show? How is Malaria transmitted? Why are decomposers important?	How are energy and temperature different? How does evaporation cool us down? How is energy transferred in conduction, convection and radiation? How can we reduce energy transfer? How do you calculate power? How do you calculate energy efficiency? How is the cost of electricity calculated?	What causes the seasons? Why does the moon appear to change shape? What is the order of the planets in our solar system? What is the difference between a star and a planet? How does a compass work? What are electromagnets used for? Why does your weight change in space but your mass remains the same?	Why is preserving biodiversity important? How is sexual and asexual reproduction different? How can plants be pollinated? What happens after pollination? What different resources are needed for germination? What conditions are needed for plants to carry out photosynthesis? What is the lifecycle of a plant? Why do we sample?	What is a transverse wave? What is a longitudinal wave? What is the electromagnetic spectrum? What happens to the wavelength, energy and frequency as you go along the EM spectrum? What can you tell about a wave? What are sound waves?
Assessment	End of chapter test ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks	End of chapter test ReAct tasks

Literacy/numeracy/SMSC/Character	**Key words:** cells, microorganisms, unicellular, Prokaryote, Protoctists, Fungi, Viruses, diffusion, Fermentation, ethanol, budding, yeast, microscopic fungi, Bacteria, binary fission, flagellum, colony, Growth curve, population, Protist, malaria, producer, chlorophyll, cell wall, nucleus, food storage, eyespot, mitochondrion, decomposer, decay **Numeracy:** taking measurements using scientific equipment. Analysing data in graphs and tables. **SMSC:** Appreciation of how many species exist and how these are categorised. Students consider the important role of decomposers, tiny microorganisms that contribute to the food chain.	**Key words:** energy, thermal energy, joules (J), temperature, degrees Celsius (ºC), Evaporation, Thermal conductors, thermal insulators, accuracy, precision, random error, systematic error, Fluids, convection currents, infrared radiation, emit, absorbed, reflected, medium, vacuum, Thermal images, Solar panels, convection, conduction, Power, watt (W), kilowatt (W) power ratings efficiency, Sankey diagram, payback time **Numeracy:** taking measurements using scientific equipment. Calculating power, efficiency and pay-back time. **SMSC:** Encouraging students to consider the use of energy and how to be more energy efficient. Experience in calculating the cost of energy using real life examples to appreciate the cost.	**Key words:** Axis, tilt, hemisphere, Plotemy, Kelper, orbit, star, planets, sun, magnet, magnetic field, north, south, moon, phases, gibbous, crescent, waxing, waning, Earth, Mars, Venus, Mercury, Jupiter, Saturn, Neptune, electromagnets, compass, solenoid, Motor, Hammer, Armature, contact, gravity, weight, mass, space **Numeracy:** Weight and mass on different planets considered. taking measurements using scientific equipment. **SMSC:** Developing a fascination with the universe beyond earth and how planets differ. Students explain the world around them. For example; why we have day and night, seasons and why we see the moon at different phases.	**Key words:** genus, species, characteristics, classify, kingdoms, biodiversity, extinct, Sexual reproduction, hybrids, fertile, inherited, variation, gametes, asexual reproduction, runners, tubers, Stigma, style, ovary, ovule, carpel, filament, anther, stamen, petal, nectary, sepal, cross-pollination, self-pollination, pollination, pollinator, pollen, gamete, competition, egested, faeces, photosynthesis, glucose, carbon dioxide, oxygen, chloroplasts, mineral salts, starch, by-product, sample. **Numeracy:** Students compare estimates and calculate distribution over a surface area. **SMSC:** Students learn the importance of biodiversity and how this impacts other organisms, making them conscientious biologists. Investigative skills are developed through practical activities.	**Key words:** transverse wave, longitudinal wave, electromagnetic spectrum, wavelength, energy, amplitude, frequency, spectrum, sound waves, compression, particles, vibrate, volume, radiation, ear, detect, **Numeracy:** calculating wavelength and frequency. Comparing frequencies and wavelengths. **SMSC:** Discussions on the uses and applications of EM waves in real-life. Students develop an understanding of the world around them by being able to explain how we hear sound and the characteristics of a sound wave.
Enrichment opportunities and futures	KS3 Science Club Science Museum Zoo Trip Visits from outside presenters Science Competitions Science Week				