

	Working Towards	Expected Standard	Greater Depth
	By the end of Year 9 a student should be able to:	By the end of Year 9 a student should be able to:	By the end of Year 9 a student should be able to:
A U T U M N	<p>Biology: Interactions & Interdependencies</p> <ul style="list-style-type: none"> • Adaptations and competition between organisms in ecosystems • The Sun is a source of energy that passes through ecosystems • Organisation of an ecosystem – interdependence of organisms (food webs) • Ecosystems provide essential services that support human life and continued development. • Importance of plant reproduction through insect pollination. <p>Maths in Science Skills</p>	<p>Biology: Interactions & Interdependencies</p> <ul style="list-style-type: none"> • Materials including carbon and water are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis. • All species live in ecosystems composed of complex communities of animals and plants dependent on each other <p>Maths in Science Skills</p>	<p>Biology: Interactions & Interdependencies</p> <ul style="list-style-type: none"> • Organisms are adapted to particular conditions, both abiotic and biotic. • Learn how humans need to engage with the environment in a sustainable way • Biodiversity and its importance with interdependence of organisms. • including insect pollinated crops and interdependence in human food security • how organisms affect and are affected by their environment, inc. the accumulatio of toxic materials. <p>Maths in Science Skills</p>

Physics: Energy and Matter

- The properties of the different states of matter (solid, liquid and gas) in terms of particle model, including gas pressure.
- Changes of state in terms of the particle model
- Density – use appropriate apparatus to make and record measurements needed to determine the densities of different objects.
- Conservation of material and of mass, and reversibility in melting, freezing, evaporation, sublimation, condensation, dissolving.

Maths in Science Skills

Biology: Cells and organisation (Bio)

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- The process of diffusion and situations where it can be used in plants and animals eg; ventilation, removal of waste products.

Maths in Science Skills

Physics: Energy and Matter

- describe and explain the similarities and differences between the different states of matter as well as the processes in which a substance changes state.
- use the relevant equation to calculate density.
- Similarities and differences, inc. density differences between solids, liquids and gases.

Maths in Science Skills

Biology: Cells and organisation

- The difference between Eukaryotic and Prokaryotic cells, the function of organelles including mitochondria and ribosomes.
- The equation needed to calculate magnification and the ability to rearrange the equation to determine image size.

Maths in Science Skills

Physics: Energy and Matter

- Pressure in liquids, increasing with depth; upthrust effects, floating and sinking
- Pressure measured by ratio of force over area – acting normal to any surface

Maths in Science Skills

Biology: Cells and organisation (Bio)

- The process of Mitosis and the importance of DNA replication for growth and repair
- Explain the process of osmosis as the movement of water particles from high concentration to low concentration and link this to mass loss or gain in cells
- The process of active transport as a means of moving particles against the concentration gradient and examples of where this is used in animal and plant cells.

Maths in Science Skills

Chemistry: Atoms, elements & compounds

- A simple (Dalton) atomic model
- Differences between atoms, elements and compounds
- The concept of pure substances
- Mixtures, including dissolving
- Chemical reactions as the rearrangement of atoms

Waves (Physics)

- Two types of wave and label specific parts.
- Frequencies of sound waves measured in hertz; echoes, reflection and absorption of sound
- Sound needs a medium to travel through
- Sound is produced by vibrations of objects

Maths in Science Skills**Chemistry: Atoms, elements & compounds**

- Chemical symbols and formulae for elements and compounds
- Conservation of mass changes of state and chemical reactions
- Diffusion in terms of the particle model
- The varying physical and chemical properties of different elements
- The periodic table: periods and groups; metals and non-metals.

Waves (Physics)

- How to calculate wave speed using an equation, and how to re-arrange the equation.
- To name sections of the electromagnetic spectrum, and explain uses and dangers.
- Similarities and differences between light waves and waves in matter

Maths in Science Skills**Chemistry: Atoms, elements & compounds**

- The identification of pure and impure substance.
- Principles underpinning the Mendeleev periodic table
- How patterns in reactions can be predicted with reference to the periodic table

Waves (Physics)

- How to set up and explain 2 required practicals based on wave properties.
- To explain the uses of infrared radiation
- Pressure waves transferring energy – uses in STEM careers
- Uses and dangers of the electromagnetic spectrum

Maths in Science Skills

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Energy Changes in systems (Physics)

Maths in Science Skills

- Energy cannot be created or destroyed, only converted from one form to another.
- Work done is the same as energy transferred. Conservation of energy links GPE, KE and work done. Power is the rate of transfer of energy or the rate of doing work.
- The equations which link GPE, KE and work done
- The equation to calculate Specific Heat Capacity.

**STEM Project - Earth and atmosphere
(cross curricular) (carbon capture)**

Energy Changes in systems (Physics)

Maths in Science Skills

- Energy transfers can be shown in Sankey diagrams.
- Efficiency is a measure of how much useful energy is converted.
- Electricity can be generated from wind, water, geothermal and solar energy. These energy resources are renewable.
- Process that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.

**STEM Project - Earth and atmosphere
(cross curricular) (carbon capture)**

Energy Changes in systems (Physics)

Maths in Science Skills

- Renewable and non-renewable energy forms advantages and disadvantages.
- Heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfers from hotter to cooler
- Specific Heat capacity investigations and calculations.

**STEM Project - Earth and atmosphere
(cross curricular) (carbon capture)**