

# Science

## Year 8 Curriculum Intent 2022-2023

### Year 8 – Curriculum

NB: Students may not follow the topics in the exact order stated below due to how topics are split between teaching staff

Big topics	Topic Name	Outcomes	Skill Components	Assessment Opportunities	KS2/Year 7 to KS4
Electricity	Electricity	<ul style="list-style-type: none"> <li>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</li> <li>potential difference, measured in volts, battery, and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</li> <li>differences in resistance between conducting and insulating components (quantitative).</li> <li>separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects</li> <li>the idea of electric field, forces acting across the space between objects not in contact.</li> <li>Investigate the production and strength of electromagnets</li> <li>Draw a labelled diagram of an atom</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Relate the theory of charged particles to observations of static electricity</li> <li>Create series or parallel circuits</li> <li>Relate models of current, potential difference and resistance to practical findings</li> <li>Investigate the current and potential difference in series and parallel circuits</li> <li>Investigate the factors affecting the strength of electromagnets</li> </ul>	Team Satchel (hw) <ul style="list-style-type: none"> <li>Series and Parallel circuits</li> </ul> Resistance investigation TA (cw) <ul style="list-style-type: none"> <li>Practical write up</li> <li>Exam Questions PA (cw)</li> <li>Effect of switches on circuits</li> <li>Effect of resistors on circuits</li> <li>Series and Parallel Circuits</li> <li>Current and potential difference</li> <li>Electromagnets</li> </ul>	Year 7 <ul style="list-style-type: none"> <li>Electricity and Magnetism</li> </ul> KS4 – Physics - Electricity
Energy		<ul style="list-style-type: none"> <li>comparing power ratings of appliances in watts (W, kW)</li> <li>comparing amounts of energy transferred (J, kJ, kW hour)</li> <li>domestic fuel bills, fuel use and costs</li> <li>heating and thermal equilibrium: temperature difference between two objects leading to</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Apply mathematical concepts to calculating power</li> <li>Apply mathematical concepts to calculating energy transferred</li> <li>Calculate the cost of bills based on sample data</li> </ul>	Team Satchel (hw) <ul style="list-style-type: none"> <li>Power</li> </ul> Applications task TA (cw) <ul style="list-style-type: none"> <li>Practical write up</li> <li>MCQ PA(cw)</li> <li>Heat transfer</li> </ul>	Year 7 <ul style="list-style-type: none"> <li>Energy</li> </ul> KS4 – Physics - Energy

		<p>energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators</p>	<ul style="list-style-type: none"> <li>Investigate conduction, convection, and radiation</li> <li>Investigate insulation</li> <li>Apply knowledge of particle model to describe conduction and convection and insulators</li> </ul>	<ul style="list-style-type: none"> <li>Effect of heat on particles</li> <li>Insulation</li> <li>Synoptic Melting and boiling points</li> </ul> <p>Team Satchel (hw)</p> <ul style="list-style-type: none"> <li>Synoptic Year 7 content</li> </ul>	
Organisms	Photosynthesis	<ul style="list-style-type: none"> <li>plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots.</li> <li>the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</li> <li>the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere</li> <li>the adaptations of leaves for photosynthesis</li> <li>the role of leaf stomata in gas exchange in plants</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Research using the internet</li> <li>Test a leaf for signs of photosynthesis <ul style="list-style-type: none"> <li>Starch testing</li> </ul> </li> <li>Write word and symbol equations for photosynthesis</li> <li>Use simulations to investigate limiting factors of photosynthesis</li> <li>Draw accurate labelled diagrams</li> <li>Use microscopes to look at the structure of stomata</li> <li>Relate knowledge of diffusion and introduce idea of pressure to the function of stomata</li> <li>Apply knowledge of plants to how to improve farmer yield of crops</li> </ul>	<p>Farmers and fertilisers TA (hw)</p> <ul style="list-style-type: none"> <li>Minerals in plant growth</li> <li>Mineral deficiencies</li> </ul> <p>Team Satchel Quiz (hw)</p> <ul style="list-style-type: none"> <li>Photosynthesis</li> <li>Gas transfer</li> <li>Limiting factors</li> </ul> <p>Exam Questions PA (hw)</p> <ul style="list-style-type: none"> <li>Limiting factors</li> <li>Gas produced in PS</li> </ul>	<p>KS2</p> <ul style="list-style-type: none"> <li>identify and describe the functions of distinct parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</li> <li>investigate the way in which water is transported within plants</li> </ul> <p>Year 7</p> <ul style="list-style-type: none"> <li>Organisms - cells</li> <li>Energy</li> </ul> <p>KS4 – Biology - Bioenergetics</p>
Forces	Forces	<ul style="list-style-type: none"> <li>forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>change depending on direction of force and its size.</li> <li>speed and the quantitative relationship between average speed, distance, and time (speed = distance ÷ time)</li> <li>the representation of a journey on a distance-time graph</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Recap effect of balanced and unbalanced forces</li> <li>Apply speed calculation</li> <li>Apply knowledge of relative motion to why it looks like a parachutist goes up when they open their parachute</li> <li>Interpret distance time graphs</li> <li>Investigate the effect of forces on objects that obey Hooke's law</li> </ul>	<p>Team Satchel (hw)</p> <ul style="list-style-type: none"> <li>Distance/time graphs</li> </ul> <p>Hooke's Law investigation TA (cw)</p> <ul style="list-style-type: none"> <li>Practical write up</li> </ul> <p>Synoptic Year 7 and 8</p> <p>Forces Plenary Multiple-choice PA (cw) (not formal assessment)</p> <ul style="list-style-type: none"> <li>Synoptic</li> </ul>	<p>Year 7</p> <ul style="list-style-type: none"> <li>Forces</li> </ul> <p>KS4 – Physics - Forces</p>

		<ul style="list-style-type: none"> <li>relative motion: trains and cars passing one another.</li> <li>force-extension linear relation; Hooke's Law as a special case</li> <li>work done and energy changes on deformation</li> <li>atmospheric pressure, decreases with increase of height as weight of air above decreases with height</li> <li>pressure in liquids, increasing with depth; up thrust effects, floating and sinking</li> <li>pressure measured by ratio of force over area – acting normal to any surface.</li> <li>opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface.</li> </ul>	<ul style="list-style-type: none"> <li>Relate knowledge of air resistance to aerodynamic design</li> <li>Apply pressure calculation</li> <li>Investigate pressure on a solid such as sand</li> <li>Interpret graphs showing pressure and distance in relation to atmosphere and liquids</li> <li>Apply knowledge of the particle model to pressure</li> </ul>	<p>KO test PA (cw)</p> <ul style="list-style-type: none"> <li>Recall key terminology</li> </ul>	
Organisms	Digestion	<ul style="list-style-type: none"> <li>Investigate, through energy transfers, the energy values of different foods (from labels) (kJ)</li> <li>content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre, and water, and why each is needed</li> <li>calculations of energy requirements in a healthy daily diet</li> <li>the consequences of imbalances in the diet, including obesity, starvation, and deficiency diseases</li> <li>the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)</li> <li>the importance of bacteria in the human digestive system</li> <li>the effects of recreational drugs (including substance misuse) on behaviour, health, and life processes.</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Accurately label a diagram of the digestive system</li> <li>Relate structure to function of distinct parts of the digestive system</li> <li>Relate diseases such as coeliac disease to the effect on the digestive system</li> <li>Calculate energy requirements in healthy and unhealthy daily diets</li> <li>Relate deficiencies to the problems they cause</li> <li>Model the digestive system</li> <li>Evaluate information and data about drugs</li> <li>Complete food tests</li> </ul>	<p>Ham and Sandwich Comic Strip TA (hw)</p> <ul style="list-style-type: none"> <li>Digestive system</li> <li>Application</li> </ul> <p>Team Satchel Quiz (hw)</p> <ul style="list-style-type: none"> <li>Digestive system</li> <li>Enzymes</li> <li>Absorption</li> <li>Food groups</li> </ul> <p>KO test SA (cw)</p> <ul style="list-style-type: none"> <li>Retention of knowledge</li> </ul> <p>Synoptic cells Year 7 multiple choice PA (cw) (not formal assessment)</p> <ul style="list-style-type: none"> <li>Cell structure</li> </ul>	<p>KS2</p> <ul style="list-style-type: none"> <li>identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</li> <li>describe the simple functions of the basic parts of the digestive system in humans</li> <li>recognise the impact of diet, exercise, drugs, and lifestyle on the way their bodies function</li> <li>describe the ways in which nutrients and water are transported within animals, including humans</li> </ul> <p>Year 7</p> <ul style="list-style-type: none"> <li>States of matter</li> <li>Organisms – Cells</li> <li>Energy</li> </ul> <p>Year 8</p>

					<ul style="list-style-type: none"> <li>Energy</li> <li>KS4 – Biology - Organisation</li> </ul>
Periodic Table	The Periodic Table	<ul style="list-style-type: none"> <li>a simple (Dalton) atomic model</li> <li>differences between atoms, elements, and compounds</li> <li>chemical symbols and formulae for elements and compounds</li> <li>the varying physical and chemical properties of different elements</li> <li>the principles underpinning the Mendeleev Periodic Table</li> <li>how patterns in reactions can be predicted with reference to the Periodic Table</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Distinguish between atoms, elements, and compounds</li> <li>Navigate the periodic table to identify elements mentioned in chemical formulae</li> <li>Determine the number of atoms and elements in a chemical formula</li> <li>Identify patterns in the periodic table</li> <li>Observe the reactions of group 1 metals and be able to put them in order of reactivity</li> <li>Make predictions about an element's properties based on its position in the periodic table</li> </ul>	<p>Synoptic Matter Year 7 multiple choice quiz PA (cw)</p> <ul style="list-style-type: none"> <li>Particle model</li> <li>Pressure</li> <li>Heat transfer</li> </ul> <p>Team Satchel Quiz (hw)</p> <ul style="list-style-type: none"> <li>Distinguish between elements, mixtures, and compounds</li> <li>Determine chemical Symbols and formulae</li> <li>Group 1 properties</li> <li>Mendeleev's periodic table</li> </ul> <p>KO test (hw) SA</p> <ul style="list-style-type: none"> <li>Recall key terminology</li> </ul> <p>Chemical formula sheet TA</p> <ul style="list-style-type: none"> <li>Determining atoms and elements from chemical formulae</li> <li>Writing formulae</li> </ul>	<p>Year 7</p> <ul style="list-style-type: none"> <li>Periodic Table</li> <li>States of matter</li> </ul> <p>KS4 – Chemistry – Periodic Table</p>
Reactions	Chemical Reactions	<ul style="list-style-type: none"> <li>chemical reactions as the rearrangement of atoms</li> <li>representing chemical reactions using formulae and using equations</li> <li>combustion, thermal decomposition, oxidation, and displacement reactions</li> <li>the chemical properties of metal and non-metal oxides with respect to acidity.</li> <li>what catalysts do</li> <li>conservation of mass changes of state and chemical reactions.</li> <li>the chemical properties of metal and non-metal oxides with respect to acidity.</li> <li>energy changes on changes of state (qualitative)</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Apply knowledge of atoms/the Dalton method to their rearrangement in reactions</li> <li>Write equations</li> <li>Investigate combustion, thermal decomposition, oxidation, and displacement reactions</li> <li>Relate observations from displacement reactions to the reactivity of metals</li> <li>Apply the concept of conservation of mass</li> <li>Investigate energy changes in reactions</li> <li>Apply knowledge of exothermic and endothermic reactions to real world examples</li> </ul>	<p>Knowledge Organiser test SA (cw)</p> <ul style="list-style-type: none"> <li>Recall key terminology</li> </ul> <p>Team Satchel Quiz (hw)</p> <ul style="list-style-type: none"> <li>Combustion</li> <li>Gas tests</li> <li>Types of reactions</li> </ul> <p>MCQ (cw) PA</p> <ul style="list-style-type: none"> <li>Thermal decomposition</li> <li>Combustion</li> <li>Exothermic and Endothermic</li> </ul> <p>EW TA</p> <ul style="list-style-type: none"> <li>catalysts</li> </ul>	<p>Year 7</p> <ul style="list-style-type: none"> <li>Reactions</li> </ul> <p>Year 8</p> <ul style="list-style-type: none"> <li>Periodic table</li> </ul> <p>KS4 – Chemistry – Chemical Changes, Energy Changes</p>

		<ul style="list-style-type: none"> <li>exothermic and endothermic chemical reactions (qualitative).</li> </ul>			
Organisms	Respiration	<ul style="list-style-type: none"> <li>the structure and functions of the gas exchange system in humans, including adaptations to function</li> <li>the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume</li> <li>the impact of exercise, asthma, and smoking on the human gas exchange system</li> <li>aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life</li> <li>a word summary for aerobic respiration</li> <li>the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration</li> <li>the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.</li> </ul>	<ul style="list-style-type: none"> <li>Recall key terminology</li> <li>Dissect safely and identify parts of lungs</li> <li>Accurately label a scientific diagram</li> <li>Relate a bell jar model to the function of lungs</li> <li>Sequence the events that occur during ventilation/breathing</li> <li>Relate the process of diffusion to gas exchange</li> <li>Relate the structure to the function of the lungs</li> <li>Write the equation for respiration</li> <li>Relate the equation for photosynthesis to respiration</li> <li>Investigate fermentation - Hovis</li> <li>Compare anaerobic to aerobic respiration</li> <li>Investigate the effect of exercise on respiration – Silk Men</li> <li>Examine the effects of asthma on the respiratory system</li> <li>Examine the effects of smoking on the respiratory system</li> </ul>	<p>Effects of exercise TA (cw)</p> <ul style="list-style-type: none"> <li>Practical write up</li> </ul> <p>Knowledge organiser Test SA (cw)</p> <ul style="list-style-type: none"> <li>Recall key terminology</li> </ul> <p>Team Satchel Quiz (hw)</p> <ul style="list-style-type: none"> <li>Respiration equation</li> <li>Gas exchange</li> <li>Respiratory system</li> </ul>	<p>Year 7</p> <ul style="list-style-type: none"> <li>Organisms – Cells</li> <li>States of matter</li> </ul> <p>Year 8</p> <ul style="list-style-type: none"> <li>Organisms - respiration</li> </ul> <p>KS4 – Biology - Organisation</p>
Genetics and the ecosystem	Genes	<ul style="list-style-type: none"> <li>a simple model of chromosomes, genes, and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model</li> <li>the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.</li> </ul>	<ul style="list-style-type: none"> <li>Extract DNA from a kiwi fruit</li> <li>Correctly label the structure of DNA and describe its key features</li> <li>Recall key terminology</li> </ul>	<p>Knowledge Organiser Test SA (cw)</p> <ul style="list-style-type: none"> <li>Recall key terminology</li> </ul> <p>Synoptic SMH (hw)</p> <ul style="list-style-type: none"> <li>Variation</li> <li>Inheritance</li> <li>DNA</li> </ul>	<p>Year 7</p> <ul style="list-style-type: none"> <li>Genes</li> <li>Reproduction</li> </ul> <p>KS4 – Biology - Cell Biology, Inheritance and Evolution</p>
	Ecosystems	<ul style="list-style-type: none"> <li>the importance of plant reproduction through insect pollination in human food security</li> </ul>	<ul style="list-style-type: none"> <li>Research the importance of maintaining biodiversity and the use of gene banks.</li> <li>Relate this to the importance of bees to humans</li> </ul>	<p>Bee project TA (hw) (not formal assessed)</p>	<p>Year 7</p> <ul style="list-style-type: none"> <li>Ecosystems</li> </ul> <p>KS4 – Biology - Ecology</p>
Waves	Waves of Sound	<ul style="list-style-type: none"> <li>waves on water as undulations which travel through water with transverse motion; these</li> </ul>	<ul style="list-style-type: none"> <li>Compare the speed of sound in air, water, and solids.</li> <li>Explain what an echo is.</li> </ul>	<p>SMH quiz</p> <ul style="list-style-type: none"> <li>Wave type</li> <li>Speed of sound</li> </ul>	<ul style="list-style-type: none"> <li>identify how sounds are made, associating</li> </ul>

		<p>waves can be reflected and add or cancel – superposition.</p> <ul style="list-style-type: none"> <li>• frequencies of sound waves, measured in hertz (Hz); echoes, reflection, and absorption of sound</li> <li>• sound needs a medium to travel, the speed of sound in air, in water, in solids</li> <li>• sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</li> <li>• auditory range of humans and animals.</li> <li>• pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify materials that absorb sound well.</li> <li>• Use oscilloscope to identify properties of waves</li> <li>• Apply knowledge of the particle model to explain the speed of sound through different materials</li> <li>• Apply the properties of pressure waves to their uses</li> </ul>	<ul style="list-style-type: none"> <li>• Ultrasound</li> <li>• Ear</li> </ul> <p>Exam questions TA</p> <ul style="list-style-type: none"> <li>• Sound</li> <li>• Light</li> <li>• Colour</li> </ul>	<p>some of them with something vibrating</p> <ul style="list-style-type: none"> <li>• recognise that vibrations from sounds travel through a medium to the ear</li> <li>• find patterns between the pitch of a sound and features of the object that produced it</li> <li>• find patterns between the volume of a sound and the strength of the vibrations that produced it</li> <li>• recognise that sounds get fainter as the distance from the sound source increases</li> </ul> <p>KS4 – Physics - Waves</p>
Waves	Light	<ul style="list-style-type: none"> <li>• the similarities and differences between light waves and waves in matter</li> <li>• light waves travelling through a vacuum; speed of light</li> <li>• the transmission of light through materials: absorption, diffuse scattering, and specular reflection at a surface use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye</li> <li>• light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras</li> <li>• colours and the different frequencies of light, white light, and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.</li> </ul>	<ul style="list-style-type: none"> <li>• Recall key terminology</li> <li>• Identify translucent, transparent, and opaque objects</li> <li>• Relate the transmission of light to the above</li> <li>• Investigate the effect of reflection and refraction on rays of light</li> <li>• Draw ray diagrams</li> <li>• Determine the laws of reflection and refraction</li> <li>• Investigate the effect of lenses on light</li> <li>• Relate knowledge gained to how the eye and pinhole cameras work</li> <li>• Create a pinhole camera</li> <li>• Compare and contrast a pinhole camera and the eye</li> <li>• Identify the colours within white light using a prism</li> </ul>	<p>Knowledge organiser test</p> <p>Light SA (cw) (not formally assessed)</p> <ul style="list-style-type: none"> <li>• Recall key terminology</li> </ul> <p>Practical (CW) TA</p> <ul style="list-style-type: none"> <li>• Reflection</li> </ul>	<p>Key Stage 2</p> <ul style="list-style-type: none"> <li>• recognise that they need light to see things and that dark is the absence of light</li> <li>• notice that light is reflected from surfaces</li> <li>• recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>• recognise that shadows are formed when the light from a light source is blocked by an opaque object</li> <li>• find patterns in the way that the size of shadows change</li> </ul>

		<ul style="list-style-type: none"> <li>Recall that visible light is a wave within a spectrum called the electromagnetic spectrum</li> </ul>	<ul style="list-style-type: none"> <li>Relate the colours we perceive to the absorption and reflection of the colours within white light</li> </ul>		<ul style="list-style-type: none"> <li>recognise that light appears to travel in straight lines</li> <li>use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</li> <li>explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes</li> <li>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</li> </ul> <p>Year 7</p> <ul style="list-style-type: none"> <li>Waves – Sound</li> <li>Energy</li> </ul> <p>KS4 – Physics - Waves</p>
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#### Cultural and local

- Throughout the year students will also complete lessons to improve their cultural capital and skills such as problem solving. These themes will include:
  - Halloween blood splatter – problem solving and analytical skills
  - Bonfire night – flame tests
  - Christmas – Santa’s lighthouse
  - Valentines – the heart – first time doing a dissection
  - Easter – wine to water – Scripture related and kidney dissection
  - Macclesfield – Hovis Breadmaking – in respiration
  - Macclesfield – The silk men. Effects of exercise – in respiration
  - Petri dishes and COVID

**Assessment:** Year 8 students will be assessed throughout the year through summative and formative assessments

- Formative assessments are more diagnostic than evaluative and allows to monitor pupil learning style and ability, to provide ongoing feedback and allow us to improve and adjust our teaching methods to help students progress. These may take the form of, but are not limited to:
  - Questioning in class
  - Impromptu quizzes

- Prepare for Learning and Review Activities
- Monitoring of class work and homework
- Peer Review
- Self-Assessment
- Our summative assessments aim to evaluate student learning and academic achievement. These assessments will also allow us to provide feedback and help improve the students progress throughout their education at All Hallows. These assessments in year 8 will take the form of:
  - Two synoptic assessments made using past SAT and GCSE style questions. One will be completed in February and one in June
  - A portfolio of data taken from the activities mentioned in the “Assessment Points” column below

### **February Synoptic Assessment**

- The March synoptic assessment will focus on:
  - Electricity – Year 7 and 8
  - Forces – Year 7 and 8
  - Energy – Year 7 and 8
  - Digestion
  - Periodic Table – Year 7 and 8

### **June Synoptic Assessment**

- The June synoptic assessment will focus on:
  - Respiration
  - Chemical Reactions
  - Waves
  - Photosynthesis
  - Periodic Table
  - Electricity – Year 7 and 8
  - Forces – Year 7 and 8
  - Energy – Year 7 and 8
  - Digestion
  - Introduction to Science – Year 7



