

	Emerging a student whose understanding of the Y9 Science skills is still emerging will be able to:	Developing a student who is developing their Y9 Science skills will be able to:	Secure a student who is secure in the skills in the Y9 Science curriculum will be able to:	Mastered a student who has mastered the skills in the Y9 Science curriculum will be able to:
Book 2, Chapter 6 Magnetism and electricity	<p>Be able to use a permanent magnet Understand that a compass points north Understand that a stronger magnet can pick up more paper clips. State a use for a magnet. Understand that there are different ways of measuring electricity. Use an ammeter and a voltmeter. Know that house lighting is on a parallel circuit.</p>	<p>Describe differences between permanent and temporary magnets. Describe some effects of the Earth's magnetic field. Describe how to test the strength of a magnet and an electromagnet. Describe different applications of magnets and electromagnets. Describe and investigate different types of batteries, including fruit batteries. Describe what is meant by current, voltage and resistance. Describe the relationship between current, voltage and resistance in a qualitative way. Make measurements of current and voltage in series and in parallel circuits. Describe different domestic uses of series and parallel circuits.</p>	<p>Describe and compare different methods to make permanent magnets. Describe the geodynamo theory. Design investigations to compare different methods of making magnets and testing the strength of electromagnets. Explain the advantages of using electromagnets. Analyse and interpret data to explain how to make the most effective fruit batteries. Apply a range of models and analogies to describe current, voltage and resistance. Use data to identify a pattern between current, voltage and resistance. Use models and simple calculations to explain and compare what happens to the current and voltage in series and parallel circuits. Make comparisons between</p>	<p>Use the domain theory to explain how materials become magnetised and demagnetised. Explain evidence for how the Earth's magnetic field works. Use models and analogies to explain the factors affecting the strengths of magnets and electromagnets. Compare and contrast the use of magnets and electromagnets in different applications, such as a circuit breaker. Explain how a battery works, using ideas about charge. Evaluate different models and analogies for explaining current, voltage and resistance. Use data and a mathematical relationship between current, voltage and resistance, to carry out calculations. Use calculations to make predictions about current and voltage in series and parallel circuits. Explain the</p>

**Book 3, Chapter 2
Our health and the
effects of drugs**

Understand what is meant by the word 'drug' Understand that smoking can make you ill. Understand that cannabis affects the body. Understand that alcohol affects the body. Understand that you can catch some diseases from others. Know that your body is able to fight off disease. Understand that bacteria need certain conditions to survive. Know that antibiotics can be used to kill bacteria. Know that vaccines can prevent you from catching a disease.

Give examples of some different types of drugs. Identify parts of the body damaged by smoking. Describe the effects of cannabis on the body. Describe some effects of alcohol on the body. Describe what addiction is and give examples. Describe and give examples of a way in which diseases are spread. Describe the body's mechanisms to prevent infection. State examples of diseases caused by microbes. Describe the conditions that bacteria need to survive. Describe the effect of antibiotics on bacteria. Describe what a vaccine is and how vaccines were discovered.

Describe the effects of different types of drugs on the body. Explain how the body is damaged by smoking and by passive smoking. Suggest some reasons why people use cannabis. Describe and explain several effects of alcohol on the body. Describe the changes in the brain caused by drugs and how this can lead to addiction. Describe several examples of how specific diseases are spread and suggest how their spread may be reduced. Describe the roles of white blood cells in fighting infection. Describe the characteristics of different microbes. Compare bacterial growth in different parts of the home. Explain how bacteria become resistant to antibiotics. Explain how vaccines prevent a viral infection.

Explain the effects of different drugs on the body, including harmful effects. Examine data about smoking and cancer, and draw a conclusion about the correlation. Present, using evidence, arguments for and against the legalisation of cannabis. Suggest how alcoholism affects society. Explain the effects of withdrawal from drug dependency on the body, including the brain. Consider suggestions to reduce the spread of specific diseases and justify decisions. Explain why we rarely catch the same infectious disease twice, but may catch influenza over and over again. Evaluate a model of a type of microbe. Analyse data about bacterial growth. Explain what superbugs are and evaluate their impact on society. Evaluate the risks.

**Book 3, Chapter 3
Obtaining useful
materials**

<p>Understand that decomposition means that a chemical breaks down. Understand that metal ores are found in the earth's crust. Understand that carbon can be used to extract some metals. Understand that some chemical reactions produce heat. State the name of some common plastics and their uses.</p>	<p>Write word equations to represent the decomposition of metal carbonates. Give uses of displacement reactions and write word equations to represent them. Describe different ways to extract metal ores from the Earth and describe the associated environmental issues. Describe the use of carbon in extracting iron from its ore. Write word equations for the reactions between carbon and metal ores. Describe what is meant by the terms exothermic and endothermic reactions, with examples. Describe what a catalyst is and give examples. Describe what is meant by the term 'ceramic', describing their properties and uses, with some examples. Describe what is meant by the term 'polymer', using examples of natural and human-made polymers. Describe what is meant by the term 'composite', using examples of natural and human-made composites.</p>	<p>Use observations from thermal decomposition reactions to make inferences about metal reactivity. Use models to explain displacement and relate it to the reactivity series. Explain how metals are recycled and how this affects the environment. Describe the process of extracting iron from its ore in a blast furnace. Describe the extraction processes for lead, copper and zinc. Explain the energy changes taking place during an exothermic and an endothermic reaction. Interpret data to explain how a catalyst affects a reaction. Explain how different types of ceramic vary in their properties. Describe the properties of polymers, explaining how these relate to their uses. Describe the properties of composites, explaining how the properties relate to their uses.</p>	<p>Write balanced symbol equations for the decomposition of metal carbonates. Write balanced symbol equations for displacement reactions. Evaluate the positive and negative aspects of metal mining and extraction. Use balanced symbol equations to make predictions about the mass of iron produced when extracted from ore, showing that mass is conserved, and explain the advantages of using carbon. Work out the yield of an extraction process. Use energy-level diagrams to compare the energy in the reactants and products of exothermic and endothermic reactions, explaining the energy changes in the particles. Explain how a catalyst works. Explain how the chemistry and bonding within a ceramic affects its properties. Explain how the properties of polymers are affected by their bonding, using simple models. Use models to explain how composites are constructed and use these to explain their properties.</p>
--	--	---	---

Book 3, Chapter 6 Waves and energy transfer

Understand that energy travels in waves. Represent a ray of light as straight line on a labelled diagram.

Understand that a ray of light can transfer energy.

State the colours of the rainbow. Name a device that is able to store energy.

State that hot objects give out heat. Recall that energy is measured in joules.

Understand that different devices will transfer different amounts of energy.

Recognise that energy may be transferred by different types of waves, and know the difference between longitudinal and transverse waves. Recognise that light can be reflected by some materials and absorbed by others. Describe the ray model of light using the idea that light travels in straight lines.

Recognise that various effects can occur when materials absorb light, for example chemical reactions or a flow of electric current. Describe the formation of a spectrum from white light. Describe different ways in which energy can be stored and different ways in which energy can be transferred. Describe the transfer of energy by heating and cooling. Recall the units used to measure quantities of energy, including joules, calories and kilowatt-hours. Describe what is meant by rate of energy transfer. Explain the data given on an energy bill, including the units used for energy 'consumed' (transferred to appliances in the home) and the meaning of 'standing charge'.

Explain wave oscillation, the reflection and superposition of waves, and the terms frequency and wavelength. Explain how some materials absorb energy, and the differences between transparent, translucent and opaque materials. Explain the difference between reflection and refraction, and describe what happens when light waves are refracted. Explain how the transfer of energy carried by light happens during photosynthesis in plants and by electron release in photovoltaic cells. Explain how white light can be split into a continuous spectrum of colours, called the visible spectrum. Explain that energy is transferred from one type of energy store to another when change happens, and understand that energy transfer does not cause change. Explain the relationship between energy transfer and temperature difference. Explain that energy can be neither created nor destroyed (the Law of Conservation of Energy). Identify the rate at which electrical appliances transfer energy (their power rating), using the correct units (watts or kilowatts). Use the power rating of an appliance to calculate the amount of energy transferred.

Compare the properties of sound waves, waves in water and light waves. Use diagrams to explain the difference between diffuse and specular reflection. Use ray diagrams to explain how a pinhole camera and the eye work. Explain the formation of photochemical smog.

Use the concepts of reflection and absorption of light to explain why some materials (transparent, translucent and opaque) are coloured. Explain that all changes, physical or chemical, result in a transfer of energy. Compare the transfer of energy by conduction and by radiation. Carry out calculations of quantities of stored and transferred energy. Compare rates of energy transferred when electrical appliances are used. Calculate the cost of energy used in different scenarios.

