



Science - Year 8

	Emerging –	Developing -	Secure -	Exceeding -
<b>BIO</b>	Understand that chemical reactions in the body release energy.	Describe the purpose of respiration.	Describe and explain aerobic respiration using a word equation.	Explain the role of respiration in building up complex molecules.
	Identify what chemicals are needed for respiration.	Describe aerobic respiration in plants.	Identify evidence for aerobic respiration in plants and animals.	Evaluate the quality of evidence for aerobic respiration in plants and animals.
		Define anaerobic respiration and give examples of sports that use anaerobic respiration.	Explain why some sports rely mainly on aerobic respiration while others require anaerobic respiration.	Describe and explain the effects on the body of anaerobic respiration and explain 'oxygen debt'.
	Understand that if you exercise with not enough oxygen your muscles will ache.	Identify some living things that carry out anaerobic respiration and identify some applications.	Describe and explain some evidence to show the products of anaerobic respiration and plan an investigation into fermentation.	Plan an investigation to test a hypothesis about anaerobic respiration, analyse the data and evaluate the investigation.
	Identify some differences between species.	Give some examples of differences between similar species and explain how these are used to classify organisms.	Explain the importance of the diversity of living organisms to life on earth and why we have a common system for naming organisms.	Explain how scientists can use the universal system of classification to research or discuss an organism and to understand ecological relationships between organisms.
	Identify a feature that is inherited.	Identify some features of different organisms that are inherited and some that are determined by the environment in which the organism lives.	Explain the difference between continuous and discontinuous variation; explain why offspring from the same parents can be very different.	Use ideas and evidence to evaluate the importance of genetic and environmental variation.
	Understand that humans breed cows to get lots of meat and milk.	Describe what selective breeding is and explain that it has produced	Explain the process of selective breeding	Explore and evaluate the advantages and disadvantages of selective breeding.

		new breeds of an organism.	and why new breeds have been produced.	
	Identify what organisms compete for.	Identify examples of how variation causes competition for resources and causes natural selection.	Explore the theories of Lamarck, Wallace and Darwin, and explain their theories about why some organisms are better able to survive than others.	Evaluate the impact of Darwin's theories on contemporary science.
	Know that genetic information is found in the nucleus of a cell.	Describe chromosomes and their role in transferring heredity information to offspring.	Explain the relationship between chromosomes, genes and DNA; explain why offspring of the same parents may look very different.	Explore the role of scientists in the discovery of DNA and evaluate the relative importance of their contributions.
	Know that offspring get half their genetic information from their Mum and half from their Dad.	Describe how fertilised egg cells contain half of the chromosomes from each parent with a random mix of genetic information from each parent.	Explain how every new individual produced by sexual reproduction is genetically unique.	Explain the impact of slight 'changes' to DNA passed on from parents to offspring.
	Understand that clones are genetically identical to their parent.	Describe cloning as one parent producing new individuals and identify examples of cloning that occur naturally; describe natural cloning as asexual reproduction.	Explain how artificial cloning is performed – for example in the creation of Dolly the sheep.	Explore and evaluate the advantages and disadvantages of artificial cloning; compare and contrast asexual and sexual reproduction.
	Understand that species can become extinct.	Identify natural and human-caused environmental changes that have caused some species to become extinct.	Explain how the use of gene banks to preserve heredity material may prevent some endangered species from becoming extinct.	Analyse and evaluate the available evidence to explain why the dinosaurs suffered mass extinction.
<b>CHEM</b>	Identify solutions as more or less concentrated.	Describe what is meant by the terms 'concentration' and 'pressure'.	Calculate concentrations of solutions.	Use ideas about particles to explain the effects of pressure.
	Understand that smells can spread across a room.	Describe how diffusion occurs in liquids and gases.	Explain observations relating to diffusion in terms of particles.	Make predictions, using ideas about particles, about factors affecting the rate of diffusion.
	Identify whether a chemical reaction has taken place.	Describe features of physical and chemical changes, recognising how mass is conserved.	Use ideas about particles to describe separation processes.	Apply the particle model to explain physical and chemical changes, taking conservation of mass into account.
	Know that you have acids and alkalis in your house.	Identify some everyday substances that contain acids and alkalis.	Explain what all acids have in common and what all alkalis have in common.	Evaluate the hazards posed by some acids and alkalis and how these risks may be reduced.
	Know that some chemicals change colour in acids and alkalis.	Give an example of an indicator and state why indicators are useful.	Explain what an indicator is and analyse results when using an	Compare the effectiveness of different indicators.

		indicator.	
Know that acids are opposite to alkalis.	Describe some examples of neutralisation.	Describe the changes to indicators when acids and alkalis are mixed.	Explain the changes to indicators in terms of pH when acids and alkalis are mixed.
Know that water is not an acid or alkali.	Recognise that water is one product of neutralisation.	Know that water is not an acid or alkali.	Recognise that water is one product of neutralisation.
Understand that bubbles being produced show that a chemical reaction is taking place.	Describe the observations of reactions between acids and metal, and acids and carbonate, that tell us that a chemical change is taking place.	Explain the general reaction between an acid and a metal, and between an acid and a carbonate, using generic equations.	Summarise specific reactions between acids and metals and between acids and carbonates using word equations and particle drawings.
Know that indigestion is often caused by a build-up of acid in your stomach	Describe what indigestion remedies are and explain how they work.	Design an investigation to compare the effectiveness of indigestion remedies.	Analyse data about indigestion remedies to decide which remedy is the most effective.
Know what gas is produced by combustion.	Describe how combustion contributes to acid rain.	Describe the effects of acid rain.	Explain, using an equation, the effects of acid rain.
Give some examples of elements.	Give some examples of elements, locate them in the Periodic Table and use the table to identify metals and non-metals.	Give examples of elements and explain how they are organised in the Periodic Table.	Define elements, use symbols, link the organisation of the Periodic Table to element features and explain how scientists organised the Periodic Table.
Understand that many elements are found in the Earth's crust.	Identify some common properties of metal elements and non-metal elements and their uses.	Classify metals and non-metals using their properties.	Identify similarities and differences between metals and how these relate to their uses; compare and contrast properties of metals and non-metals.
Identify metals and non-metals.	Identify metals and non-metals using data and suggest a reason for particular applications.	Explain the properties of elements using data and why they are used for different applications.	Select and justify the use of elements for different purposes, based on their properties.
Understand what a compound is.	Describe an example of a compound and represent a chemical reaction using a simple model.	Explain how compounds can be formed and explain a chemical reaction using simple models.	Make links between simple models of compounds and chemical symbols.
Know the difference between melting and burning.	Identify changes during a reaction, relate these to reactants and products, and identify a difference between melting and burning.	Make accurate observations, explain them using a simple model and a word equation and explain differences between chemical and physical changes in terms of atoms.	Explain observations using word equations, relate chemical symbols to a simple circle model and use the correct terms and simple models to explain the differences between chemical and physical changes.
Make observations of a chemical reaction.	Make observations and identify reactants and products.	Make accurate observations, identify differences, and with support, describe reactions using simple	Suggest reasons for different observations, describe reactions using word equations and start to use symbols to model chemical

			models or word equations.	reactions.
	Know that when an element reacts with oxygen it is an oxygenation reaction.	Identify oxidation and thermal decomposition reactions.	Explain why oxidation is a reaction; explain the differences between oxidation and thermal decomposition.	Use models and word equations to explain changes during oxidation and thermal decomposition reactions.
PHY	Understand why polar bears have big feet.	Describe the causes and effects of varying pressure on and by solids.	Explain the effects of varying pressure on and by solids; calculate the pressure applied by a solid from the force applied and the contact surface area.	Explain how force and area can be varied to alter the pressure applied.
		Describe the variation of pressure in liquids with depth and the effects of this.	Explain the variation of pressure with depth in liquids.	Identify the causes and implications of variation of pressure with depth.
	Identify objects that may float or that may sink.	Suggest why some objects float and others sink.	Use the concepts of density, displacement and upthrust in explaining floating and sinking.	Apply ideas about density and upthrust to predict the outcomes of various situations.
	Name common types of energy.	Recognise that energy is transferred by a range of different processes.	Interpret and draw energy transfer diagrams for a range of different energy transfers, including gravitational potential energy, elastic potential energy, chemical energy and electrical energy.	Use Sankey diagrams to explain a range of energy changes and demonstrate that all energy is always accounted for.
	Know that energy can be transferred.	Identify simple energy transfers which involve gravitational potential energy, elastic potential energy and chemical energy.	Explain how energy is transferred using elastic, gravitational and chemical potential energy.	Analyse changes in gravitational potential energy in different situations, and compare the energy per gram of different fuels.
	Name a device that is able to store energy.	Describe different ways in which energy can be stored and different ways in which energy can be transferred.	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 that all changes, physical or chemical, result in a transfer of energy.
	State that hot objects give out heat.	Describe the transfer of energy by heating and cooling.	Explain the relationship between energy transfer and temperature difference.	Compare the transfer of energy by conduction and by radiation.
	Recall that energy is measured in joules.	Recall the units used to measure quantities of energy, including joules, calories and kilowatt-hours.	Explain that energy can be neither created nor destroyed (the Law of Conservation of Energy).	Carry out calculations of quantities of stored and transferred energy.

		Describe what is meant by rate of energy transfer.	Identify the rate at which electrical appliances transfer energy (their power rating), using the correct units (watts or kilowatts).	Compare rates of energy transferred when electrical appliances are used.
	Understand that different devices will transfer different amounts of energy.	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'.	Use the power rating of an appliance to calculate the amount of energy transferred.	Calculate the cost of energy used in different scenarios.
	Recognise that sound energy is transferred by waves.	Recognise that sound energy is transferred by waves and describe how sound waves are made in different situations.	Explain how longitudinal waves carry sound. Relate the terms frequency and amplitude to sounds.	Interpret and devise wave diagrams to represent sounds of different wavelength and amplitude.
	Know that sound can be reflected.	Recognise an echo as a reflection of sound.	Describe how to measure the speed of sound, and how the speed of sound can be used in different applications to measure distances.	Use calculations to measure the speed of sound and the distance of objects in different applications, applying ideas about echoes.
		Recognise that some materials are good at reflecting sound and others can absorb it.	Use the particle model to explain why sound cannot travel through a vacuum. Explain what is meant by reflection and absorption of sound.	Use the particle model to explain why the speed of sound is different in solids, liquids and gases, and how energy is transferred in the reflection and absorption of sound.
	Understand that energy travels in waves.	Recognise that light can be reflected by some materials and absorbed by others.	Explain how some materials absorb energy, and the differences between transparent, translucent and opaque materials.	Use diagrams to explain the difference between diffuse and specular reflection.
	Represent a ray of light as straight line on a labelled diagram.	Describe the ray model of light using the idea that light travels in straight lines.	Explain the difference between reflection and refraction, and describe what happens when light waves are refracted.	Use ray diagrams to explain how a pinhole camera and the eye work.
	State the colours of the rainbow.	Describe the formation of a spectrum from white light.	Explain how white light can be split into a continuous spectrum of colours, called the visible spectrum.	Use the concepts of reflection and absorption of light to explain why some materials (transparent, translucent and opaque) are coloured.