



Science - Year 9

	Emerging –	Developing -	Secure -	Exceeding -
BIO	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 new breeds of an organism.	Explain the process of selective breeding and why new breeds have been produced.	Explore and evaluate the advantages and disadvantages of selective breeding.
	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	Describe cloning as one parent producing	Explain how artificial cloning is	Explore and evaluate the

	genetically identical to their parent.	new individuals and identify examples of cloning that occur naturally; describe natural cloning as asexual reproduction.	performed – for example in the creation of Dolly the sheep.	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.
	Know that your body is able to fight off disease.	Describe the body's mechanisms to prevent infection.	Describe the roles of white blood cells in fighting infection.	Explain why we rarely catch the same infectious disease twice, but may catch influenza over and over again.
		State examples of diseases caused by microbes.	Describe the characteristics of different microbes.	Evaluate a model of a type of microbe.
	Understand that bacteria need certain conditions to survive.	Describe the conditions that bacteria need to survive.	Compare bacterial growth in different parts of the home.	Analyse data about bacterial growth.
	Know that antibiotics can be used to kill bacteria.	Describe the effect of antibiotics on bacteria.	Explain how bacteria become resistant to antibiotics.	Explain what superbugs are and evaluate their impact on society.
	Know that vaccines can prevent you from catching a disease.	Describe what a vaccine is and how vaccines were discovered.	Explain how vaccines prevent a viral infection.	Evaluate the risks
	Recognise that green plants need sunlight.	State that green plants need sunlight to grow and to make food.	Identify water and carbon dioxide as the raw materials for photosynthesis, and glucose and oxygen as the products.	Explain the chemical changes involved in photosynthesis and the roles of light and chlorophyll.
	Identify the part of a leaf cell that is responsible for absorbing the sun's light energy.	Describe how gases enter and leave a leaf and how light energy for photosynthesis is captured.	Describe how cells in the leaf and root are adapted for their functions.	Relate and explain how the structure of palisade, mesophyll and guard cells allows them to perform their function.
	Understand that the amount of light affects photosynthesis.	Describe how levels of light, temperature and carbon dioxide affect the rate of photosynthesis.	Explain how levels of light, temperature and carbon dioxide affect the rate of photosynthesis.	Apply learning about the factors affecting photosynthesis to solve problems.
	Name some of the nutrients needed by plants and supplied by fertilisers.	Name some of the nutrients needed by plants and supplied by fertilisers; state how they enter the plant dissolved in soil water.	Explain why nutrients are needed by plants, how spreading manure adds them to the soil and how water passes through the plant.	Explain how mineral deficiencies affect plants and how different factors affect the rate of transpiration.
CHEM	Understand that decomposition means that a chemical breaks down.	Write word equations to represent the decomposition of metal carbonates.	Use observations from thermal decomposition reactions to make inferences about metal reactivity.	Write balanced symbol equations for the decomposition of metal carbonates.

		Give uses of displacement reactions and write word equations to represent them.	Use models to explain displacement and relate it to the reactivity series.	Write balanced symbol equations for displacement reactions.
	Understand that metal ores are found in the earth's crust.	Describe different ways to extract metal ores from the earth and describe the associated environmental issues.	Explain how metals are recycled and how this affects the environment.	Evaluate the positive and negative aspects of metal mining and extraction.
	Understand that carbon can be used to extract some metals.	Describe the use of carbon in extracting iron from its ore.	Describe the process of extracting iron from its ore in a blast furnace.	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.
		Write word equations for the reactions between carbon and metal ores.	Describe the extraction processes for lead, copper and zinc.	Work out the yield of an extraction process.
		Describe what a catalyst is and give examples.	Interpret data to explain how a catalyst affects a reaction.	Explain how a catalyst works.
	State the name of some common plastics and their uses.	Describe what is meant by the term 'polymer', using examples of natural and human-made polymers.	Describe the properties of polymers, explaining how these relate to their uses.	Explain how the properties of polymers are affected by their bonding, using simple models.
PHY	Describe what a magnet does.	Describe the attraction of unlike poles and repulsion of like poles; show how a magnetic field can be represented.	Identify magnetic attraction and repulsion as non-contact forces; explain how field lines indicate the direction and strength of forces.	Apply and evaluate the concept of magnetic fields in various contexts.
	Know that friction produces heat.	Describe how friction between objects may cause electrostatic charge through the transfer of electrons.	Explain various examples of electrostatic charge; use ideas of electron transfer to explain different effects.	Explain why some electrostatic charge mechanisms are more effective than others.
	Understand that static causes objects to stick together.	Describe the field around a charged object; describe some applications of static electricity.	Use the idea of fields to explain various examples and applications of static electricity.	Compare and contrast useful and dangerous instances of static charge; compare electrostatic and magnetic fields.
	Be able to use a permanent magnet	Describe differences between permanent and temporary magnets.	Describe and compare different methods to make permanent magnets.	Use the domain theory to explain how materials become magnetised and demagnetised.
	Understand that a stronger magnet can pick up more paper clips.	Describe how to test the strength of a magnet and an electromagnet.	Design investigations to compare different methods of making magnets and testing the strength of electromagnets.	Use models and analogies to explain the factors affecting the strengths of magnets and electromagnets.
	State a use for a magnet.	Describe different applications of	Explain the advantages of using	Compare and contrast the use of

	magnets and electromagnets.	electromagnets.	magnets and electromagnets in different applications, such as a circuit breaker.
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.
Understand that the earth moves around the sun.	Describe the movement of the sun, earth and moon in relation to each other.	Explain the effects of the relative motion of the sun, earth and moon.	Explain the relative movement of the sun, earth and moon using the idea of gravity.
Place the earth, moon, sun and galaxy in order of relative size.	Describe the differences between the sun, other stars and galaxies.	Describe the relationship between the sun, other stars and galaxies.	Relate ideas about the sun, stars and galaxies to evidence visible from Earth.
Recognise that the earth is tilted and identify the north and south poles.	Describe the effects that the tilt of the earth's axis has on earth.	Explain the causes of daily seasonal changes.	Explain what would happen if the earth's axis was tilted by a different amount.