

Variation for survival

Modest progress		Good progress		Excellent progress	
I can;		I can;		I can;	
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 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.	
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 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.	
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.	
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.	
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.	
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.	

Our health and the effects of drugs

Modest progress I can;		Good progress I can;		Excellent progress I can;	
Give examples of some different types of drugs.		Describe the effects of different types of drugs on the body.		Explain the effects of different drugs on the body, including harmful effects.	
Identify parts of the body damaged by smoking.		Explain how the body is damaged by smoking and by passive smoking.		Examine data about smoking and cancer, and draw a conclusion about the correlation.	
Describe the effects of cannabis on the body.		Suggest some reasons why people use cannabis.		Present, using evidence, arguments for and against the legalisation of cannabis.	
Describe some effects of alcohol on the body.		Describe and explain several effects of alcohol on the body.		Suggest how alcoholism affects society.	
Describe what addiction is and give examples.		Describe the changes in the brain caused by drugs and how this can lead to addiction.		Explain the effects of withdrawal from drug dependency on the body, including the brain.	
Describe and give examples of a way in which diseases are spread.		Describe several examples of how specific diseases are spread and suggest how their spread may be reduced.		Consider suggestions to reduce the spread of specific diseases and justify decisions.	
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.	
Describe the conditions that bacteria need to survive.		Compare bacterial growth in different parts of the home.		Analyse data about bacterial growth.	
Describe the effect of antibiotics on bacteria.		Explain how bacteria become resistant to antibiotics.		Explain what superbugs are and evaluate their impact on society.	
Describe what a vaccine is and how vaccines were discovered.		Explain how vaccines prevent a viral infection.		Evaluate the risks associated with vaccination.	

Obtaining useful materials

Modest progress I can;		Good progress I can;		Excellent progress I can;	
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.	
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.	
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 is meant by the terms exothermic and endothermic reactions, with examples.		Explain the energy changes taking place during an exothermic and an endothermic reaction.		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.	
Describe what a catalyst is and give examples.		Interpret data to explain how a catalyst affects a reaction.		Explain how a catalyst works.	
Describe what is meant by the term 'ceramic', describing their properties and uses, with some examples.		Explain how different types of ceramic vary in their properties.		Explain how the chemistry and bonding within a ceramic affects its properties.	
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.	
Describe what is meant by the term 'composite', using examples of natural and human-made composites.		Describe the properties of composites, explaining how the properties relate to their uses.		Use models to explain how composites are constructed and use these to explain their properties.	

Using our Earth sustainably

Modest progress		Good progress		Excellent progress	
I can;		I can;		I can;	
Name the main gases in the atmosphere and describe the composition of the atmosphere.		Describe how the gases in the atmosphere, and their relative proportions, have changed over time.		Explain how plants and then animals have changed the atmosphere over time using different processes.	
Name and describe some examples of human activities that cause damage to the atmosphere.		Name and describe the environmental effects caused by some human activities and suggest how they can be reduced.		Name some technological advances that reduce the effects of human activities on the atmosphere and analyse their impact.	
Identify natural resources that the Earth provides.		Explain how human activities limit or damage these resources – for example through agricultural practices.		Analyse the advantages of a development against the disadvantages to the environment and make evidenced judgements about whether the development should be allowed.	
Describe what global warming is and identify the effects of global warming on the Earth.		Explain how global warming affects living organisms and identify that scientists across the world have different opinions about global warming and its effects.		Evaluate the arguments for and against human activities enhancing the global warming effect.	
Describe the carbon cycle as natural recycling and name the different ways that carbon enters and leaves the atmosphere.		Explain how each stage of the carbon cycle affects the amount of carbon in the atmosphere.		Explain what is meant by 'carbon footprint' and analyse the carbon footprint of different activities.	
Describe the benefits of recycling and name materials that can be recycled.		Explain the advantages and disadvantages of some recycling schemes.		Compare the efficiency of different recycling schemes to extracting the natural resource from the Earth.	
Name the layers that make up the Earth and identify that the Earth's surface is made of plates that move constantly.		Describe the characteristics of each layer of the Earth and recall that tectonic plates move very slowly.		Explain that earthquakes, volcanic eruptions and the formation of mountains can happen where tectonic plates meet; explain how volcanic activity changes the surface of the Earth.	
Describe how igneous, sedimentary and metamorphic rocks are formed; give examples and describe how they can change from one type to another.		Describe the features and properties of these rocks, including crystals in igneous rocks, recrystallisation in metamorphic rocks and layers (burying fossils) in sedimentary rocks.		Explain the processes involved in the rock cycle and link these to how the rocks are formed.	

Motion on Earth and in Space

Modest progress I can;		Good progress I can;		Excellent progress I can;	
Collect data about distance travelled and time taken for types of movement or journeys.		Present data you have collected or data you have been given as distance–time graphs.		Construct distance–time graphs for complex journeys.	
Describe some features of distance–time graphs.		Analyse distance–time graphs to describe an object’s movement at different stages in a journey.		Explain distance–time graphs for complex journeys, including where an object travels at different speeds and accelerates at different rates.	
Describe a situation where objects are travelling at different speeds.		Apply the idea of relative speed to two objects moving in situations involving overtaking and collisions.		Apply the concept of relative motion to several moving objects in a variety of situations.	
Identify the forces acting on an object and explain how they can cancel each other out so that a stationary object does not move.		Explain how opposing forces may or may not be in equilibrium and the effect that this has on a stationary object.		Explain how multiple forces may or may not be in equilibrium and identify the effect this has on an object.	
Identify the forces acting on an object moving at a constant speed and explain how they can cancel each other out so that there is no change in speed or direction.		Explain how opposing forces may or may not be in equilibrium and the effect this has on an object’s motion.		For a moving object, explain how multiple forces can act and how they may or may not be in equilibrium; identify the effect this has on an object’s motion.	
Explain what causes an object to have weight.		Describe how gravity affects the weight of an object.		Explain the relationship between gravitational field and the weight of an object.	
Describe how an object’s weight can vary.		Predict how an object’s weight would vary depending on its position in relation to large bodies such as planets.		Use the concept of gravitational field to explain various phenomena, including the orbits of planets around stars.	
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.	
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 the Earth.	
Describe the effects that the tilt of the Earth’s axis has on Earth.		Explain the causes of daily and seasonal changes.		Explain what would happen if the Earth’s axis was tilted by a different amount.	
Recognise the need for large units to measure distances in space.		Describe how light years can be used to measure distances.		Explain the implications of other stars and galaxies being many light years away from Earth.	

Waves and energy transfer

Modest progress		Good progress		Excellent progress	
I can;		I can;		I can;	
Recognise that energy may be transferred by different types of waves, and know the difference between longitudinal and transverse waves.		Explain wave oscillation, the reflection and superposition of waves, and the terms frequency and wavelength.		Compare the properties of sound waves, waves in water and light 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.	
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.	
Recognise that various effects can occur when materials absorb light, for example chemical reactions or a flow of electric current.		Explain how the transfer of energy carried by light happens during photosynthesis in plants and by electron release in photovoltaic cells.		Explain the formation of photochemical smog.	
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.	
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.	
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 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.	
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.	

