

Stage 8

Thinking and Working Scientifically

Models and representations

- **8TWSm.01** Describe what an analogy is and how it can be used as a model.
- **8TWSm.02** Use an existing analogy for a purpose.
- **8TWSm.03** Use symbols and formulae to represent scientific ideas.

Scientific enquiry: purpose and planning

- **8TWSp.01** Identify whether a given hypothesis is testable.
- **8TWSp.02** Describe how scientific hypotheses can be supported or contradicted by evidence from an enquiry.
- **8TWSp.03** Make predictions of likely outcomes for a scientific enquiry based on scientific knowledge and understanding.
- **8TWSp.04** Plan a range of investigations of different types, while considering variables appropriately, and recognise that not all investigations can be fair tests.
- **8TWSp.05** Make risk assessments for practical work to identify and control risks.

Carrying out scientific enquiry

- **8TWSc.01** Sort, group and classify phenomena, objects, materials and organisms through testing, observation, using secondary information, and making and using keys.
- **8TWSc.02** Decide what equipment is required to carry out an investigation or experiment and use it appropriately.
- **8TWSc.03** Evaluate whether measurements and observations have been repeated sufficiently to be reliable.
- **8TWSc.04** Take appropriately accurate and precise measurements, explaining why accuracy and precision are important.
- **8TWSc.05** Carry out practical work safely, supported by risk assessments where appropriate.
- **8TWSc.06** Evaluate a range of secondary information sources for their relevance and know that some sources may be biased.
- **8TWSc.07** Collect and record sufficient observations and/or measurements in an appropriate form.

Scientific enquiry: analysis, evaluation and conclusions

- **8TWSa.01** Describe the accuracy of predictions, based on results, and suggest why they were or were not accurate.
- **8TWSa.02** Describe trends and patterns in results, including identifying any anomalous results.
- **8TWSa.03** Make conclusions by interpreting results and explain the limitations of the conclusions.
- **8TWSa.04** Evaluate experiments and investigations, and suggest improvements, explaining any proposed changes.
- **8TSWa.05** Present and interpret observations and measurements appropriately.

Biology**Structure and function**

- **8Bs.01** Identify ball-and-socket and hinge joints, and explain how antagonistic muscles move the bones at a hinge joint.
- **8Bs.02** Describe the components of blood and their functions (limited to red blood cells transporting oxygen, white blood cells protecting against pathogens and plasma transporting blood cells, nutrients and carbon dioxide).
- **8Bs.03** Describe how the structure of the human respiratory system is related to its function of gas exchange (in terms of lung structure and the action of the diaphragm and intercostal muscles) and understand the difference between breathing and respiration.
- **8Bs.04** Describe the diffusion of oxygen and carbon dioxide between blood and the air in the lungs.

Life processes

- **8Bp.01** Identify the constituents of a balanced diet for humans as including protein, carbohydrates, fats and oils, water, minerals (limited to calcium and iron) and vitamins (limited to A, C and D), and describe the functions of these nutrients.
- **8Bp.02** Understand that carbohydrates and fats can be used as a store of energy in animals, and animals consume food to obtain energy and nutrients.
- **8Bp.03** Discuss how human growth, development and health can be affected by lifestyle, including diet and smoking.
- **8Bp.04** Know that aerobic respiration occurs in the mitochondria of plant and animal cells, and gives a controlled release of energy.
- **8Bp.05** Know and use the summary word equation for aerobic respiration (glucose + oxygen → carbon dioxide + water).

Ecosystems

- **8Be.01** Identify different ecosystems on the Earth, recognising the variety of habitats that exist within an ecosystem.
- **8Be.02** Describe the impact of the bioaccumulation of toxic substances on an ecosystem.
- **8Be.03** Describe how a new and/or invasive species can affect other organisms and an ecosystem.

Chemistry

Materials and their structure

- **8Cm.01** Describe the Rutherford model of the structure of an atom.
- **8Cm.02** Know that electrons have negative charge, protons have positive charge and neutrons have no charge.
- **8Cm.03** Know that the electrostatic attraction between positive and negative charge is what holds together individual atoms.
- **8Cm.04** Know that purity is a way to describe how much of a specific chemical is in a mixture.

Properties of materials

- **8Cp.01** Understand that the concentration of a solution relates to how many particles of the solute are present in a volume of the solvent.
- **8Cp.02** Describe how paper chromatography can be used to separate and identify substances in a sample.

Changes to materials

- **8Cc.01** Use word equations to describe reactions.
- **8Cc.02** Know that some processes and reactions are endothermic or exothermic, and this can be identified by temperature change.
- **8Cc.03** Describe the reactivity of metals (limited to sodium, potassium, calcium, magnesium, zinc, iron, copper, gold and silver) with oxygen, water and dilute acids.
- **8Cc.04** Know that reactions do not always lead to a single pure product and that sometimes a reaction will produce an impure mixture of products.
- **8Cc.05** Describe how the solubility of different salts varies with temperature.
- **8Cc.06** Understand that some substances are generally unreactive and can be described as inert.

Physics

Forces and energy

- **8Pf.01** Calculate speed (speed = distance / time).
- **8Pf.02** Interpret and draw simple distance / time graphs.
- **8Pf.03** Describe the effects of balanced and unbalanced forces on motion.
- **8Pf.04** Identify and calculate turning forces (moment = force x distance).
- **8Pf.05** Explain that pressure is caused by the action of a force, exerted by a substance, on an area (pressure = force / area).
- **8Pf.06** Use particle theory to explain pressures in gases and liquids (qualitative only).
- **8Pf.07** Describe the diffusion of gases and liquids as the intermingling of substances by the movement of particles.

Light and sound

- **8Ps.01** Describe reflection at a plane surface and use the law of reflection.
- **8Ps.02** Describe refraction of light at the boundary between air and glass or air and water in terms of change of speed.
- **8Ps.03** Know that white light is made of many colours and this can be shown through the dispersion of white light, using a prism.
- **8Ps.04** Describe how colours of light can be added, subtracted, absorbed and reflected.

Electricity and magnetism

- **8Pe.01** Describe a magnetic field, and understand that it surrounds a magnet and exerts a force on other magnetic fields.
- **8Pe.02** Describe how to make an electromagnet and know that electromagnets have many applications.
- **8Pe.03** Investigate factors that change the strength of an electromagnet.

Earth and Space

Planet Earth

- **8ESp.01** Know that the reason the Earth has a magnetic field is that the core acts as a magnet.
- **8ESp.02** Identify renewable resources (including wind, tidal and solar power, and bioplastics) and non-renewable resources (including fossil fuels), and describe how humans use them.

Cycles on Earth

- **8ESc.01** Understand that there is evidence that the Earth's climate exists in a cycle between warm periods and ice ages, and the cycle takes place over long time periods.
- **8ESc.02** Understand that the Earth's climate can change due to atmospheric change.
- **8ESc.03** Describe the difference between climate and weather.

Earth in space

- **8ESs.01** Describe a galaxy in terms of stellar dust and gas, stars and planetary systems.
- **8ESs.02** Describe asteroids as rocks, smaller than planets, and describe their formation from rocks left over from the formation of a planetary system.

Science in Context

- **8SIC.01** Discuss how scientific knowledge is developed through collective understanding and scrutiny over time.
- **8SIC.02** Describe how science is applied across societies and industries, and in research.
- **8SIC.03** Evaluate issues which involve and/or require scientific understanding.
- **8SIC.04** Describe how people develop and use scientific understanding as individuals and through collaboration, e.g. through peer-review.
- **8SIC.05** Discuss how the uses of science can have a global environmental impact.