

Stage 7

Thinking and Working Scientifically

Models and representations

- **7TWSm.01** Describe the strengths and limitations of a model.
- **7TWSm.02** Use symbols and formulae to represent scientific ideas.

Scientific enquiry: purpose and planning

- **7TWSp.01** Identify whether a given hypothesis is testable.
- **7TWSp.02** Describe how scientific hypotheses can be supported or contradicted by evidence from an enquiry.
- **7TWSp.03** Make predictions of likely outcomes for a scientific enquiry based on scientific knowledge and understanding.
- **7TWSp.04** Plan a range of investigations of different types, while considering variables appropriately, and recognise that not all investigations can be fair tests.
- **7TWSp.05** Know the meaning of hazard symbols, and consider them when planning practical work.

Carrying out scientific enquiry

- **7TWSc.01** Sort, group and classify phenomena, objects, materials and organisms through testing, observation, using secondary information, and making and using keys.
- **7TWSc.02** Decide what equipment is required to carry out an investigation or experiment and use it appropriately.
- **7TWSc.03** Evaluate whether measurements and observations have been repeated sufficiently to be reliable.
- **7TWSc.04** Take appropriately accurate and precise measurements, explaining why accuracy and precision are important.
- **7TWSc.05** Carry out practical work safely.
- **7TWSc.06** Evaluate a range of secondary information sources for their relevance and know that some sources may be biased.
- **7TWSc.07** Collect and record sufficient observations and/or measurements in an appropriate form.

Scientific enquiry: analysis, evaluation and conclusions

- **7TWSa.01** Describe the accuracy of predictions, based on results, and suggest why they were or were not accurate.
- **7TWSa.02** Describe trends and patterns in results, including identifying any anomalous results.
- **7TWSa.03** Make conclusions by interpreting results and explain the limitations of the conclusions.
- **7TWSa.04** Evaluate experiments and investigations, and suggest improvements, explaining any proposed changes.
- **7TWSa.05** Present and interpret observations and measurements appropriately.

Biology**Structure and function**

- **7Bs.01** Understand that all organisms are made of cells and microorganisms are typically single celled.
- **7Bs.02** Identify and describe the functions of cell structures (limited to cell membrane, cytoplasm, nucleus, cell wall, chloroplast, mitochondria and sap vacuole).
- **7Bs.03** Explain how the structures of some specialised cells are related to their functions (including red blood cells, neurones, ciliated cells, root hair cells and palisade cells).
- **7Bs.04** Describe the similarities and differences between the structures of plant and animal cells.
- **7Bs.05** Understand that cells can be grouped together to form tissues, organs and organ systems.

Life processes

- **7Bp.01** Describe the seven characteristics of living organisms.
- **7Bp.02** Discuss reasons for classifying viruses as living or non-living.
- **7Bp.03** Describe a species as a group of organisms that can reproduce to produce fertile offspring.
- **7Bp.04** Use and construct dichotomous keys to classify species and groups of related organisms.

Ecosystems

- **7Be.01** Know and describe the ecological role some microorganisms have as decomposers.
- **7Be.02** Construct and interpret food chains and webs which include microorganisms as decomposers.

Chemistry

Materials and their structure

- **7Cm.01** Understand that all matter is made of atoms, with each different type of atom being a different element.
- **7Cm.02** Know that the Periodic Table presents the known elements in an order.
- **7Cm.03** Know metals and non-metals as the two main groupings of elements.
- **7Cm.04** Describe the differences between elements, compounds and mixtures, including alloys as an example of a mixture.
- **7Cm.05** Describe a vacuum as a space devoid of matter.
- **7Cm.06** Describe the three states of matter as solid, liquid and gas in terms of the arrangement, separation and motion of particles.
- **7Cm.07** Use the particle model to represent elements, compounds and mixtures.

Properties of materials

- **7Cp.01** Understand that all substances have chemical properties and physical properties.
- **7Cp.02** Understand that the acidity or alkalinity of a substance is a chemical property and is measured by pH.
- **7Cp.03** Use indicators (including Universal Indicator and litmus) to distinguish between acidic, alkaline and neutral solutions.
- **7Cp.04** Use tests to identify hydrogen, carbon dioxide and oxygen gases.
- **7Cp.05** Describe common differences between metals and non-metals, referring to their physical properties.
- **7Cp.06** Understand that alloys are mixtures that have different chemical and physical properties from the constituent substances.
- **7Cp.07** Use the particle model to explain the difference in hardness between pure metals and their alloys.

Changes to materials

- **7Cc.01** Identify whether a chemical reaction has taken place through observations of the loss of reactants and/or the formation of products which have different properties to the reactants (including evolving a gas, formation of a precipitate or change of colour).
- **7Cc.02** Explain why a precipitate forms, in terms of a chemical reaction between soluble reactants forming at least one insoluble product.
- **7Cc.03** Use the particle model to describe chemical reactions.
- **7Cc.04** Describe neutralisation reactions in terms of change of pH.

Physics

Forces and energy

- **7Pf.01** Describe changes in energy that are a result of an event or process.
- **7Pf.02** Know that energy tends to dissipate and in doing so it becomes less useful.
- **7Pf.03** Describe gravity as a force of attraction between any two objects and describe how the size of the force is related to the masses of the objects.
- **7Pf.04** Understand that there is no air resistance to oppose movement in a vacuum.

Light and sound

- **7Ps.01** Describe the vibration of particles in a sound wave and explain why sound does not travel in a vacuum.
- **7Ps.02** Explain echoes in terms of the reflection of sound waves.

Electricity and magnetism

- **7Pe.01** Use a simple model to describe electricity as a flow of electrons around a circuit.
- **7Pe.02** Describe electrical conductors as substances that allow electron flow and electrical insulators as substances that inhibit electron flow.
- **7Pe.03** Know how to measure the current in series circuits.
- **7Pe.04** Describe how adding components into a series circuit can affect the current (limited to addition of cells and lamps).
- **7Pe.05** Use diagrams and conventional symbols to represent, make and compare circuits that include cells, switches, lamps, buzzers and ammeters.

Earth and Space

Planet Earth

- **7ESp.01** Describe the model of plate tectonics, in which a solid outer layer (made up of the crust and uppermost mantle) moves because of flow lower in the mantle.
- **7ESp.02** Describe how earthquakes, volcanoes and fold mountains occur near the boundaries of tectonic plates.
- **7ESp.03** Know that clean, dry air contains 78% nitrogen, 21% oxygen and small amounts of carbon dioxide and other gases, and this composition can change because of pollution and natural emissions.

Cycles on Earth

- **7ESc.01** Describe the water cycle (limited to evaporation, condensation, precipitation, water run-off, open water and groundwater).

Earth in space

- **7ESs.01** Describe how planets form from dust and gas, which are pulled together by gravity.
- **7ESs.02** Know that gravity is the force that holds components of the Solar System in orbit around the Sun.
- **7ESs.03** Describe tidal forces on Earth as a consequence of the gravitational attraction between the Earth, Moon and Sun.
- **7ESs.04** Explain how solar and lunar eclipses happen.

Science in Context

- **7SIC.01** Discuss how scientific knowledge is developed through collective understanding and scrutiny over time.
- **7SIC.02** Describe how science is applied across societies and industries, and in research.
- **7SIC.03** Evaluate issues which involve and/or require scientific understanding.
- **7SIC.04** Describe how people develop and use scientific understanding, as individuals and through collaboration, e.g. through peer-review.
- **7SIC.05** Discuss how the uses of science can have a global environmental impact.