

Secondary Stage 9 Science for Year 9

Scientific enquiry

Ideas and evidence

- Discuss and explain the importance of questions, evidence and explanations, using historical and contemporary examples.
- Test explanations by using them to make predictions and then evaluate these against evidence.
- Discuss the way that scientists work today and how they worked in the past, including reference to experimentation, evidence and creative thought.

Plan investigative work

- Select ideas and produce plans for testing based on previous knowledge, understanding and research.
- Suggest and use preliminary work to decide how to carry out an investigation.
- Decide whether to use evidence from first hand experience or secondary sources.
- Decide which measurements and observations are necessary and what equipment to use.
- Decide which apparatus to use and assess any hazards in the laboratory, field or workplace.
- Use appropriate sampling techniques where required.

Obtain and present evidence

- Make sufficient observations and measurements to reduce error and make results more reliable.
- Use a range of materials and equipment and control risks.
- Make observations and measurements.
- Choose the best way to present results.

Consider evidence and approach

- Describe patterns (correlations) seen in results.
- Interpret results using scientific knowledge and understanding.
- Look critically at sources of secondary data.
- Draw conclusions.
- Evaluate the methods used and refine for further investigations.
- Compare results and methods used by others.
- Present conclusions and evaluation of working methods in different ways.
- Explain results using scientific knowledge and understanding.
- Communicate this clearly to others.

Biology

Plants

- Define and describe photosynthesis, and use the word equation.
- Understand the importance of water and mineral salts to plant growth.
- Understand sexual reproduction in flowering plants, including pollination, fertilisation, seed formation and dispersal.

Living things in their environment

- Explain the ways in which living things are adapted to their habitats. Secondary sources can be used.
- Research the work of scientists studying the natural world. Secondary sources can be used.
- Explain and model food chains, food webs and energy flow.
- Explain the role of decomposers.
- Describe factors affecting the size of populations.
- Describe and investigate some effects of human influences on the environment.

Variation and classification

- Use and construct keys to identify plants and animals.
- Understand that organisms inherit characteristics from their parents through genetic material that is carried in cell nuclei.
- Describe how selective breeding can lead to new varieties.
- Discuss the work of Darwin in developing the scientific theory of natural selection.

Chemistry**Material properties**

- Describe the structure of an atom and learn about the methods and discoveries of Rutherford.
- Compare the structures of the first twenty elements of the Periodic Table.
- Describe trends in groups and periods.
- Talk about the contribution of scientists. Secondary sources can be used.

Material changes

- Explore and explain the idea of endothermic processes, e.g. melting of ice, and exothermic reactions, e.g. burning, oxidation.
- Describe the reactivity of metals with oxygen, water and dilute acids.
- Explore and understand the reactivity series.
- Give examples of displacement reactions.
- Explain how to prepare some common salts by the reactions of metals and metal carbonates and be able to write word equations for these reactions.
- Give an explanation of the effects of concentration, particle size, temperature and catalysts on the rate of a reaction.

Physics**Forces and motion**

- Explain that pressure is caused by the action of a force on an area.
- Determine densities of solids, liquids and gases.
- Explain pressures in gases and liquids (qualitative only).
- Know that forces can cause objects to turn on a pivot and understand the principle of moments.

Electricity

- Describe electrostatics and the concept of charge, including digital sensors.
- Interpret and draw simple parallel circuits.
- Model and explain how common types of components, including cells (batteries), affect current.
- Explain how current divides in parallel circuits.
- Measure current using ammeters and voltage using voltmeters, including digital meters.

Energy

- Use knowledge of energy sources including fossil fuels and renewable energy resources to consider the world's energy needs, including research from secondary sources.
- Identify and explain the thermal (heat) energy transfer processes of conduction, convection and radiation.
- Explain cooling by evaporation.