

Cambridge Secondary 1

Science Curriculum Framework

Cambridge
Secondary 1



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Introduction

Welcome to the Cambridge Secondary 1 Science curriculum framework.

This framework provides a comprehensive set of progressive learning objectives for science. The objectives detail what the learner should know or what they should be able to do in science in each year of lower secondary education. They provide a structure for teaching and learning and a reference against which learners' ability and understanding can be checked.

The Cambridge Secondary 1 Science curriculum is presented in four content areas: *Scientific enquiry*, *Biology*, *Chemistry* and *Physics*. *Scientific enquiry* is about considering ideas, evaluating evidence, planning investigative work and recording and analysing data. The *Scientific enquiry* objectives underpin *Biology*, *Chemistry* and *Physics*, which are focused on developing confidence and interest in scientific knowledge. Environmental awareness and some history of science are also incorporated. The Cambridge Secondary 1 Science curriculum framework continues the journey from the Cambridge Primary Science framework and provides a solid foundation upon which the later stages of education can be built.

The Cambridge Curriculum is founded on the values of the University of Cambridge and best practice in schools. The curriculum is dedicated to developing learners who are confident, responsible, innovative and engaged. Each curriculum framework for English, mathematics and science is designed to engage learners in an active and creative learning journey.

Scientific enquiry

Ideas and evidence

- Discuss the importance of developing empirical questions which can be investigated, collecting evidence, developing explanations and using creative thinking.
- Test predictions with reference to evidence gained.

Plan investigative work

- Select ideas and turn them into a form that can be tested.
- Plan investigations to test ideas.
- Identify important variables; choose which variables to change, control and measure.
- Make predictions using scientific knowledge and understanding.

Obtain and present evidence

- Take appropriately accurate measurements.
- Use a range of equipment correctly.
- Discuss and control risks to themselves and others.
- Present results as appropriate in tables and graphs.

Consider evidence and approach

- Make simple calculations.
- Identify trends and patterns in results (correlations).
- Compare results with predictions.
- Identify anomalous results and suggest improvements to investigations.
- Interpret data from secondary sources.
- Discuss explanations for results using scientific knowledge and understanding. Communicate these clearly to others.
- Present conclusions to others in appropriate ways.

Biology

Plants

- Explore how plants need carbon dioxide, water and light for photosynthesis in order to make biomass and oxygen.
- Describe the absorption and transport of water and mineral salts in flowering plants.

Humans as organisms

- Identify the constituents of a balanced diet and the functions of various nutrients. Secondary sources can be used.
- Understand the effects of nutritional deficiencies.

Biology (continued)

Humans as organisms (continued)

- Recognise the organs of the alimentary canal and know their functions. Secondary sources can be used.
 - Understand the function of enzymes as biological catalysts in breaking down food to simple chemicals.
 - Recognise and model the basic components of the circulatory system and know their functions.
 - Understand the relationship between diet and fitness.
 - Discuss how conception, growth, development, behaviour and health can be affected by diet, drugs and disease.
 - Recognise the basic components of the respiratory system and know their functions.
 - Define and describe aerobic respiration, and use the word equation.
 - Explain gaseous exchange.
 - Describe the effects of smoking. Secondary sources can be used.
 - Discuss the physical and emotional changes that take place during adolescence.
- * [• Describe the human reproductive system, including the menstrual cycle, fertilisation and foetal development.

* Not being taught at the school as per the Government directions.

Chemistry

States of matter

- Show how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion.

Material properties

- Describe and explain the differences between metals and non-metals.
- Give chemical symbols for the first twenty elements of the Periodic Table.
- Understand that elements are made of atoms.
- Explain the idea of compounds.
- Name some common compounds including oxides, hydroxides, chlorides, sulfates and carbonates.
- Distinguish between elements, compounds and mixtures.

Material changes

- Use a word equation to describe a common reaction. Secondary sources can be used.
- Describe chemical reactions which are not useful, e.g. rusting.

Physics

Forces and motion

- Calculate average speeds, including through the use of timing gates.
- Interpret simple distance/time graphs.

Sound

- Explain the properties of sound in terms of movement of air particles.
- Recognise the link between loudness and amplitude, pitch and frequency, using an oscilloscope.

Light

- Use light travelling in a straight line to explain the formation of shadows and other phenomena.
- Describe how non-luminous objects are seen.
- Describe reflection at a plane surface and use the law of reflection.
- Investigate refraction at the boundary between air and glass or air and water.
- Explain the dispersion of white light.
- Explain colour addition and subtraction, and the absorption and reflection of coloured light.

Magnetism

- Describe the properties of magnets.
- Recognise and reproduce the magnetic field pattern of a bar magnet.
- Construct and use an electromagnet.

Safety issues

An essential part of this programme is that learners develop skills in scientific enquiry. This includes the collection of primary data by experiment. Scientific experiments are engaging and provide opportunities for first hand exploration. However, they must, at all times, be conducted with the utmost respect for safety, specifically:

- It is the responsibility of the teacher in charge to adhere and conform to any national, regional and school regulation in place with respect to safety of scientific experimentation.
- It is the responsibility of the teacher in charge to make a risk assessment of the hazards involved with any particular class or individual when undertaking a scientific experiment that conforms to these regulations.
- Cambridge takes no responsibility for the management of safety for individual published experiments or for the management of safety for the undertaking of practical experiments in any given location. Cambridge only endorses support material in relation to curriculum content and is not responsible for the safety of activities contained within it. The responsibility for the safety of all activities and experiments remains with the school.

Policy frameworks

It is expected that schools will have their own sex education policy set within their national legislative framework and drawn up in consultation with parents. We are aware that these policies will be distinct and varied due to the diversity in tradition and culture enjoyed over our global network of schools. For this reason, the focus of the Secondary 1 curriculum is the factual and preparative aspects of sex education. It does not address attitudes and values or personal and social skills as we expect each school to make a judgement on how these aspects of sex education are addressed within their wider curriculum framework/obligations.

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