

Cambridge Secondary 1

Science Curriculum Framework

Cambridge
Secondary 1



UNIVERSITY *of* CAMBRIDGE
International Examinations
Excellence in education

Contents

Stage 7	1
Stage 8	4
Stage 9	7

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.

Stage 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.

Stage 9

Chemistry (continued)

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.

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.

University of Cambridge International Examinations
1 Hills Road, Cambridge, CB1 2EU, United Kingdom
Tel: +44 (0)1223 553554 Fax: +44 (0)1223 553558
international@cie.org.uk www.cie.org.uk

© University of Cambridge International Examinations 2011
V1Y04

