

Science Curriculum Framework

Grades 7-8 Bilingual Program

2026\2027

الإطار المنهجي لمادة العلوم
الصفوف ٧-٨ للبرنامج ثنائي اللغة
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2026

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Introduction

Science stands as a cornerstone of knowledge, essential for nurturing the young minds of today into the competent citizens of tomorrow. It serves as the driving force behind innovation, global competitiveness, and human progress. Therefore, the instruction of science must be tailored to meet contemporary demands while also equipping learners for future aspirations. Within science education, a dual emphasis is imperative: fostering innate curiosity and creativity, while also providing a structured framework for applying the scientific method of inquiry.

Consequently, a daily regimen of training should instill the scientific approach, wherein students learn to formulate hypotheses, conduct experiments, gather, and scrutinize data, and ultimately unravel the solutions to posed questions. Amid this process, a pivotal task emerges – nurturing students' affirmative outlook towards society, environment, and ethical considerations.

This curriculum framework has been meticulously crafted to prepare our students as adept, contributing citizens proficient in navigating an increasingly technology-centered world. It instills in them the perspective that the pursuit of science holds significance and utility. Notably, it serves as a compass, directing educators in guiding their students towards the mastery of scientific skills, knowledge, and attitudes.

The curriculum framework also encompasses the primary objectives to consider when guiding the science learning process. It distinctly outlines the skills to be acquired and the varying levels of cognitive processes that students should engage with at this level (grades 7-8) and accordingly, their skills and abilities to be assessed.

In harmony with the developmental requisites of the targeted age group and drawing upon the latest international educational resources, this curriculum framework presents a comprehensive array of subject topics. Each topic is accompanied by an expansive set of learning objectives, designed to cater to a spectrum of educational needs.

Aims of science standards

The overall aims of science standards are that students should:

- develop confidence, scientific knowledge, conceptual understanding through specific disciplines of biology, chemistry, and physics
- Have a greater awareness of the role of Science and Technology in Everyday life.
- develop understanding of nature, processes, and methods of science through different types of science enquiries that help them to answer scientific questions about the world around.
- understand the application of some basic scientific ideas and concepts in everyday situations and apply knowledge, skills, and resources in designing and making tasks.
- develop curiosity and excitement in science and its application and stimulate them to ask questions about science and natural phenomena.
- observe, ask questions, discern patterns, hypothesize, plan, experiment, design, make, measure, discuss, analyses and evaluate results and so develop a scientific approach to problem-solving.
- develop relevant attitudes, such as a concern for accuracy and precision, objectivity, integrity, enquiry, initiative, and inventiveness.
- plan, design and perform experiments to test theories and hypotheses.
- develop the ability to work independently and collaboratively with others when necessary.
- apply and use scientific knowledge, skills, and resources in designing and making tasks.
- become actively involved in the discussion, exploration, and resolution of environmental issues.
- be aware of the ethical, social, and environmental applications and recognize the limitations of science.
- be prepared towards using scientific knowledge and methods in making personal decisions.
- Understand and apply safety in scientific and technological investigations and activities.

Attitudes and Ethics

Attitudes that students should be encouraged to develop should include:

- curiosity by exploring the environment and questioning what they find.
- creativity by suggesting innovative and relevant ways to solve problems.
- integrity by handling and communicating data and information with integrity.
- objectivity by seeking data and information to validate observations and explanations objectively.
- open-mindedness by accepting all knowledge as tentative and willing to change their view if the evidence is convincing.
- perseverance by pursuing a problem until a satisfactory solution is found.
- responsibility by showing care and concern for living things and awareness of the responsibility they have for the quality of the environment.
- appreciate and acknowledge the achievements of previous scientists.
- realize that with science we can bring great benefits to humanity and also if it is abused it can cause serious damage to the environment.

ICT application:

Different activities in which students can use information and communication technology (ICT) are provided through this curriculum framework to play a full part in modern society. Teachers could select from the following possible uses of ICT for their science lessons:

- A digital camera to capture images, record observations and make displays.
- Computer games to help to reinforce children's basic knowledge.
- The secure websites as a source of information.
- A simple database to organize and share results of investigations.
- An interactive whiteboard to enter and display information.
- using animations and simulations to visualize scientific ideas.

Skills to be assessed:

Assessment is an important part of the teaching and learning process. It provides information to the teacher about student's achievements in relation to the learning objectives.

Students' learning is assessed based on the assessment objectives outlined in the Student Assessment Handbook for Science (Grades 5–10) for Private Schools, issued by the Directorate General of Educational Assessment. The handbook is circulated through the official correspondence system and is also available on the Educational Portal (www.moe.gov.om). It should be consulted when planning and implementing assessment practices in science.

How to use this curriculum framework

This curriculum framework is arranged according to the following manner:

- **Learning Objectives:** Indicate the scope of the content that provide an overview of what students are expected to achieve at the end of the unit.
- **Coursebook #:** indicates the series book number as the recommended textbooks are dedicated to cover Cambridge Lower Secondary Science 0893 which is a 3-year program (stages 7, 8 and 9).
- **The numbering key:** [Topic–Learning objective]
e.g., Topic 1 (1. Cells and organisms) and the objective 1.3 State the role of microscopes in discovering cells and revealing the structures of cells.

For the topics and activities refer to the textbooks that are recommended by MOE in the approved books list.

Note:

When implementing lessons and covering learning objectives, it is preferable to adhere to the order of objectives in the student's textbook, even if it differs from the sequence of educational objectives in this curriculum framework, while ensuring that all objectives of each semester are covered. Additionally, there may be enriching topics and ideas in the books that are not covered by the educational objectives. It is acceptable to address them if the time is sufficient.

Learning objectives

Grade 7 – Semester 1		
Topic	Objectives	Coursebook #
1. Cells and organisms	1.1. Understand that all organisms are made of cells and microorganisms are typically single celled. 1.2. Identify and describe the functions of cell structures (limited to cell membrane, cytoplasm, nucleus, cell wall, chloroplast, mitochondria and sap vacuole). 1.3. State the role of microscopes in discovering cells and revealing the structures of cells. 1.4. 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). 1.5. Describe the similarities and differences between the structures of plant and animal cells. 1.6. Understand that cells can be grouped together to form tissues, organs and organ systems.	7
2. Diet and growth	2.1. 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. 2.2. Understand that carbohydrates and fats can be used as a store of energy in animals, and animals consume food to obtain energy and nutrients. 2.3. Discuss how human growth, development and health can be affected by lifestyle, including diet and smoking. 2.4. Identify ball-and-socket and hinge joints, and explain how antagonistic muscles move the bones at a hinge joint.	8

Grade 7 – Semester 1		
Topic	Objectives	Coursebook #
3. Structure and properties of materials	3.1. Understand that all matter is made of atoms, with each different type of atom being a different element. 3.2. Know that the Periodic Table presents the known elements in an order. 3.3. State the chemical symbols of the first twenty elements of the periodic table. 3.4. Know metals and non-metals as the two main groupings of elements. 3.5. Describe the differences between elements, compounds and mixtures, including alloys as an example of a mixture. 3.6. Understand that alloys are mixtures that have different chemical and physical properties from the constituent substances. 3.7. Use the particle model to explain the difference in hardness between pure metals and their alloys. 3.8. Describe a vacuum as a space devoid of matter. 3.9. Describe the three states of matter as solid, liquid and gas in terms of arrangement, separation and motion of particles. 3.10. Use the particle model to represent elements, compounds and mixtures. 3.11. Understand that all substances have chemical properties and physical properties. 3.12. Describe common differences between metals and non-metals, referring to their physical properties. 3.13. Understand that the acidity or alkalinity of a substance is a chemical property and is measured by pH. 3.14. Use indicators (including Universal Indicator and litmus) to distinguish between acidic, alkaline and neutral solutions.	7

Grade 7 – Semester 1		
Topic	Objectives	Coursebook #
4. Forces and energy	4.1. Identify several stores of energy. 4.2. Describe changes in energy that are a result of an event or process. 4.3. Know that energy tends to dissipate and in doing so it becomes less useful. 4.4. 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. 4.5. Understand that there is no air resistance to oppose movement in a vacuum.	7
5. Sound	5.1. Describe the vibration of particles in a sound wave and explain why sound does not travel in a vacuum. 5.2. Explain echoes in terms of the reflection of sound waves.	7
6. The earth in space	6.1 Describe how planets form from dust and gas, which are pulled together by gravity. 6.2 Know that gravity is the force that holds components of the Solar System in orbit around the Sun. 6.3 Describe tidal forces on Earth as a consequence of the gravitational attraction between the Earth, Moon and Sun. 6.4 Explain how solar and lunar eclipses happen. 6.5 Identify the four layers of the Earth (crust, mantle, outer core and inner core). 6.6 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. 6.7 Describe how earthquakes, volcanoes and fold mountains occur near the boundaries of tectonic plates.	7

Grade 7 – Semester 2		
Topic	Objectives	Coursebook #
1. Grouping and identifying species	1.1. Describe the seven characteristics of living organisms. 1.2. Discuss reasons for classifying viruses as living or non-living. 1.3. Describe a species as a group of organisms that can reproduce to produce fertile offspring. 1.4. Use and construct dichotomous keys to classify species and groups of related organisms. 1.5. Know and describe the ecological role some microorganisms have as decomposers. 1.6. Define the term ecosystem and describe its components, e.g. habitate, community, biodiversity, herbivore, carnivore, omnivore, producer, consumer (including the levels of consuming (Primary, Secondary, Tertiary and Quaternary)), predator, prey. 1.7. Construct and interpret food chains and webs which include microorganisms as decomposers.	7
2. Ecosystems	2.1. Identify different ecosystems on the Earth, recognising the variety of habitats that exist within an ecosystem. 2.2. Describe the impact of the bioaccumulation of toxic substances on an ecosystem. 2.3. Describe how a new and/or invasive species can affect other organisms and an ecosystem.	8
3. Chemical changes and reactions	3.1. 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). 3.2. Use tests to identify hydrogen, carbon dioxide and oxygen gases. 3.3. Explain why a precipitate forms, in terms of a chemical reaction between soluble reactants forming at least one insoluble product. 3.4. Use the particle model to describe chemical reactions. 3.5. Describe neutralisation reactions in terms of change of pH.	7

Grade 7 – Semester 2		
Topic	Objectives	Coursebook #
4. Solutions and solubility	4.1. Understand that the concentration of a solution relates to how many particles of the solute are present in a volume of the solvent. 4.2. Describe how the solubility of different salts varies with temperature. 4.3. Describe how paper chromatography can be used to separate and identify substances in a sample.	8
5. Electricity and circuits	5.1. Use a simple model to describe electricity as a flow of electrons around a circuit. 5.2. Describe electrical conductors as substances that allow electron flow and electrical insulators as substances that inhibit electron flow. 5.3. Know how to measure the current in series circuits. 5.4. Describe how adding components into a series circuit can affect the current (limited to addition of cells and lamps). 5.5. Use diagrams and conventional symbols to represent, make and compare circuits that include cells, switches, lamps, buzzers and ammeters.	7
6. Magnetism	6.1. Describe a magnetic field, and understand that it surrounds a magnet and exerts a force on other magnetic fields. 6.2. Recognize and draw the field lines of the magnetic field produced by a bar magnet. 6.3. Recall that the arrows on the field lines of magnetic fields point from the north pole to the south pole 6.4. Recall that the strength of the magnetic field is indicated by how close together the field lines are 6.5. Know that the reason the Earth has a magnetic field is that the core acts as a magnet. 6.6. Describe how to make an electromagnet and know that electromagnets have many applications. 6.7. Investigate factors that change the strength of an electromagnet.	8

Grade 7 – Semester 2		
Topic	Objectives	Coursebook #
7. The Earth and its climate	7.1. 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. 7.2. Describe the water cycle (limited to evaporation, condensation, precipitation, water run-off, open water and groundwater). 7.3. 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. 7.4. Understand that the Earth's climate can change due to atmospheric change. 7.5. Identify renewable resources (including wind, tidal and solar power, and bioplastics) and non-renewable resources (including fossil fuels), and describe how humans use them. 7.6. Describe the difference between climate and weather.	7&8

Grade 8 – Semester 1		
Topic	Objectives	Coursebook #
1. Gas exchange and respiration	1.1. 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. 1.2. Describe the diffusion of oxygen and carbon dioxide between blood and the air in the lungs. 1.3. Know that aerobic respiration occurs in the mitochondria of plant and animal cells, and gives a controlled release of energy¹. 1.4. Know and use the summary word equation for aerobic respiration (glucose + oxygen → carbon dioxide + water)¹. 1.5. 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).	8
2. Maintaining life	2.1. Describe the pathway of water and mineral salts from the roots to the leaves in flowering plants, including absorption in root hair cells, transport through xylem and transpiration from the surface of leaves. 2.2. Describe the structure of the human excretory (renal) system and its function (limited to kidneys filtering blood to remove urea, which is excreted in urine). 2.3. Discuss how fetal development is affected by the health of the mother, including the effect of diet, smoking and drugs	9
3. Structure and properties of materials	3.1. Describe the Rutherford model of the structure of an atom. 3.2. Know that electrons have negative charge, protons have positive charge and neutrons have no charge. 3.3. Know that the electrostatic attraction between positive and negative charge is what holds together individual atoms.	8

¹ Covering objectives (1.3) and (1.4) briefly is sufficient, as students have already studied it in grade 7.

Grade 8 – Semester 1		
Topic	Objectives	Coursebook #
4. Properties of materials	4.1. Understand that the structure of the Periodic Table is related to the atomic structure of the elements and the Periodic Table can be used to predict an element's structure and properties. 4.2. Understand that the groups within the Periodic Table have trends in physical and chemical properties, using group 1 as an example. 4.3. Understand that a molecule is formed when two or more atoms join together chemically, through a covalent bond. 4.4. Describe a covalent bond as a bond made when a pair of electrons is shared by two atoms (limited to single bonds). 4.5. Describe an ion as an atom which has gained at least one electron to be negatively charged or lost at least one electron to be positively charged. 4.6. Describe an ionic bond as an attraction between a positively charged ion and a negatively charged ion. 4.7. Know that elements and compounds exist in structures (simple or giant), and this influences their physical properties.	9
5. Forces and motion	5.1. Describe the effects of balanced and unbalanced forces on motion. 5.2. Calculate speed (speed = distance / time). 5.3. Interpret and draw simple distance / time graphs. 5.4. Identify and calculate turning forces (moment = force x distance). 5.5. Explain that pressure is caused by the action of a force, exerted by a substance, on an area (pressure = force/ area). 5.6. Use particle theory to explain pressures in gases and liquids (qualitative only). 5.7. Describe the diffusion of gases and liquids as the intermingling of substances by the movement of particles.	8

Grade 8 – Semester 1		
Topic	Objectives	Coursebook #
6. Light	6.1. Describe reflection at a plane surface and use the law of reflection. 6.2. Describe refraction of light at the boundary between air and glass or air and water in terms of change of speed. 6.3. Know that white light is made of many colours and this can be shown through the dispersion of white light, using a prism. 6.4. Describe how colours of light can be added, subtracted, absorbed and reflected. 6.5. Describe a galaxy in terms of stellar dust and gas, stars and planetary systems. 6.6. Describe asteroids as rocks, smaller than planets, and describe their formation from rocks left over from the formation of a planetary system.	8
7. Sound ²	7.1. Draw and interpret waveforms, and recognise the link between loudness and amplitude, pitch and frequency. 7.2. Use waveforms to show how sound waves interact to reinforce or cancel each other.	9
8. Plate tectonics	8.1. Explain the movement of tectonic plates in terms of convection currents. 8.2. Explain why the jigsaw appearance of continental coasts, location of volcanoes and earthquakes, fossil record and alignment of magnetic materials in the Earth's crust are all evidence for tectonic plates.	9

² It is recommended to briefly cover the objectives of Topic 3 (Sound) from the Grade 7-Semester 1 (coursebook#7) as a preliminary step to address the learning loss for this year's cohort only.

Grade 8 – Semester 2		
Topic	Objectives	Coursebook #
1. Photosynthesis and the carbon cycle	1.1. Know that photosynthesis occurs in chloroplasts and is the process by which plants make carbohydrates, using the energy from light. 1.2. Know and use the summary word equation for photosynthesis (carbon dioxide + water → glucose + oxygen, in the presence of light and chlorophyll). 1.3. Know that plants require minerals to maintain healthy growth and life processes (limited to magnesium to make chlorophyll and nitrates to make protein). 1.4. Describe the carbon cycle (limited to photosynthesis, respiration, feeding, decomposition and combustion). 1.5. Describe the historical and predicted future impacts of climate change, including sea level change, flooding, drought and extreme weather events. 1.6. Describe the consequences of asteroid collision with the Earth, including climate change and mass extinctions.	9
2. Genes and inheritance	2.1. Know that chromosomes contain genes, made of DNA, and that genes contribute to the determination of an organism's characteristics. 2.2. Describe the fusion of gametes to produce a fertilised egg with a new combination of DNA 2.3. Describe the inheritance of sex in humans in terms of XX and XY chromosomes. 2.4. Describe variation within a species and relate this to genetic differences between individuals. 2.5. Describe the scientific theory of natural selection and how it relates to genetic changes over time. 2.6. Describe what could happen to the population of a species, including extinction, when there is an environmental change.	9

Grade 8 – Semester 2		
Topic	Objectives	Coursebook #
3. Reactivity	3.1. Know that some processes and reactions are endothermic or exothermic, and this can be identified by temperature change. 3.2. Describe the reactivity of metals (limited to sodium, potassium, calcium, magnesium, zinc, iron, copper, gold and silver) with oxygen, water and dilute acids. 3.3. Identify the reactivity series and use it to compare the reactivity of metals. 3.4. Understand that some substances are generally unreactive and can be described as inert. 3.5. Know that purity is a way to describe how much of a specific chemical is in a mixture. 3.6. Use word equations and symbol equations to describe reactions (balancing symbol equations is not required). 3.7. Know that reactions do not always lead to a single pure product and that sometimes a reaction will produce an impure mixture of products. 3.8. Describe the effects of concentration, surface area and temperature on the rate of reaction, and explain them using the particle model. 3.9. Identify examples of displacement reactions and predict products (limited to reactions involving calcium, magnesium, zinc, iron, copper, gold and silver salts). 3.10. Describe how to prepare some common salts by the reactions of metals with acids, and metal carbonates with acids, and purify them, using filtration, evaporation and crystallisation. 3.11. Understand that in chemical reactions mass and energy are conserved.	8&9

Grade 8 – Semester 2		
Topic	Objectives	Coursebook #
4. Forces and energy	4.1. Use density to explain why objects float or sink in water. 4.2. Describe how the density of a substance relates to its mass in a defined volume. 4.3. Calculate and compare densities of solids, liquids and gases. 4.4. Describe the difference between heat and temperature. 4.5. Know that energy is conserved, meaning it cannot be created or destroyed. 4.6. Know that thermal energy will always transfer from hotter regions or objects to colder ones, and this is known as heat dissipation. 4.7. Describe thermal transfer by the processes of conduction, convection and radiation. 4.8. Explain cooling by evaporation.	9
5. Electrical circuits	5.1. Describe how current divides in parallel circuits. 5.2. Know how to measure current and voltage in series and parallel circuits, and describe the effect of adding cells and lamps. 5.3. Calculate resistance (resistance = voltage / current) and describe how resistance affects current. 5.4. Use diagrams and conventional symbols to represent, make and compare circuits that include cells, switches, resistors (fixed and variable), ammeters, voltmeters, lamps and buzzers.	9
6. Astronomy	6.1. Describe the evidence for the collision theory for the formation of the Moon. 6.2. Know that nebulae are clouds of dust and gas and can act as stellar nurseries.	9

توزيع المحتوى على الفصلين الدراسيين
The Yearly Work Scheme

Grade 7		Grade 8	
Semester 1	Semester 2	Semester 1	Semester 2
1. Cells and organisms 2. Diet and growth 3. Structure and properties of materials 4. Forces and energy 5. Sound 6. The Earth in space	1. Grouping and identifying species 2. Ecosystems 3. Chemical changes and reactions 4. Solutions and solubility 5. Electricity and circuits 6. Magnetism 7. The Earth and its climate	1. Gas exchange and respiration 2. Maintaining life 3. Structure and properties of materials 4. Properties of materials 5. Forces and motion 6. Light 7. Sound 8. Plate tectonics	1. Photosynthesis and the carbon cycle 2. Genes and inheritance 3. Reactivity 4. Forces and energy 5. Electrical circuits 6. Astronomy

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End of Curriculum framework