

Lebanon

Center for Educational Research and Development (CRDP)
Ministry of Education and Higher Education, Lebanon

Introduction

Overview of the Education System

The education system in Lebanon is centralized, with the Ministry of Education and Higher Education regulating public sector institutions through regional education bureaus at the center of each province. The bureaus serve as a liaison between public schools that offer basic education (elementary and/or intermediate grades) and the directorates of education at the Ministry's headquarters in Beirut. Decisions are conveyed to the directorates and then circulated to schools. Private schools are organized independently, but education decisions are under the jurisdiction of the Ministry.

The Center for Educational Research and Development (CRDP) is an autonomous organization that operates under the trusteeship of the Ministry of Education and Higher Education. CRDP tasks include drafting academic curricula in all subject areas, including mathematics and science for the preuniversity education stage, making revisions and modifications as needed, and preparing methods for implementing curricula, including required teaching methodologies.¹ CRDP also conducts education research, provides training for pre-university teachers, writes textbooks, and conducts evaluations.

The current structure of the education system in Lebanon divides pre-university education into three stages:²

- Kindergarten—ages 3 to 5
- Basic education—Elementary level, ages 6 to 12 (Cycle 1: Grades 1 to 3 and Cycle 2: Grades 4 to 6); Intermediate level, ages 13 to 15 (Cycle 3: Grades 7 to 9)
- Secondary education—ages 16 to 18 (First, second and third year secondary)

Schooling is compulsory through Grade 9 (kindergarten plus nine years of basic education). Some schools provide only basic education, some also include kindergarten, and some provide basic and secondary education, while other schools provide only secondary education

The Ministry of Education and Higher Education finances public schools.³ Private schools are either financed by student fees or supported by the Ministry. The processes involved in drafting and modifying curricula and providing teacher training are organized and financed by CRDP, which is mainly supported by nongovernmental funds derived from private companies or international bodies including the United Nations Development Program and the World Bank.

The Lebanese national curriculum is used in all public and private schools. If schools wish to implement a foreign curriculum (French, English, or International Baccalaureate), they need to take into consideration both the Lebanese and foreign curricula at the same time. Since Lebanon began participating in TIMSS in 2003, no modifications have been made to the mathematics and science curricula.

The teaching of mathematics and science in public and private schools is conducted in one of three languages—Arabic, English, or French—throughout the first and second cycles of basic education. In the third and fourth cycles, teaching is conducted in a foreign language (French or English).

Use and Impact of TIMSS

CRDP has administered TIMSS to Grade 8 students in Lebanon since TIMSS 2003 and has administered TIMSS Advanced 2008 and 2015 to Grade 12 students. CRDP studies TIMSS results carefully and has written national reports on the results of TIMSS 2011 and 2015. Currently, CRDP is engaged in mathematics and science curriculum development, and is considering the TIMSS Assessment Frameworks and results from TIMSS 2003, 2007, 2011, 2015, and 2019 during the curriculum development process.

The Mathematics Curriculum in Primary and Lower Secondary Grades^a

The following guidelines correspond to the national mathematics curriculum through the eighth grade. The curriculum for the elementary level (Grades 4 to 6) ensures that students who finish the second cycle of basic education have the necessary skills and a solid foundation in mathematics. To achieve this goal, the general objectives of mathematics education comprise the following domains:⁴

- Mathematical Reasoning—Find patterns in a sequence of results and generalize them; extract general statements from specific contexts; establish procedures; and argue by providing an analogy and giving examples and counter examples
- Problem Solving—Visualize situations and handle information; use and apply mathematics in various domains, especially in technology and other branches of learning; verify results; and use mini-calculators to carry out the four arithmetic operations
- Communication—Read, understand, and interpret a mathematical text by translating it into figures, representations, or equations, and translate a given mathematical relation into spoken language
- Spatial—Represent locations on a map, characterize various plane figures and use geometric instruments to draw them, and develop an understanding of some solid figures
- Numerical—Master the Indo-Arabic system of numeration; recognize decimal numbers; master all types of calculation, including computational and mental, and learn to use a mini-calculator (for integers and decimals); perform simple operations with fractions; and estimate a result

^a Part of the content is suspended and also is subject to future changes.

- Measurement—Measure perimeter, area, capacity, and angles and use metric units
- Statistics—Collect and interpret data

Exhibit 1 presents a summary of the mathematics concepts and skills covered in the fourth grade of basic education (elementary level, Cycle 2).⁵

Exhibit 1: Mathematics Content in Basic Education, Grade 4

Content Area	Main Topics	Concepts and Skills Covered
Arithmetic and Algebra	Numbers	<ul style="list-style-type: none"> ▪ Natural integers ▪ Fractions ▪ Decimals
	Operations	<ul style="list-style-type: none"> ▪ Addition ▪ Subtraction ▪ Multiplication ▪ Division
Geometry	Location	<ul style="list-style-type: none"> ▪ Distance from a point to a straight line ▪ Location of a point on a square grid
	Solid figures	<ul style="list-style-type: none"> ▪ Building models
	Plane figures	<ul style="list-style-type: none"> ▪ Intersecting straight lines and parallel straight lines ▪ Classification of quadrilaterals according to their sides ▪ Circles and discs
	Transformations	<ul style="list-style-type: none"> ▪ Drawing symmetrical figures with respect to an axis
Measurement	Length	<ul style="list-style-type: none"> ▪ Metric units of length
	Mass	<ul style="list-style-type: none"> ▪ Metric units of mass
	Area	<ul style="list-style-type: none"> ▪ Comparison of areas
	Angle	
	Capacity	<ul style="list-style-type: none"> ▪ Liter and its submultiples
	Volume	
Statistics	Handling data	<ul style="list-style-type: none"> ▪ Collecting and organizing data

In the third cycle of basic education (intermediate level, Grades 7 to 9), the general objectives of math education comprise the following domains:

- Mathematical Reasoning—Find connections between the real world and mathematical models and between these models and concepts; find generating formulas of a sequence; distinguish between general and particular statements; write simple proofs; and recognize incorrect proofs
- Problem Solving—Analyze situations and deduce the relevant elements; look for necessary information to clarify incomplete sets of information; construct mathematical models associated with a situation; choose strategies for finding a solution; deconstruct problems into simpler tasks, and conversely, combine necessary facts to reach conclusions; and use calculators with memory

- Communication—Read, understand, and use mathematical notation and language; present work orally or in writing with clarity and rigor, and with particular care when writing proofs
- Spatial—Construct geometric figures based on a given set of conditions, represent solid (three-dimensional) figures, prove theorems about the properties of plane (two-dimensional) figures, and perform transformations on figures
- Numerical—Find and use relations among numbers, extend computational techniques to literal expressions, and estimate answers
- Measurement—Measure area and volume
- Statistics—Make representations of statistical problems and read them, and calculate the mean of a statistical distribution

Exhibit 2 presents a summary of the mathematics concepts and skills covered in the eighth grade of basic education (intermediate level, Cycle 3).⁶

Exhibit 2: Mathematics Content in Basic Education, Grade 8

Content Area	Main Topics	Concepts and Skills Covered
Arithmetic and Algebra	Numbers	<ul style="list-style-type: none"> ▪ Natural integers ▪ Fractions ▪ Decimals ▪ Square roots
	Operations	<ul style="list-style-type: none"> ▪ Powers of positive numbers with a positive integer exponent ▪ Powers of a negative integer exponent of 10
	Proportionality	<ul style="list-style-type: none"> ▪ Inverse proportionalities
	Algebraic expressions	<ul style="list-style-type: none"> ▪ Common identities ▪ Literal expressions with fractional forms
	Equations and inequalities	<ul style="list-style-type: none"> ▪ Equations of the type $(ax + b)(cx + d) = 0$ ▪ Equations and inequalities of the first degree with one unknown
Geometry	Location	<ul style="list-style-type: none"> ▪ Relative positions of two circles ▪ Geometric loci and constructions ▪ Coordinates of the midpoint of a segment
	Solid geometry	<ul style="list-style-type: none"> ▪ Plane representations of cylinders, pyramids, cones, and spheres ▪ Relative positions of lines and planes

Content Area	Main Topics	Concepts and Skills Covered
	Plane figures	<ul style="list-style-type: none"> ▪ Pythagorean theorem ▪ Theorem of midpoints in triangles and trapezoids ▪ Characteristic properties of parallelograms ▪ Central angles and inscribed angles in a circle ▪ Area of a circular sector
	Transformations and figures	<ul style="list-style-type: none"> ▪ Vectors and translation
Statistics	Handling data	<ul style="list-style-type: none"> ▪ Cumulative exact values and frequencies ▪ Representation of data, including circular diagrams and cumulative frequency polygons

The Science Curriculum in Primary and Lower Secondary Grades^b

The following guidelines correspond to the national science curriculum through eighth grade. Science plays an important role in everyday life. It manifests itself in all aspects of human activity. Consequently, it is important that students become lifelong learners of science, learning it at school and extending science learning beyond their school years. To achieve this goal, science education comprises the following general objectives:⁷

- Develop students' intellectual and practical scientific skills
- Deepen students' awareness of the ability of humans to understand, invent, and create
- Understand the nature of science and technology, their development throughout history, and their impact on human thought
- Ensure that students have acquired the facts, concepts, and principles necessary to understand natural phenomena
- Motivate students to apply basic scientific principles to all sciences
- Explain the scientific concepts and principles behind commonly used machines and devices
- Acquire knowledge about health, the environment, and safety practices, and behave accordingly
- Realize that some natural resources can be depleted and develop student awareness of the role of science in sustaining these resources
- Encourage students to use scientific knowledge and skills in novel situations, especially in everyday life
- Emphasize the role of scientists in the advancement of humankind
- Encourage students to be open to the ideas of scientists from different cultures and understand their contributions to the advancement of science
- Encourage students to abide by scientific values, such as honesty and objectivity
- Develop students' scientific curiosity and orientation toward scientific research

^b Part of the content is suspended and also is subject to future changes.

- Encourage students to work independently and cooperatively in solving scientific problems
- Develop student awareness of career possibilities in different areas related to science

Exhibit 3 presents a summary of the science concepts and skills covered in the fourth grade of basic education (elementary level, Cycle 2).^{8,9}

Exhibit 3: Science Content in Basic Education, Grade 4

Main Topics	Concepts and Skills Covered
Plants and Their Habitats	<ul style="list-style-type: none"> ▪ Fresh water habitat and plants ▪ Classification of plants
Animals and Their Habitats	<ul style="list-style-type: none"> ▪ Fresh water habitat and animals ▪ Classification of animals
Man and Health	<ul style="list-style-type: none"> ▪ Support and movement systems ▪ Food pyramid
Man and the Environment	<ul style="list-style-type: none"> ▪ Included in the other themes
Matter and Energy	<ul style="list-style-type: none"> ▪ Properties of matter ▪ Mixtures ▪ Magnets ▪ Electricity ▪ Sound
Earth and the Universe	<ul style="list-style-type: none"> ▪ Soil ▪ Formation of soil ▪ Clay ▪ Rocks ▪ Fossils

Exhibit 4 presents a summary of the science concepts and skills covered in the eighth grade of basic education (intermediate level, Cycle 3).^{10,11,12,13}

Exhibit 4: Science Content in Basic Education, Grade 8

Content Area	Main Topics	Concepts and Skills Covered
Life and Earth Sciences	Immunology	<ul style="list-style-type: none"> ▪ Immunological specificity ▪ Immune system deficiencies and disorders ▪ Preventive and curative methods
	Earth and the environment	<ul style="list-style-type: none"> ▪ Geology, including Earth science ▪ Manifestations of Earth's processes ▪ Structure and dynamics of Earth ▪ Circulation of matter on Earth ▪ Geology and human responsibilities
Chemistry	Classification and constituents of matter	<ul style="list-style-type: none"> ▪ Pure substances, including elements, compounds, atoms, molecules, and ions; symbols and formulas ▪ Allotropes, including diamond and graphite

Content Area	Main Topics	Concepts and Skills Covered
	Chemical reactions and energy	<ul style="list-style-type: none"> ▪ Electrical nature of matter, including electrification, electric discharge, conductors, and insulators; electricity and safety ▪ Chemical reactions, including chemical equations, types of chemical reactions, and rate of chemical reactions ▪ Acids, bases, and salts, including acidic and basic solutions and the concept of pH ▪ Applications
Physics	Mechanics	<ul style="list-style-type: none"> ▪ Motion and speed ▪ Forces, including their effects and classification ▪ Work, power, and forms of energy
	Waves	<ul style="list-style-type: none"> ▪ Characteristics of waves, including sound waves ▪ Electromagnetic waves and colors
	Optics	<ul style="list-style-type: none"> ▪ Rectilinear propagation of light ▪ Reflection of light and plane mirrors

Professional Development Requirements and Programs

Since the 1998–1999 school year, all teachers have completed professional development sessions and have been required to attend continuous education courses. Teachers of mathematics and science attend special professional development sessions focused on active methodologies for teaching and learning in laboratories. These sessions are conducted as qualification and follow-up courses during the school year.

To monitor teacher performance and offer professional development on the use of technology, including Information and Communication Technology, the CRDP conducts professional development sessions at dedicated centers and secondary schools, as well as other public schools. These sessions are offered during or outside official working hours throughout the school year.

Monitoring Student Progress in Mathematics and Science

There are two types of assessments: school examinations and central official examinations.^{14,15} In public schools, students in Cycles 2 and 3, as well as secondary level students, take two examinations during the school year, in addition to monthly tests.¹⁶ Private schools apply the same examination system as public schools; however, some students in private schools take three term tests during the school year.

Upon completing basic education (Grade 9), students in public and private schools take central official examinations to obtain an Intermediate Certificate, a requirement for students who plan to pursue secondary education.^{17,18,19} At the end of secondary education (third secondary year), students take central official examinations in one of four subject areas (general sciences, life sciences, economics and sociology, or literature and humanities) to obtain a General Secondary School Certificate, which is a university entrance requirement.

It should be noted that, in the official examinations, students' school results are not taken into account. Only official examinations results are considered.

In public schools in Cycle 2 and up, students are promoted to the next grade or repeat the same grade based on the results of the examinations and tests mentioned above. In Cycle 1, students are promoted automatically. (Weaker students may enroll in a booster program at school.) In private schools, promotion and retention of students are based on the same terms and conditions administered to public school students. However, in some private schools, promotion from grade to grade in Cycle 1 is based on the results of the aforementioned examinations.

Suggested Reading

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