Québec, Canada

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Introduction

Overview of Education System

In Québec, the education system offers a variety of educational programs and services to the public, from preschool through university. The *Ministère de l'Éducation du Québec* (Ministry of Education of Québec, or MEQ) fulfills different functions for each level of education. For the preschool, elementary, secondary, and college levels, in which schooling is free, the MEQ develops programs and determines objectives and, often, content and standards. It also negotiates and ratifies provincewide collective agreements. At the financial level, it defines a normative framework and provides most of the educational resources used in schools. At the university level, the MEQ promotes the advancement of teaching and research by providing universities with the resources required for operation and development while respecting their autonomy and fostering collaboration among their partners.

The Québec Education Program (QEP) for preschool, elementary school, and secondary school is based on the development of competencies, including cross-curricular competencies, referred to as such because they are used in the broad areas of learning that address major issues confronting young people and programs of study grouped into various subject areas. The QEP defines a competency as "a set of behaviours based on the effective mobilization and use of a range of resources."[1] One aim of a competency-based program is to ensure that knowledge serves as a tool for acting and thinking, which also is a form of action. Because competencies are complex and develop over time, they involve more than simply adding or juxtaposing certain elements, and students can improve their mastery of a competency throughout their academic career and beyond. The QEP also produces complementary documents to provide additional information about the knowledge that students must acquire and be capable of using in each year of elementary and secondary school. A preschool cycle education program, for kindergarten children ages 4 and 5, has been available since 2021. The elementary school programs came into effect in Québec schools in September 2000. The Secondary Cycle One program came into effect in September 2005, while the Secondary Cycle Two program was implemented gradually between September 2007 and September 2009.

The public education system is currently made up of 60 French-language school service centers and 9 English-language school boards,[a] 1 special-status school service center (*Centre de services scolaire du Littoral*), and 2 special-status school boards (the Cree School Board and Kativik Ilisarniliriniq), all of which are dedicated to serving more than 2,700 educational institutions. Private institutions, some of which are subsidized in part by the MEQ, also provide elementary and secondary education. Private schools are subject to the same regulations as public institutions and must implement the official curriculum. In academic year 2022–2023, the private school system accounted for 6.3% of elementary students and 20.3% of secondary students in the youth sector. Québec has 11 Autochtones nations. For eight of them, education for young people is the responsibility of the federal government, but the MEQ supports them when necessary. For the other three, school organizations are part of the MEQ's network but have specific powers under rights and provisions of the *Convention de la Baie-James et du Nord Québécois* and the *Convention du Nord-Est québécois*.

Preschool education is for 4- and 5-year-olds. Accompanied by their parents, all 4-year-olds may benefit from the Passe-Partout program, which provides parents with tools to help foster their child's success in school and ensure that their child's transition to school life is positive and stimulating. Full-time kindergarten for 4-year-olds has been implemented gradually across Québec since academic year 2013–2014. In academic year 2013–2014, 664 students were enrolled, while in academic year 2022–2023, 18,243 children were enrolled. Full-time kindergarten for 5-year-olds is not compulsory, but almost all children attend.

Elementary education is divided into three 2-year cycles (Cycle One comprises Grades 1 and 2, Cycle Two comprises Grades 3 and 4, and Cycle Three comprises Grades 5 and 6) and is compulsory. Secondary education consists of 5 years of study divided into two cycles. Secondary Cycle One lasts 2 years (Secondary I and II) and is a continuation of the Common Core education begun in elementary school; Secondary Cycle Two lasts 3 years (Secondary III, IV, and V). Some secondary schools offer vocational training programs. Secondary school is compulsory until the year a student turns 16, normally during the fourth year of secondary school. After completing their secondary studies, students may continue to *Collège d'enseignement général et professionnel* (CÉGEP) (a general and vocational college) to acquire 2 years of preuniversity training or 3 years of technical training, both of which lead to a Diploma of College Studies.

Elementary education in Québec is offered in French, English, or an aboriginal language, and secondary education is offered in French or English. Some secondary schools offer Spanish as a third language in addition to the official curriculum, and some elementary and secondary schools offer students from other language communities instruction in their first language (e.g., Greek, Hebrew, Italian, Portuguese, German). Sometimes instruction in this language is offered to all students at a school. The English-speaking population, which accounts for approximately 8% of the population of the province, has access to a full network of English

a On June 15, 2020, the French-language school boards became school service centers. In the English-language education system, school boards are maintained.

educational institutions, from preschool to university. For aboriginal school organizations arising from conventions, education is given in their tongue during preschool and the first 3 years of primary school. French or English is introduced gradually beginning in the third year of primary school. Increased immigration has resulted in the arrival of large numbers of students whose first language is neither French nor English, especially in the greater Montréal area. These students attend French-language schools, and schools offer francization services and, in some cases, welcoming classes to meet their particular needs.

Specialists provide instruction in a second language (English or French) in elementary and secondary school. Students receive instruction in English as a second language starting in the first year of elementary school for an average of 1 hour per week. Some schools provide intensive instruction in English as a second language in the fifth or sixth year of elementary school to meet the needs of the community. In secondary school, the Basic School Regulation suggests that students at the Secondary I and II levels receive 200 hours of instruction per year in English as a second language in a core program or an enriched program and students at the Secondary III, IV, and V levels receive 100 hours of instruction per year in English as a second language. The Basic School Regulation suggests that students at the Secondary I and II levels receive 300 hours of instruction per year in French as a second language, students at the Secondary II level receive 150 hours of instruction per year in French as a second language, and students at the Secondary IV and V levels receive 100 hours of instruction per year in French as a second language.[b]

Use and Impact of TIMSS

Over the last two decades, a number of briefs, reports, and studies produced primarily by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Organisation for Economic Co-operation and Development (OECD), and the International Association for the Evaluation of Educational Achievement (IEA) have spurred reflection on how to adapt schools to new social and cultural realities. The QEP, which reflects these analyses and choices, was developed as a collective education project involving more than 500 people, including teachers, school administrators, consultants, and other professionals working in education and in universities. TIMSS provides an external measure of student achievement that is part of the province's assessment effort to improve the education system's support of student learning.

Québec has been participating in TIMSS since the first administration in 1995. TIMSS results are used to establish program orientations to better prepare young people for the 21st century and to help them remain competitive on the world stage. In 2023, Québec participated only in TIMSS Grade 4, unlike in previous years, when the province also participated in Grade 8.

b See https://www.legisquebec.gouv.qc.ca/fr/pdf/rc/I-13.3,%20R.%208.pdf for more information.

The Mathematics Curriculum in Primary and Lower Secondary Grades[c]

Mathematics is a compulsory subject in Québec throughout elementary and secondary school.[2,3,4,5] The mathematics programs employ prescribed concepts and processes in a problem-solving approach. The concepts are grouped by cycle in the three cycles of elementary school and in Secondary Cycle One, and by year for each of the 3 years of Secondary Cycle Two. Three learning profiles, or "options," are available to students in Secondary IV and V: the Cultural, Social, and Technical option; the Technical and Scientific option; and the Science option. Students who wish to pursue studies in science or certain technical training programs in college (i.e., the 12th and 13th years of study) must complete the appropriate option.

Learning mathematics enables students to do the following:

- use mathematical reasoning to make conjectures and to criticize, justify, or refute a proposition by drawing on an organized body of mathematical knowledge
- communicate (i.e., interpret, produce, and convey) messages in contexts in which the subject and purpose of the message, as well as the target audience, play a significant role
- solve situational problems by using various strategies for understanding, organizing, solving, validating, and communicating

Thus, students develop their ability to interpret reality, anticipate, generalize, and make decisions in a changing world.

Exhibits 1 and 2 present the mathematics content objectives for Elementary Cycle Two (Grade 4) and Secondary Cycle One (Grade 8) in Québec.

c It should be noted that aboriginal school organizations arising from conventions may develop specific educational programs that are suitable for the populations they serve.

Exhibit 1: Mathematics Content Objectives for Elementary Cycle Two (Grade 4) in Québec

Content Area	Main Topics	Content Objectives
Arithmetic	understanding and writing numbers	• natural numbers less than 100,000—reading, writing, counting, representing, comparing, classifying, ordering, writing equivalent expressions, writing numbers in expanded form, writing patterns, understanding properties (e.g., even and odd numbers, squares, prime numbers, and compound numbers), and estimating values • fractions based on a whole or a collection of objects—reading, writing, and understanding numerator, denominator, various representations (using objects or pictures), equivalent parts, isometric parts, and comparison with 0, ½, and 1 • decimals up to two decimal places—reading, writing, understanding various representations, ordering, writing equivalent expressions, writing numbers in expanded form, comparing, and estimating
	meaning of operations involving numbers	• natural numbers and decimals—choice of operation and operation sense (addition, subtraction, multiplication, division), meaning of an equality relation, meaning of an equivalence relation, relationships between the operations (addition, subtraction), and properties of operations (commutative law, associative law)
	operations involving numbers	• natural numbers—approximating operation results, acquiring processes for mental computation, and memorizing operations (addition, subtraction); acquiring conventional processes for written computation (i.e., adding 2 four-digit numbers and subtracting a four-digit number from a four-digit number such that the difference is greater than 0); acquiring processes for written computation (i.e., multiplying a three-digit number by a one-digit number and dividing a three-digit number by a one-digit number); and working with patterns • decimals—written computation (i.e., addition and subtraction where the result does not go beyond the second decimal place)
Geometry	space	• locating objects on an axis • locating objects in a plane • locating objects in a Cartesian plane

Exhibit 1: Mathematics Content Objectives for Elementary Cycle Two (Grade 4) in Québec (Continued)

Content Area	Main Topics	Content Objectives
Geometry	solids	• comparing, constructing, and identifying spheres, cones, cubes, cylinders, prisms, and pyramids • describing prisms and pyramids in terms of faces, vertices, and edges • classifying prisms and pyramids and using nets for prisms and pyramids
	plane figures	• comparing, identifying, and describing squares, rectangles, triangles, rhombuses, trapezoids, parallelograms, and circles • describing convex and nonconvex polygons • describing and classifying quadrilaterals (e.g., parallel segments, perpendicular segments, right angles, acute angles, obtuse angles, and congruent sides) • identifying and constructing parallel lines and perpendicular lines
	frieze patterns and tessellations	• identifying congruent figures • observing and producing patterns using geometric figures • observing and producing frieze patterns and tessellations by means of reflections
Measurement	length	• estimating and measuring with conventional units (e.g., m, dm, cm, mm) • understanding relationships among units of measurement (e.g., m, dm, cm, mm) • calculating perimeter
	surface area	• estimating and measuring with unconventional units
	volume	• estimating and measuring with unconventional units
	angles	• comparing angles (e.g., right, acute, and obtuse)
	time	• estimating and measuring time and duration with conventional units (e.g., day, hour, minute, second, daily cycle, weekly cycle, and yearly cycle)
Probability and statistics		• enumerating the possible outcomes of simple random experiments • interpreting and displaying data using data tables, bar graphs, pictographs, and broken-line graphs

Exhibit 2: Mathematics Content Objectives for Secondary Cycle One (Grade 8) in Québec

Content Area	Main Topics	Content Objectives
Arithmetic	number sense with regard to decimal and fractional notation and operation sense	• reading, writing, various representations, patterns, and properties of numbers—order of magnitude, comparison of numbers, and decomposition of numbers (e.g., additive and multiplicative) • fractional, decimal, and exponential (integral exponent) notation, percentage, and square root—recognizing the different meanings of fractions (e.g., part of a whole, division, ratio, operator, and measurement), switching from one way of writing numbers to another, and simplifying and reducing fractions • approximation (i.e., estimating, rounding off, and truncating) • properties of divisibility—determining the divisibility of a number (by 2, 3, 4, 5, 6, 8, 9, and 10) and using properties of divisibility (by 2, 3, 4, 5, and 10) in different situations • rules of signs for numbers written in decimal notation • equality relations: meaning, properties, and rules for transforming numerical equalities (balancing equalities) • transforming arithmetic equalities • inverse operations: addition, subtraction, multiplication, and division, and square and square root—expressing situations using operations; mental computation with numbers written in decimal notation; and written computation with numbers written in decimal notation or with positive numbers written in fractional notation • properties of operations—commutative and associative properties, distributive property of multiplication over addition or subtraction, and factoring out the common factor; and simplifying the terms of an operation • order of operations and the use of no more than two levels of parentheses in different contexts • locating numbers on a number line or in a Cartesian plane
	understanding proportionality	• ratio and rate—ratios and equivalent rates, unit rate, comparison of ratios and rates, and expressing situations using ratio or rate • proportion—equality of ratios and rates; ratios and coefficients of proportionality; and recognizing and solving proportional situations by referring to their context, tables of values, or graphs • percentage—finding a specified percentage of a number and values corresponding to 100% • variation—direct and inverse

Exhibit 2: Mathematics Content Objectives for Secondary Cycle One (Grade 8) in Québec (Continued)

Content Area	Main Topics	Content Objectives

Geometry	geometric figures and spatial sense[d]	• plane figures
		  ○ triangles, quadrilaterals, and regular convex polygons—segments and lines (e.g., bisector, perpendicular bisector, median, altitude, base, and height)
		  ○ circles and sectors—radius, diameter, chord, arc, and central angle
		  ○ measurement—degree (angle and arc), length, perimeter, circumference, area, lateral area, total area, choice of unit of measurement for length and area, and relationship between SI units of length and SI units of area
		• angles—complementary and supplementary; angles formed by two intersecting lines (e.g., vertically opposite and adjacent); and angles formed by a transversal intersecting two other lines (e.g., alternate interior, alternate exterior, and corresponding)
		• solids—right prisms, right pyramids, and right cylinders; using possible nets of solids to calculate surface area; and decomposable solids
		• congruent and similar figures—translation, rotation, reflection, and dilatation

Algebra	understanding algebraic expressions	• algebraic expressions—understanding variables, coefficients, degrees, terms, and like terms; constructing and interpreting algebraic expressions; finding equivalent algebraic expressions; and performing numerical evaluation of algebraic expressions • operations on algebraic expressions—addition, subtraction, multiplication of first-degree monomials, and division by a constant • equality, equations, and unknowns • first-degree equations with one unknown expressed in the form $ax + b = cx + d$
	dependence between variables	• analyzing situations using different types of representation (e.g., graphs, tables of values, words); and representing situations using graphs

d In a geometric space of a given dimension (0, 1, 2, or 3), a geometric figure is a set of points representing a geometric object such as a point, line, curve, polygon, or polyhedron.

Exhibit 2: Mathematics Content Objectives for Secondary Cycle One (Grade 8) in Québec (Continued)

Content Area	Main Topics	Content Objectives
Probability	random experiments	• random experiments involving one or more steps (with or without replacement and with or without order); enumerating possible outcomes of random experiments using different types of representations (e.g., tree diagrams, networks, tables, and Venn diagrams); and sample spaces
	events	• certain, probable, and impossible events; simple, complementary, compatible, incompatible, dependent, and independent events; calculating the probability of an event; and interpreting probabilities
	types of probability	• theoretical probability and experimental probability
	interpretation	• interpreting the resulting probabilities
Statistics	statistical reports	• population and sample—sample surveys, polls, and censuses; representative samples; sampling methods (e.g., simple random and systematic); and sources of bias • data—gathering data, qualitative variables, discrete or continuous quantitative variables, comparing distributions, minimum and maximum, arithmetic mean, and range • tables—characteristics, population, and frequencies • reading and drawing graphs—bar graphs, broken-line graphs, and circle graphs

The Science Curriculum in Primary and Lower Secondary Grades

In Québec, the science and technology subject begins in Elementary Cycle One and is compulsory from Elementary Cycle Three to Secondary IV.[6,7] In Elementary Cycle One, the competence and knowledge related to this subject develop through other disciplinary programs and through general areas of training. In Elementary Cycles Two and Three, the Basic School Regulation indicates that science and technology is compulsory, but the time allocated for instruction is not prescribed. In Secondary Cycle One, the instruction time guideline is 100 hours per year. In the first and second year of Secondary Cycle Two, the instruction time guideline is 100 hours (Secondary III) and 100 (Science and Technology) or 150 hours (Applied Science and Technology) per year (Secondary IV).[e] In the third and final year of Secondary Cycle Two (Secondary V), science and technology programs are optional. Students who wish

e The Science and Technology (ST) and Applied Science and Technology (AST) courses are compulsory science courses in Secondary III and IV. Students who have a strong interest in science can, in Secondary IV, choose to add the Science and the Environment (SE) or Environmental Science and Technology (EST) option to their basic curriculum (see https://www.legisquebec.gouv.qc.ca/fr/pdf/cr/I-13.3,%20R.%208.pdf for more information).

to pursue studies in science or in certain technical training programs in college (i.e., the 12th and 13th years of study) must complete Secondary V physics and/or chemistry.[f]

Learning science and technology in elementary school enables students to do the following:

- propose explanations for or solutions to scientific or technological problems
- make the most of their scientific and technological knowledge
- communicate in the languages used in science and technology

Given the wide range of knowledge covered in the elementary school program, and the fact that teachers are free to choose the themes they will address, complementary documents[8,9] provide additional information on the areas that should be emphasized. Exhibit 3 presents the science content objectives for Elementary Cycle Two (Grade 4) in Québec, and Exhibit 4 presents the science and technology content objectives for Secondary Cycle One (Grade 8) in Québec.

Exhibit 3: Science Content Objectives for Elementary Cycle Two (Grade 4) in Québec

Content Area	Content Objectives
The material world	properties and characteristics of matter, physical changes, forms and sources of energy, transmission and transformation of energy, motion, effects of forces, and simple machines and mechanisms
Earth and space	properties and characteristics of soil; the water cycle and precipitation; forms and sources of energy; and systems involving the Sun, Earth, and the Moon (e.g., rotation, revolution, lunar cycle, and eclipses)
Living things	characteristics, needs, organization, and transformations of living things; sources of energy for living things; how animals move; and the environment (i.e., habitats, populations, relationships between living things, and adaptations)
Techniques	the use of simple measuring and observation instruments (appropriately use simple measuring instruments [e.g., ruler, dropper, graduated cylinder, balance, thermometer, chronometer], appropriately use simple machines [e.g., lever, inclined plane, screw, pulley, winch, wheel], and appropriately and safely use tools [e.g., pliers, screwdriver, hammer, wrench, simple template]); and the design and manufacture of instruments, tools, machines, structures (e.g., bridges, towers), devices (e.g., water filtration device), models (e.g., glider), and simple circuits (know the symbols associated with types of motion, electrical components, and mechanical parts;

f Students who wish to pursue studies in science or in certain technical training programs in college (i.e., the 12th and 13th years of study) must either complete the Secondary IV enriched science course (SE or EST profile) or complete Secondary V physics and/or chemistry.

Exhibit 3: Science Content Objectives for Elementary Cycle Two (Grade 4) in Québec (Continued)

Content Area	Content Objectives
Techniques	interpret a diagram or a plan containing symbols; use symbols associated with mechanical parts and electrical components in a diagram or drawing; draw and cut parts out of various materials using appropriate tools; use appropriate assembling methods [e.g., screws, glue, nails, tacks, nuts]; use appropriate tools for proper finishing work)
Appropriate language	the use of terminology associated with science and technology, and types of representation specific to science and technology

Exhibit 4: Science and Technology Content Objectives for Secondary Cycle One (Grade 8) in Québec

Content Area	Main Topics	Content Objectives
The living world	diversity of life forms	habitat, ecological niche, species, population, physical and behavioral adaptations, differences and similarities between different species, taxonomy, transmission of hereditary characteristics to future generations through genes and chromosomes, and use of environmental design and construction techniques that respect the characteristics of a habitat (e.g., terrarium, aquarium, composting medium)
	survival of species	asexual and sexual reproduction, reproductive mechanisms in plants and animals, birth control, contraception, methods of preventing the implantation of the zygote in the uterus, and sexually transmitted diseases and blood-borne diseases
	life-sustaining processes	characteristics of living things, plant and animal cells, photosynthesis and respiration, cellular components visible under a microscope, inputs and outputs (i.e., energy, nutrients, and waste), and osmosis and diffusion
The material world	properties	characteristic properties of matter; mass, volume, and temperature; changes in the states of matter (i.e., solid, liquid, gaseous); and acidity/alkalinity
	changes	physical and chemical changes, conservation of matter (i.e., conservation of the number of atoms), mixtures, solutions, and separation of mixtures
	organization	the difference between atoms and molecules, elements, and the periodic table

Exhibit 4: Science and Technology Content Objectives for Secondary Cycle One (Grade 8) in Québec (Continued)

Content Area	Main Topics	Content Objectives
Earth and space	general characteristics of Earth	the internal structure of Earth; the lithosphere, hydrosphere, and atmosphere; types of rock (basic minerals); types of soil; relief; atmospheric layers; water (distribution); and air (composition)
	geological and geophysical phenomena	tectonic plates, volcanos, earthquakes, orogenesis, erosion, natural energy sources, winds, the water cycle, and renewable and nonrenewable energy resources
	astronomical phenomena	universal gravitation (qualitative study), the solar system, light (properties), cycles of day and night, phases of the Moon, eclipses, seasons, comets, aurora borealis (northern lights), and meteoroid impacts
The technological world	engineering	specifications, design plan and technical drawing, manufacturing process sheets, raw materials, materials, equipment, drawing techniques, using scales, and manufacturing techniques
	technological systems	systems (overall function, inputs, processes, outputs, and control), components of a system, basic mechanical functions (links, guiding controls), and energy transformations
	forces and motion based on the analysis of technical objects	types of motion, effects of forces, simple machines, mechanisms that transmit motion, and mechanisms that bring about changes in motion

Teacher Professional Development Requirements and Programs

The most common forms of professional development for teachers are university studies, training provided by the MEQ or school boards, and conferences. Peer-led continuing education, self-training on various digital platforms, and collaboration in action-research projects are also offered to the community and are increasingly appreciated by teachers. Additionally, the English school board system has developed centers that offer training and support to teachers of students with language difficulties.

Monitoring Student Progress in Mathematics and Science

At the end of Elementary Cycle Three, the MEQ administers a compulsory examination in mathematics (counts for 20% of the student's final result in this discipline). Teachers score the examination using a scoring guide. The MEQ sometimes collects samples of student work in order to draw up a profile of student learning in mathematics.

To earn a diploma, students must have obtained 54 Secondary IV and V credits, including Secondary IV mathematics and science credits, and must pass uniform (i.e., standard)

examinations in mathematics and science and technology at the end of Secondary IV (counts for 50% of the competence targeted by the uniform examinations in the student's final result in each discipline). The final mark for each subject is determined based on the weighting assigned to each competency in the framework for the evaluation of learning.[10,11] The MEQ scores the multiple-choice section of these examinations, while schools score the short-answer and constructed-response items using scoring guides provided by the MEQ. Schools are responsible for student evaluation and accordingly must adopt a local evaluation policy compliant with current ministerial frameworks.

Special Initiatives in Mathematics and Science Education[g]

Since 2013, a group of education consultants from various regions of Québec have formed a community of practice to discuss mathematics instruction in disadvantaged areas, among other things. They share their experiences and discuss various concerns related to their work with students with special needs. The science curriculum offered in elementary and secondary schools will undergo a makeover in 2026. It will be updated to "make students more aware of current issues," such as climate change.[h] The elementary curriculum will be updated before the secondary one.

Suggested Reading

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g See https://www.education.gouv.qc.ca/fileadmin/site_web/documents/dpse/adaptation_serv_compl/Referentiel-mathematique.PDF, https://www.ctreq.qc.ca/wp-content/uploads/2022/12/CTREQ-Napperon-Se-mobiliser-pour-reussite-math-11x17-419VF.pdf, and https://cdn-contenu.quebec.ca/cdn-contenu/education/pfeq/formations/Presentation-pistes-action-mise-en-oeuvre-realiste-harmonisee-programmes-math-primaire-AN.pdf for more information about special intiatives related to mathematics. See https://technoscience-rm.ca/en/evenements-competitions-scientifiques/ for more information about events and competitions related to science. See https://technoscience-rm.ca/en/animations-scientifiques/en-classe/ for more information about scientific activities that can be done in preschool, elementary, and secondary classes.

h See https://recit.qc.ca/ for more information.

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