

Islamic Republic of Iran

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Introduction

Overview of the Education System

The education system in Iran is a social and cultural institution that serves for the edification, dissemination, and transfer of culture in Iranian society, helping students to lay appropriate foundations and develop appropriate values.¹ Education in Iran from kindergarten through Grade 12 is highly centralized and supervised by the Ministry of Education. The ultimate goals of education in Iran are grouped into cultural and ethical goals; scientific and instructional goals; social, environmental, and life goals; and economic goals.

Iran's Ministry of Education comprises several deputy ministries, organizations, and centers with specific administrative responsibilities, including developing goals and strategies, conducting and supervising education activities, developing curricula and textbooks, publishing and distributing education materials, planning and conducting professional development and education for teachers, carrying out student assessments and examinations, and defining human resources policies within the Ministry (see Exhibit 1).²

Exhibit 1: Divisions in the Ministry of Education

Deputy Ministries	Organizations	Centers	Offices
Primary Education	Educational Research and Planning	Human Resources and Information Technology Planning	Secretariat of the Central Recruitment Committee
Secondary Education	Renovating and Equipping Schools	Talented and Gifted Students and Young Researchers	Performance Evaluation and Responding to Complaints
Educational and Cultural Affairs	Private Schools and Public Participation	Department of International Affairs and Schools Abroad	Veterans Affairs
Health and Physical Education	Students with Special Needs	Assessment and Evaluation	
Legal Affairs and Parliament	Literacy Movement		
Development and Management Support	Institute for the Intellectual Development of Children and Young Adults		

The Supreme Educational Council, an autonomous legislative body, is responsible for adopting and communicating executive policies; designing mechanisms for achieving policy objectives; improving education structures and processes; updating, amending, and coordinating policies; and monitoring the implementation of programs pertaining to the strategic reform of education. The council is required to provide the Supreme Council of the Cultural Revolution with an annual progress report on the implementation of the fundamental reform plan and the performance of the Ministry of Education.

At the tertiary level, the Ministry of Science, Research, and Technology oversees universities offering nonmedical degrees; the Ministry of Health and Medical Education oversees medical schools and paramedical degrees; and the Ministry of Labor and Social Affairs oversees informal vocational education.

The formal education system in Iran includes six years of primary education and six years of secondary education (see Exhibit 2). Each school year begins on September 21 and ends on June 21 of the following year. A high school diploma is required to enter university.

Exhibit 2: Overview of the Education System in Iran

Level of Schooling	Ages	Grades	Number of Years	Sessions per Week
Preprimary	4–5		2	Varies by institute
Primary (two three-year periods)	6–8	1–3	6	25 (45 minutes each)
	9–11	4–6		
Lower Secondary	12–14	7–9	3	30 (50 minutes each)
Upper Secondary	15–17	10–12	3	35 (50 minutes each)
Vocational	15–17	10–12	3	40 (50 minutes each)

The optional level of preprimary education prepares children for the mandatory stage of primary education. The Organization for Educational Research and Planning and the Welfare Organization are responsible for the supervision and education preparation of preschool centers. Preschools may be public or private and may cater to only boys or girls, although many admit both. The main objectives of preprimary education are to:

- Contribute to the physical, mental, emotional, and social growth of children
- Promote children’s socioemotional development, self-confidence, sense of environmental conditions, and sense of aesthetics
- Provide children with opportunities to enjoy and be interested in group activities
- Strengthen religious and ethical values and national identity
- Promote desired social and individual behavior in children
- Promote oral language development and communication skills

Primary education, the first stage of formal education, comprises two three-year periods from Grades 1 to 6 for students ages 6 to 11. The main objectives of primary education are to:

- Create an atmosphere for moral development
- Develop literacy and numeracy skills
- Develop social skills
- Teach students about personal hygiene
- Develop students' talents, abilities, and physical strength

The subjects taught in primary school include the Holy Quran, Farsi (reading, writing, and dictation), mathematics, science, religious education, social studies (social studies, history, and geography), art, and physical education. In addition to these subjects, Thinking and Inquiry, Technology, and Occupations also are taught in sixth grade. Typically, one teacher is responsible for teaching all subjects in Grades 1 to 3, except religion, art, and physical education. In Grades 4 to 6, specialist teachers in some schools teach mathematics and science.

The lower secondary stage of education lasts three years (Grades 7 to 9) for students ages 12 to 14. The main objectives of lower secondary education are to:

- Develop moral and intellectual abilities
- Increase general knowledge
- Strengthen academic discipline and scientific imagination
- Identify individual preferences and talents to direct students toward suitable programs of study

At this stage, students become familiar with various subjects in the physical and social sciences and in the humanities and art. In addition to the subjects taught at the primary level, students in lower secondary school receive second language instruction in a language of their choice (English, French, or German), vocational education, and defense education (boys only).

Upper secondary education lasts three years (Grades 10 to 12) for students ages 15 to 17. At this stage, students choose among three tracks of study: academic, technical and vocational, and *Kar-Danesh* (or knowledge skill, a flexible vocational branch). These programs have different objectives and are intended for students with different abilities and interests. Academic programs (or academic tracks) prepare students to enter university. Students select the tracks focusing on mathematics; physics and chemistry (for engineering and science degrees); natural science with a focus on biology, geology and chemistry (for medical sciences and science degrees); or social science, which focuses on literature and social sciences and prepares students for further study in humanities. Students make their selection based on their education backgrounds and career interests. Technical, vocational, and *Kar-Danesh* programs prepare students for participation in the labor market after finishing high school, leading to a post-diploma (associate's diploma) degree or a skill certificate diploma, respectively. Students who complete these programs have the opportunity to continue their education at a vocational college, where they may choose a program

based on their capabilities and interests, or they may take a university entrance examination after completing vocational college.

Schools in Iran may be public or private at all levels, from elementary school through university. Approximately 11.5 percent of students attend private schools, and about 35 percent of students attend vocational schools.³ These schools must conform to the regulations of the Ministry of Education, though they are financed primarily through students' tuition. Public schools in Iran are free for all citizens.⁴

Iran is a diverse country with a population comprising many ethnic and linguistic groups, including Persians (61 percent), Azerbaijanis (16 percent), Kurds (10 percent), Lurs (6 percent), Arabs (2 percent), Baluchis (2 percent), Turkmen (2 percent), and Turkic tribal groups, such as the Mazandarani and Gilaki (7 percent).⁵

The population of Iran is approximately 83.6 million with a literacy rate of 86 percent among those age 15 and older.⁶ Article 15 of the Iranian Constitution states that the official language of Iran is Persian (Farsi) and that “the use of regional and tribal languages in the press and mass media, as well as for teaching of their literature in schools, is allowed in addition to Persian.”⁷

To prepare students entering first grade who do not speak Farsi at home, a one month program is offered to them prior to starting the school year. According to Article 3 of the Constitution, the government is responsible for providing free education and strengthening the spirit of inquiry and investigation in science, technology, culture, and Islamic studies through secondary school. Religious minority groups including Christians, Jews, and Zoroastrians are free to teach and practice their own religion.

Use and Impact of TIMSS

The Islamic Republic of Iran began formally participating in IEA assessments in 1991 to evaluate and improve its education system. Since then, Iran has participated in TIMSS seven times, TIMSS Advanced 2008, and the Progress in International Reading Literacy Study (PIRLS) four times. Iran is currently participating in PIRLS 2021.

TIMSS results have informed modifications to the Iranian education system. Objectives for mathematics and science education were evaluated following the publication of both the TIMSS outcomes and the TIMSS analysis of factors contributing to Iranian achievement results. Based on updated objectives, revisions to specific curriculum components have been considered. For example, the eighth grade science framework also was reviewed following TIMSS 1999. The Earth science curriculum was updated in line with the TIMSS framework, leading to better performance in that content area in later assessments.

At the school level, TIMSS released items for Grades 4, 8, and 12 have been disseminated for teacher use. The cognitive classifications used in the TIMSS assessment were introduced to teachers in teacher editions of textbooks. Professional development sessions have been conducted to introduce the TIMSS frameworks and their goals and objectives to teachers.

A secondary analysis of TIMSS data (2003–2011) revealed mathematical misconceptions among fourth grade Iranian students. These results were used in compiling new primary school textbooks and also are approved for use in teacher education programs and professional development courses to familiarize teachers with student shortcomings.

A longitudinal study (trend comparison) has been conducted which compares the misconceptions of fourth grade mathematics students' participating in TIMSS 2015 with those of fourth grade students participating in TIMSS 2011 and matching the results with changes to mathematics textbooks after changes to the education system. This information was communicated to curriculum planners and textbook editors to inform them of the effect of the change on students' learning.

Results of TIMSS 2015 revealed that Iranian fourth graders had weaker performance in science compared with performance in TIMSS 2011. Identifying 10 competencies in science in primary school, using the Cognitive Diagnostic Assessment method, and comparing TIMSS 2011 and TIMSS 2015 results in science showed that mastery of four of the science competencies decreased among Iranian fourth graders; the remaining competencies showed no difference. This change was compared against the changes made to science textbooks, indicating a correlation. Again, this information was communicated to curriculum planners and textbook editors to inform them of the effect of the change on students' learning.

Research opportunities and potential research topics using TIMSS results have been introduced to master's degree and doctoral students majoring in mathematics education and curriculum planning.

The Mathematics Curriculum in Primary and Lower Secondary Grades

Mathematics and science are taught separately, beginning in first grade. The Higher Council of Education allocates five periods of 40 minutes each for Grades 1 and 2 and four periods of 45 minutes each for Grades 3 to 6. At the lower secondary level, four sessions of 40 minutes each per week are devoted to mathematics instruction.

The approach to mathematics instruction is based on a constructivist view through problem solving that encourages the active participation of students in educational activities. Teachers are expected to move from lecturing to acting more as facilitators. Students use calculators, abacuses and counters, and drawing and construction tools in mathematics. New mathematics textbooks include instructions on the use of calculators, as students are encouraged to use calculators to check the accuracy of their operations.

The Organization for Educational Research and Planning developed the national curriculum with the cooperation of school districts and teachers. In 2012, this curriculum was approved by the Organization's mathematics department. The curriculum prescribes goals and objectives, instructional processes or methods, materials (textbooks and other instructional materials), assessment methods and activities, mathematics teacher competencies, characteristics of educational kits, and the process of curriculum implementation. The main feature of the new

curriculum is its approach to teaching. Prior to this curriculum, problem solving was considered an outcome of learning, but the recommended approach to teaching and learning in the new curriculum encourages teachers to engage students in problem solving and in class or group activities, as well as consider different learning styles when presenting a topic. Visiting inspectors, research programs, and national and regional assessments evaluate curriculum implementation. The ministry's guidelines for mathematics emphasize the following areas: mathematics content (basic and essential facts and concepts), mathematical processes (problem solving, modeling simple real life situations, making and evaluating hypotheses, estimating, and reasoning), and general skills (critical and creative thinking, observation, abstraction and generalization, comparing and ordering, and classifying and sorting).

The following mathematics topics are covered in the fourth grade:

- Number and operations—Whole numbers and their representations; estimation and computation with whole numbers; place value; multiples and factors in terms of divisibility; fractions as part of a collection and their location on the number line; equivalent fractions; comparing and ordering fractions; operations with fractions, such as adding and subtracting; multiplying fractions by whole numbers; number sentences, number patterns, and the extension of patterns; modeling simple situations; and comparing, adding, and subtracting decimals with at most one decimal digit^a
- Geometry and measurement—Metric units; measuring, estimating, and drawing angles; length; areas of common two-dimensional shapes; parallel and perpendicular lines; comparing angles; properties of common geometric shapes; calculating the perimeter and area of parallelograms, rectangles, triangles, and squares; and figures with lines of symmetry
- Data handling—Reading and constructing pictographs, simple block diagrams, bar graphs, and line graphs for a given table of data; reading but not constructing pie charts; and empirical probability^b

The following mathematics topics are covered in the eighth grade:

- Number and operations—Multiplication and division of fractions and decimals and operations on them; conversion of fractions to decimals and vice versa; integers and computation with integers; ratio, proportion, and percentage; mixed numbers, addition and subtraction of mixed numbers, and multiplication of mixed numbers by a whole number; exponents and square roots
- Geometry and measurement—Types of and relationships between angles; angles formed by a transversal that intersects parallel lines; perpendicular lines; congruent triangles and

^a The new program of study focuses on number patterns and sequences much more than the old program, and students are expected to find the relationship between terms of a sequence to extend and continue the sequence.

^b In the previous curriculum, the concepts of chance and probability were not introduced at the primary level, but in the new curriculum, students start working with probability at the primary level and are expected to be able to find and talk about outcomes of an event.

conditions for congruency; the Pythagorean theorem; three-dimensional objects and their relationships to two-dimensional shapes and drawing nets of three-dimensional shapes; the surface area and volume of a cylinder; rectangular prisms; cubes; circles, tangents, and angles; the circumference and area of a circle; irregular compound areas; Cartesian planes and intersections; reflection and rotational symmetry; and translations

- Algebra—Expressions; sums, products, and powers of algebraic expressions; simplifying algebraic expressions and evaluating algebraic expressions for given values; linear equations; and ordered pairs and coordinate systems
- Probability and statistics—Chance; same likelihood; simple empirical and theoretical probability; histograms; and reading and constructing proper graphs and calculating the mean for a given set of data

The emphasis of the eighth grade curriculum has shifted from logical and deductive reasoning in the previous curriculum to intuitive reasoning in the new curriculum. As such, students learn to present certain geometrical proofs in the ninth grade rather than the eighth grade.

The Science Curriculum in Primary and Lower Secondary Grades

The Higher Council of Education allocates three periods of 40 minutes for Grades 1 and 2, three periods of 45 minutes for Grades 3 to 5, two periods of 45 minutes per week for Grade 6, and three periods of 50 minutes each at the lower secondary level for science education. The approach to science instruction supports learning based on process, context, and inquiry, and students are expected to learn by working with data. In science, the program of study includes the use of laboratories, which also may be used for extracurricular activities. Equipment for laboratories is funded by the Ministry of Education and individual schools. The new National Science Curriculum was revised and introduced in 2012 at the primary level and in 2013 at the lower secondary level.^{8,9} It reflects a thematic and outcome and competency-based approach to science education. Science education in Iran focuses on fostering logical thinking skills and preparing students for lifelong learning. The national curriculum is designed to help students learn basic science facts; observe and acquire skills; develop a positive attitude toward physical science, life science, health, and Earth science; and understand important applications of science in real life. The curriculum aims to integrate Science, Technology, Society, and the Environment (STSE). The three main goals of science education for students in Iran are as follows:

- Acquiring basic facts and ideas in three stages
 - Understanding basic information
 - Understanding complex information
 - Utilizing information to build theories, and to analyze and solve problems
- Acquiring learning skills
 - Collecting basic information
 - Conceptualizing

- Conducting and reviewing research
- Problem solving
- Communicating, presenting, and reporting
- Developing a healthy attitude toward and respect for:
 - Oneself
 - Science and knowledge
 - The environment, including other people, other living things, and one’s physical and material surroundings

The science curriculum teaches students to make observations and take measurements, collect data, analyze results, make hypotheses, communicate, predict, use instruments, and plan and conduct investigations. Students learn to think about and search for the causes of phenomena and develop a sense of curiosity about natural phenomena in their environment. They learn to use their skills to investigate answers to their questions about science, to save energy and time, to observe personal and public hygiene practices, and to take interest in environmental issues. The recommended approach to teaching and learning involves engaging students in problem solving, in actively participating in practical activities, and in conducting experiments.

By the end of the fourth grade, students have learned the following biology content:

- Human health: maintaining health and safety
 - Needs for children’s growth—Exercise, nutrition (useful, varied, and sufficient), sleep, individual health and disease prevention (e.g., hand washing, dental care, tooth brushing); activities to maintain the health of different parts of the body, such as eyes, ears, skin, and muscles
 - Social health—Helping to keep school clean; safety at school and in society, such as when using a crosswalk and not running in the school corridors; identifying symbols of safety agencies, such as Red Crescent and the fire department
- Major body structures and their functions in humans, animals, and plants
 - Animals (shape, size, movement, food, egg laying); making nests, caring for offspring
 - Main parts of a plant (root, stem, flower, seeds and fruits)
 - Seed components, seeds and fruit, methods of dispersal (wind, human, and animal), planting (by seed and propagation),
 - Main parts of digestive, respiratory, circulation, excretion systems in human body and their functions
 - Main parts of some cells
 - Pollination with insects
 - Characteristics of living organisms and their basic needs
- Relationships in ecosystems
 - Roles of plants and animals in human life, simple food chains and food networks, animal habitats, relationship between predator and prey

- Human role in environmental protection
 - River and air contamination by humans
 - Providing drinking water, conserving water, sorting waste, recycling plant products (paper), maintaining habitats
- Life cycles of common plants and animals
 - Flowering plants, such as tomatoes and beans; butterflies; frogs; sea turtles
- Classification of living things and some of their important characteristics
 - Important characteristics of five vertebrate groups, some invertebrate groups, and the main groups of plants (flowers and conifers, monocotyledons and dicotyledonous, seedless plants)

By the end of the fourth grade, students have learned the following physical science content:

- Energy sources and effects
 - Identify sources of energy (e.g., the Sun, electricity, water, wind, fossil fuels); describe practical uses of this energy
 - Recognize that hot objects can heat cold objects; explain that heating means increasing temperature; identify examples of common materials that easily conduct heat
 - Identify common light sources (e.g. light bulb, flame, the Sun); relate familiar physical phenomena to the behavior of light (e.g., reflections, rainbows, shadows)
 - Explain the need for a complete (unbroken) electrical pathway to power a simple electrical system (e.g., a battery in an appliance); recognize objects and materials that conduct electricity
 - Recognize that magnets have north and south poles, that like poles repel and opposite poles attract, and that magnets attract some other materials or objects; construct an electromagnet and compass
- Forces and motion
 - Identify familiar forces that cause objects to move (e.g., gravity, push/pull forces); compare effects of greater or lesser forces on an object; describe how to determine the relative weight of objects using a balance; describe how levers affect balance
- Matter
 - States of matter; volume, mass, and density; structure of matter; and types of mixture, solutions, and solvents
- Heat
 - Temperature changes; the effect of color on absorbing sunlight; applications of heat and heating appliances; sources of heat; materials to wear in cold and warm environments; state changes and the effect of heat on states of matter; and how to construct and use a thermometer

- Motion
 - Moving and stationary objects; wheels and their applications; how motion is affected by surface type and weight of an object
- Force
 - Force and the effect of force on the movement of objects, and Earth's gravity
- Energy
 - Types of energy, uses and the conversion of energy, and sources of energy
- Light and reflection
 - The role of light in vision, sources and applications of light, refraction, shadows, types of mirrors, and images formed by mirrors and their applications
- Electricity
 - Electric currents, series and parallel circuits, and insulators and conductors
- Magnets
 - Shapes, interactions, and applications of magnets; electromagnets; magnetic poles; and navigation using a compass

By the end of the fourth grade, students have learned the following Earth science content:

- Earth's structure, physical characteristics, and resources
 - Identify substances that make up Earth's surface; recognize that most of Earth's surface is covered with water; describe where fresh or salt water are found; provide evidence for the existence of air; recognize common events such as cloud formation, dewdrops, evaporation of puddles, and drying of wet clothes, as evidence that air contains water
 - Describe features of Earth's landscape (e.g., mountains, plains, deserts, rivers, lakes, seas) and relate them to human use (e.g., farming, irrigation, land development); identify some of Earth's resources that are used in everyday life (e.g., water, soil, wood, minerals, air); explain the importance of using these resources responsibly
- Earth's processes and cycles
 - Describe the movement of water on Earth's surface (e.g., flowing in rivers or streams from mountains to oceans or lakes); relate the formation of clouds and rain or snow to a change of state of water; describe changes in weather conditions from day to day or over the seasons in terms of temperature, precipitation (rain or snow), clouds, wind, and the rock cycle
- Earth in the Solar System
 - Describe the solar system as a group of planets (including Earth), each revolving around the Sun; recognize that the Moon revolves around Earth and looks different at different times of the month; identify the Sun as the source of heat and light for the solar system

- Relate daily patterns observed on Earth to Earth’s rotation on its axis and its relationship to the Sun (e.g., day and night, appearance of shadows)

By the end of Grade 8, students have learned the following biology content:¹⁰

- Characteristics, classification, and life processes of organisms
 - Locate major organs in the human body; identify the components of organ systems in human body; explain the role of organs and organ systems in sustaining life in human (e.g., circulatory, respiratory); compare and contrast organs and organ systems in humans
 - Explain how biological actions in response to external and internal changes work to maintain stable bodily conditions (e.g., increasing blood pressure in some situations, increased heart rate during exercise)
- Cells and their functions
 - Explain that living things are made of cells that carry out life functions and undergo cell division, and that tissues, organs, and organ systems are formed from groups of cells with specialized structures and functions; identify cell structures and some functions of cell organelles (e.g., cell wall, cell membrane, nucleus, chloroplast, vacuole); compare plant and animal cells
 - Describe the processes of photosynthesis (the need for light, carbon dioxide, water, and chlorophyll; production of food; and release of oxygen) and cellular respiration (the need for oxygen, breaking down of food to produce energy, and release of carbon dioxide)
- Life cycles, reproduction, and heredity
 - How humans and plants grow and develop
 - Compare and contrast asexual and sexual reproduction in general terms (e.g., asexual reproduction producing identical offspring versus sexual—egg and sperm—reproduction producing offspring that are similar but not identical to either parent)
 - Relate the inheritance of traits to organisms passing on genetic material to their offspring; distinguish inherited characteristics from acquired or learned characteristics
- Human health
 - Describe causes of common diseases (e.g., influenza, measles, strep throat, malaria, HIV), methods of infection or transmission, prevention, and the importance of the body’s resistance (immunity) and healing capabilities
 - Explain the importance of diet, exercise, and lifestyle in maintaining health and preventing illness (e.g., heart disease, high blood pressure, diabetes, cancer); identify the dietary sources and role of nutrients (vitamins, minerals, proteins, carbohydrates, fats) in a healthy diet

By the end of the eighth grade, students have learned the following physics content:

- Measuring in science and its tools
 - Apply knowledge about measurement, precision in measurement, and density
- Force effects, work, and energy
 - Describe how the force acting on an object causes the object to change its shape or size, start moving, stop moving, reduce or increase speed
 - Understand the relationship between force and work; use $w = fd$ to calculate work
 - Demonstrate basic knowledge of the function of simple machines (e.g., levers and ramps, wedge pulley, wheel and axle) using common examples
- Energy transformations, heat, and temperature
 - Identify different forms of energy (e.g., mechanical, light, sound, electrical, thermal, chemical); describe simple energy transformations (e.g., combustion in a car engine, electrical energy in a lamp, light energy to chemical energy in photosynthesis, hydroelectric power, changes between potential and kinetic energy); and apply knowledge of the concept of conservation of total energy
 - Relate heating to the transfer of energy from an object at a higher temperature to one at a lower temperature; compare the relative thermal conductivity of different materials; compare and contrast three methods of heat transfer (conduction, convection, and radiation)
 - Relate temperature changes to changes in volume and/or pressure and to changes in the speed of particles
- Light and its properties
 - Describe or identify basic properties of light (e.g., transmission through different media; speed of light; reflection, refraction, absorption; dispersion of white light through a prism)
 - Solve practical problems involving the reflection of light from plane mirrors and the formation of shadows; interpret simple ray diagrams to identify the path of refracted light through lenses (concave and convex) and prisms
- Electricity and magnetism
 - Describe the origin of electric charges, induction of electrical charge, lightning and electric discharge, electric potential difference, flow of current in an electrical circuit; draw or identify simple diagrams representing complete circuits; classify materials as electrical conductors or insulators; describe factors that affect currents in circuits; recognize that there is a relationship between current and voltage in a circuit
 - Describe the properties of permanent magnets and electromagnets and the effects of magnetic force; describe uses of permanent magnets and electromagnets in everyday life

By the end of the eighth grade, students have learned the following chemistry content:

- Chemistry
 - The classification of matter (physical and chemical properties, pure substances and mixtures, separation techniques); the particulate structure of matter (molecules, atoms, protons, neutrons, the movement of particles, electrons, the atomic model, symbols and notations, atomic bonds, molecular bonds, and ions); solutions (solvents, solutes, and solubility); acids and bases; chemical changes and reactions; conservation of mass; endothermic and exothermic reactions; physical changes

By the end of the eighth grade, students have learned the following Earth science content:

- Earth's structure and physical features
 - Describe the structure and physical characteristics of Earth's crust, mantle, and core as provided by observable phenomena (e.g., earthquakes, volcanoes); describe the characteristics and uses of rocks, minerals, and soils; describe the formation of soils
 - Compare the physical state, movement, composition, and relative distribution of water on Earth
 - Recognize that Earth's atmosphere is a mixture of gases and identify the relative abundance of its main components; relate changes in atmospheric conditions to altitude
- Earth's processes, cycles, and history
 - Describe the general processes involved in the rock cycle; identify or describe physical processes and major geological events that have occurred over millions of years (e.g., erosion, volcanic activity, mountain building); explain the formation of fossils and fossil fuels
 - Diagram or describe the processes in Earth's water cycle, referencing the Sun as the source of energy, and the role of cloud movement and water flow in the circulation and renewal of fresh water on Earth's surface
 - Compare seasonal climates in relation to latitude, altitude, and geography; interpret weather data/maps, local factors in terms of such factors as temperature, pressure, precipitation, and wind speed and direction
- Earth's resources, their use and conservation
 - Provide examples of the Earth's resources and energy sources; describe methods of conservation; relate some environmental concerns to their possible causes and effects (e.g., pollution, global warming, deforestation, desertification); present ways in which science, technology, and human behavior can be used to address these concerns
 - Explain how common methods of agriculture and land use (e.g., farming, tree harvesting, mining) can affect land resources; describe how fresh water is obtained (e.g., purification, desalination, irrigation); explain the importance of water conservation

- Earth in the Solar System and the universe
 - Explain phenomena on Earth (day and night, year, seasons in the northern and southern hemispheres, tides, phases of the Moon, eclipses, appearance of the Sun, the Moon, planets, and constellations) in terms of the relative movements, distances, and sizes of Earth, the Moon, and other bodies in and outside the Solar System
 - Compare and contrast the physical features of Earth with the Moon and other planets (e.g., atmosphere, temperature, water, distance from the Sun, period of revolution and rotation, ability to support life); recognize the role of gravity in the Solar System (e.g., tides, keeping the planets and moons in orbit, pulling us to Earth's surface)

Professional Development Requirements and Programs

The Ministry of Education's Bureau for the Scientific Promotion of Human Resources has developed short term courses and workshops as in-service training, that provide general and specific education content to help teachers and other staff members develop their knowledge and skills. Pre-employment training, training for promotion, teacher education regarding newly implemented policies, and computer literacy courses are mandatory for teachers. The goal of short term training courses is to improve the competencies of teachers and education staff. Some of these courses—such as those for pre-employment training, training for promotion, and teacher education about newly implemented policies—are compulsory. Teachers also are required to take computer literacy courses to advance their proficiency in technology.

The Curriculum Development Center and other offices also provide assistance and instruction to mathematics and science departments and teachers.

Monitoring Student Progress in Mathematics and Science

Prior to the start of primary school, a school readiness assessment is administered to screen and diagnose students with special needs, and to determine whether students are ready to start first grade or need to be directed into a program for students with special needs.¹¹

Student evaluation up to sixth grade involves continual formative assessment, including observation of students' in-class activities, in-class oral or written exams, and homework. Schools issue descriptive report cards for all students in June. Students who do not qualify for promotion to the next grade in at least three subjects must participate in compensatory sessions and complete further enrichment activities by the following September.

At the end of Grade 6, students take a regional examination developed by the Office for Assessment in the Ministry of Education in each province. Students who pass the examination receive an elementary school-leaving certificate, while students who fail may retake the examination in September. Students who fail a second time may retake the examination the following year. The grading system at this stage uses points earned through continual assessment and criterion-referenced written and oral examinations. Ten points (out of 20) are required for promotion.

Students in lower secondary school are graded on a point system (out of 20) in each subject of study and are issued report cards. At the end of upper secondary education, students who pass a national final examination receive a high school diploma. High school graduates who wish to further their education take a university entrance exam, administered by the National Organization for Educational Testing.

Special Initiatives in Mathematics and Science Education

The Fundamental Reform Document of Education (FRDE) in the Islamic Republic of Iran has identified 10 domains as key components of education. Education goals, basic competencies, and special objectives are defined for each subject area, as well as goals for each subject area as it relates to others. Mathematics and science education are two of these subject areas.

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