

Parent Guide *to Provincial Achievement Testing*



GRADE

Achievement tests?

Find out all about them inside!

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Questions Frequently Asked About the Achievement Testing Program

Each year, children in Grade 9 write provincial achievement tests in language arts, mathematics, science, and social studies. Children in grades 3 and 6 also write achievement tests. In learning about and being advocates for their children as they prepare to write achievement tests, parents often ask the following questions about the Achievement Testing Program.

What is the purpose of the achievement tests? The purpose of the achievement tests is to determine how well students are learning what they are expected to learn, to inform Albertans about students' achievement relative to provincial standards, and to assist schools, school authorities, and the province in monitoring and improving student learning.

Who is expected to write the tests? All students registered in grades 3, 6, and 9 are expected to write the tests for their grade.

What tests are administered and when? Grade 9 students in semestered school programs may write achievement tests in January. Achievement tests are also administered to students registered in Grade 9 as follows:

Subject	Duration	Month
English Language Arts	Part A: Writing 120 min	May
	Part B: Reading 75 min	June
Mathematics	90 min	June
Science	75 min	June
Social Studies	75 min	June

What do the achievement tests assess? Alberta's achievement tests are aligned with the provincial curriculum and with authorized learning and teaching resources. No single test can assess everything. The achievement tests address only those learning outcomes that can be readily assessed by a paper-and-pencil test. The clearest picture of students' growth and development is gained when a wide variety of assessment information is considered. The achievement tests provide part of the picture. In addition, classroom teachers use many different assessment strategies throughout the school year to gain information about what students are learning.

How are achievement tests developed? Classroom teachers from across the province are involved at every stage of the test development and implementation process, including:

- writing, revising, and reviewing questions,
- administering field tests,
- validating test forms,
- validating French translations,
- validating scoring guides,
- confirming standards,
- administering the tests, and
- marking students' written responses.

What are test accommodations? Alberta Education provides alternate test formats and/or administration conditions for students with special test-writing needs in order to allow these students to do their best. Test accommodations may include Braille or large print formats, sign language, use of a reader or scribe, additional writing time, CD format, and taped responses. Students who regularly use aids of this type in the classroom to support their learning may make use of these accommodations when writing one or more of their achievement tests.

How can parents help their children prepare for the tests?

It is important that children feel relaxed and comfortable when they write any test, including achievement tests. Children's feelings about a test are very much influenced by what adults close to them say about those tests. Parents can be of most help to their children by encouraging them to relax and do their best, just as they would when writing any test.

How can teachers prepare their students for writing the tests?

Alberta Education discourages excessive test rehearsals and coaching. Achievement tests are like any other test students would normally write. The best preparation for students to write the provincial achievement tests is effective instruction based on the full range of learning outcomes in the Alberta curriculum.

How are the achievement tests marked?

All achievement tests, except the language arts writing test, are machine scored. Written-response sections of the language arts tests are marked centrally, in July, by classroom teachers who have been nominated by their superintendents. These teachers are trained by and work under the supervision of Alberta Education staff.

Alberta Education also encourages teachers to mark achievement tests locally using the answer keys and marking manuals that are provided to them each year. Locally awarded marks on the language arts written response test that are submitted to Alberta Education will be used as the first reading of a student's response. The papers will then be marked centrally as the second reading. Both marks contribute to the student's final mark. In the case of a discrepancy between the two marks, papers will be adjudicated by a third reading, which will determine the final mark that the paper is awarded. In this way, valid and reliable individual and group results can be reported. Papers that are not marked locally by teachers will be marked centrally only once.

How should achievement test results be communicated and used?

Each school and school authority receives a detailed report of its results. A school also receives two copies of a student's Individual Student Profile (ISP). One copy of the ISP is to be placed in the student's permanent file and the other copy is to be forwarded to the student's parents or guardians.

School staff, in consultation with their school council, should look at the school report to see what patterns and trends are evident in the results and to determine how the school's programs might be improved. The principal, teachers, parents, and community can look at these results in relation to past results, along with school and district assessments and other information about students and programs. They can use this information to provide the best possible learning opportunities for their students.

Similarly, it is helpful if the school board and the jurisdiction look at the school authority report to see how district-wide programs can be improved for students. It is also important for Alberta Education to examine the provincial results to see if changes are needed in provincial programs or policies.

Used in these ways, the test results support continuous improvement in program planning and in teaching. This, in turn, helps to ensure that as many students as possible achieve provincial standards.

How should school councils use achievement test results?

In collaboration with the school staff, a school council should review the achievement test results. Questions such as the following may serve as a starting point:

- What are the strengths of our school?
- What are the areas requiring growth?
- What factors could be contributing to our school's performance?
- What trends in achievement test results can we identify for our school over the past several years?
- What are our local achievement targets for this year?
- What plans can we develop to address the areas requiring growth and to help students to do their best?

Should schools be ranked according to their results on provincial achievement tests?

Alberta Education **does not support** comparisons of schools or authorities based on achievement test scores. Rather, in evaluating a school, people should consider a variety of factors that are relevant to that school. The department emphasizes the importance of provincial standards, local targets, and past performance as the basis for examining the test results and planning instructional programs.

More questions?

If you have additional questions or comments about achievement testing, please speak with your child's teacher or school principal, or contact:

Achievement Testing Program
Learner Assessment
Alberta Education
(780) 427-0010

To be connected toll-free in Alberta, dial 310-0000 and then enter 780-427-0010.

Test Description and Sample Questions

All four of the Grade 9 achievement tests are designed to reflect the nature and aim, and to assess the achievement, of learning outcomes that are prescribed in provincial programs of study. More information about these provincial programs of study is available in the *Curriculum Handbook for Parents* (2005–06), which can be accessed at: www.education.gov.ab.ca/parents/handbooks/pub9.pdf. Excerpts from the *Curriculum Handbook for Parents* (2005–06), related to English language arts, mathematics, science, and social studies are presented later in this document.

Descriptions of the Grade 9 achievement tests and sample questions have been included to give you a first-hand look at what provincial achievement tests are all about. We have reduced the print size and changed the layout of the questions to fit the limited space available in this guide.

English Language Arts

Test Description

Part A: Writing consists of two writing assignments—one narrative/essay and one functional—developed to be completed in two hours. For the first 10 minutes of the two hours, students have time to discuss both assignments with classmates, in groups of two to four, or to think alone about the writing prompts. Students will engage in this discussion time without teacher participation. During this discussion time, students may record their ideas on the planning pages provided in the test booklet. The allotted two hours provides students with time for planning, drafting, and revising both the narrative/essay and functional writing. Students may take an additional 30 minutes to complete the test, and may do their writing using a computer. They may use commercially published dictionaries, bilingual dictionaries, and thesauri **only** when completing Part A.

Part B: Reading consists of 55 multiple-choice questions based on reading selections from fiction, nonfiction, drama, poetry, and visual media. It has two booklets—one containing reading passages and one containing corresponding questions. Students record their answers on a tear-out, machine scorable answer sheet. The test is developed to be completed in 75 minutes; however, students may take an additional 30 minutes to complete the test. Students are **not** allowed to use a dictionary, a thesaurus, or other reference material when writing *Part B: Reading*.

For more information, view the *Grade 9 English Language Arts Subject Bulletin* at www.education.gov.ab.ca/k_12/testing/achievement/bulletins.

Sample Questions

- I. Read the article below and answer questions 1 to 5 from your Questions Booklet.

ABACUS

EVER SEEN AN ABACUS? You know, those centipedelike things with wooden beads in rows. They're sold mostly in knickknack import shops, for wall decoration. But, in fact, an abacus is an adding machine, calculator, and computer. On second thought, that's not quite true. The abacus is just a visual record of the computations going on in the mind of the person using it.

Millions of people in Asia still use the abacus daily. And it has been in use there for a couple of thousand years or more. Not only is it an effective practical tool, but it is nice to look at. Nice to hold and touch. Wood and brass and ivory. And the older they get and the longer they are handled by a human being, the lovelier they get—smooth and dark and polished. They will last for a lifetime; they will never need updating; all the software needed to drive them is between your ears; and if they break they can be fixed by an eight-year-old with household tools.

The presence of the abacus puts some kinds of progress in perspective. I remember a time when a Japanese-American computer conglomerate moved into the Chinese market in a big way. In order to demonstrate the value of its small pocket calculators, it arranged a contest. The great abacus-PC shoot-out. The guy who won—the one with the abacus, of course—was named Chan Kai Kit. Hong Kong Chinese—a senior clerk for a shipping company. It is true that the operator of the little computer did handle the pile of invoices forty-four seconds faster than Chan Kai Kit and his abacus. But the computer got the wrong answer. Seems the machine operator was in too big a hurry to prove how smart his machine was and fed it fuzzy facts. Much face was lost.

Now don't get me wrong. Pocket calculators are here to stay, and they have their place. A Luddite I am not—machines are not evil in themselves. And a careful, thoughtful man like Chan Kai Kit might do even better with his own pocket calculator instead of his abacus—who knows? It's just that I'm a sentimentalist about the wonders of the human hand and mind. And when I find evidence that it can still hold its own in the face of the wizardry of the electronic circuitry of little chips, I am pleased. It is comforting to know that some very old and very simple ways of getting from one place to another still work.

And I ponder the fact that an ancient and worn abacus will find its way to the walls of the twentieth century as a thing of art and wonder, made lovely by its usefulness and made useful by its beauty. I have an old wooden bowl and an elderly chopping knife I would stack up against a food processor any day. It's the same story.

Robert Fulghum

- I. Read the article “Abacus” in your Readings Booklet and answer questions 1 to 5.

- The phrase “the one with the abacus, of course” (line 26) is used to convey
 - irony
 - closure
 - mystery
 - foreshadowing
- The outcome of the contest was **mostly** a result of the
 - invoices not being printed quickly
 - abacus operator completing the work first
 - spectators distracting the calculator operator
 - calculator operator entering inaccurate information
- The sentence “Much face was lost” (line 33) means that the
 - value of the calculator decreased
 - calculator manufacturers were embarrassed
 - calculator operator mysteriously disappeared
 - information about the demonstration was destroyed
- A “Luddite” (line 35) is a person who
 - opposes advances in technology
 - appreciates the dangers of technology
 - wants humans to work with technology
 - understands the usefulness of technology
- The purpose of mentioning the bowl and knife (lines 49 to 51) is to
 - generalize the discussion of the abacus to other areas
 - suggest that technology sometimes brings improvements
 - consider the other side of the argument about technology
 - confirm that some possessions are more beautiful than useful

Fulghum, Robert. *All I Really Need to Know I Learned in Kindergarten: Uncommon Thoughts on Common Things*. New York: Ivy Books, 1989. Copied under licence from *Access Copyright*. Further reproduction prohibited unless licensed.

Mathematics

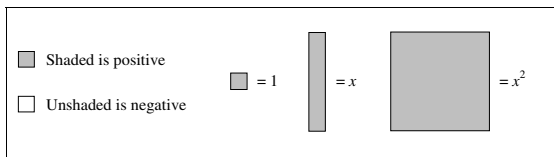
Test Description

The Grade 9 Mathematics Achievement Test consists of 44 multiple-choice questions and 6 numerical-response questions. Test items are created from the student outcomes contained within each of the following four strands of the Alberta Program of Studies for Grade 9 Mathematics: Number, Patterns and Relations, Shape and Space, and Statistics and Probability. Students record their answers on a tear out machine-scorable answer sheet. The test is developed to be completed in 90 minutes, however, students may take an additional 30 minutes to complete the test.

For more information on test administration, view the *Grade 9 Mathematics Subject Bulletin* at www.education.gov.ab.ca/k_12/testing/achievement/bulletins.

Sample Questions

Use the following algebra-tile legend to answer question 1.

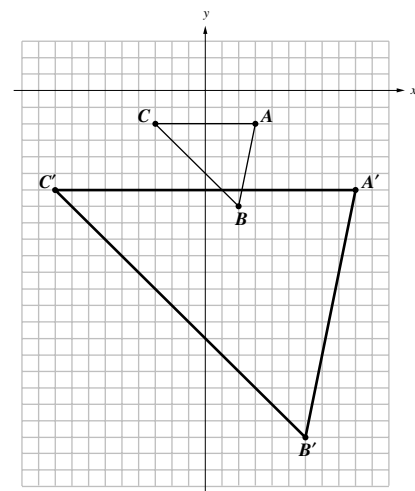


1. Which of the following area diagrams represents the product of $(x + 3)(x - 4)$?

- A.
- B.
- C.
- D.

Use the following information to answer question 2.

On the grid below, the original image is $\triangle ABC$ and the dilatation image is $\triangle A'B'C'$.



2. The scale factor of the dilatation is

- A. $\frac{1}{4}$
 B. $\frac{1}{3}$
 C. 3
 D. 4

3. Michael is 1.7 m tall. At 2:00 P.M., he casts a shadow 90 cm long and the cabin casts a shadow 305 cm long. The height of the cabin, to the nearest tenth of a metre, is

- A. 0.5 m
- B. 2.0 m
- C. 4.7 m
- D. 5.8 m

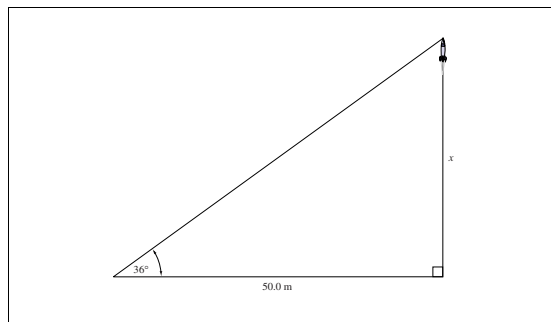
4. While on a tour, you see a rectangular dock on the River Thames. The area of the surface of the dock can be represented by $24y^2$ square units. The length is 6 times the width. What are the dimensions of the surface of the dock?

- A. $2y$ units by $12y$ units
- B. $4y$ units by $24y$ units
- C. y units by $6y$ units
- D. y units by $24y$ units

5. The total cost of admission to an attraction in London is \$240.00 Canadian for 2 adults and 3 children. An adult admission is \$15 more than a child's. How much is an **adult** admission?

- A. \$42.00
- B. \$45.00
- C. \$48.00
- D. \$57.00

Use the following diagram to answer numerical-response question 1.



Numerical Response

1. In a park, some people are launching model rockets. To find out the maximum height, x , that a rocket reaches, a person stands 50.0 m from the launch site and measures the angle from the ground to the rocket at its maximum height. If the angle is 36° , then the maximum height, x , of the rocket is _____ m.

(Record your answer, to the nearest tenth of a metre, in the numerical-response section on the answer sheet.)

Science

Test Description

The Grade 9 Science Achievement Test consists of 50 multiple-choice questions and five numerical-response questions. The test is developed to be completed in 75 minutes; however, students may take an additional 30 minutes to complete the test. Students record their answers on separate, tear out machine-scorable answer sheet. In addition to knowledge, the skills of initiating and planning, performing and recording, and analyzing and interpreting will be assessed within the five strands of the Science 9 Program of Studies: Biological Diversity, Matter and Chemical Change, Environmental Chemistry, Electrical Principles and Technology, and Space Exploration.

For more information on test administration, view the *Grade 9 Science Subject Bulletin* at www.education.gov.ab.ca/k_12/testing/achievement/bulletins.

Sample Questions

Use the following information to answer question 1.

A scientist was concerned that if a resort uses detergents containing phosphates, the wastewater could affect the water quality of a nearby stream. The scientist suggested that the resort regularly test the stream to monitor the following factors:

- I the amount of dissolved oxygen
- II the amount of bacteria
- III the number of different species
- IV the flow rate

1. The scientist was concerned that over a long period of time, the use of detergents containing phosphates could affect the stream by causing a **decrease** in factors
- A. I and III
 - B. I and IV
 - C. II and III
 - D. III and IV

Use the following information to answer question 2.

A white crystalline substance is uncovered when a pit is dug. Water is added to a sample of the substances to determine what it is. When the water is added the substance disappears, but the crystals reappear when the water evaporates.

Properties of Some Pure Substances

Substance	Melting Point	Density (g/cm ³)	Solubility in water	Appearance
Copper(II) sulfate	—	2.3	dissolves	blue solid crystals
Calcium carbonate	—	2.9	does not dissolve	grey-white crystals
Sodium chloride	801	2.2	dissolves	white solid crystals
Calcium hydroxide	—	2.2	does not dissolve	white solid

2. Given the information above, the crystalline substance is **most likely**
- A. copper (II) sulfate
 - B. calcium carbonate
 - C. sodium chloride
 - D. calcium hydroxide

Use the following information to answer question 3.

As honeybees collect nectar from flowers, pollen sticks to the bees' hairy bodies. The pollen is then transferred from one flower to the next by the bees.

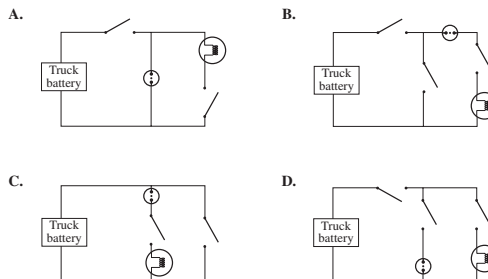


3. The interdependence that exists between flowers and honeybees is called
- A. mitosis
 - B. symbiosis
 - C. competition
 - D. specialization

Use the following information to answer question 4.

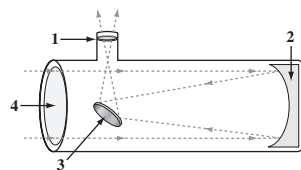
A tow truck equipped with a motorized winch is wired with a night spotlight. The winch is controlled by a switch, and the spotlight is controlled by a different switch. There is a master switch that controls both the spotlight and the winch together.

4. Which of the following circuit diagrams represents a possible circuit for the spotlight and the winch?



Use the following information to answer numerical-response question 1.

Cutaway View of a Telescope



Numerical Response

1. Match each part of the telescope numbered above with its name, given below.

Part: _____
 Name: Secondary mirror Eyepiece Aperture Main mirror

(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)

Social Studies

Test Description

The Grade 9 Social Studies Achievement Test consists of 55 multiple-choice questions based on three topics as presented in the program of studies: Economic Growth: The U.S.A., Economic Growth: A Case Study of the Former U.S.S.R., and Canada: Responding to Change. Students record their answers on a tear-out, machine-scorable answer sheet. The test is developed to be completed in 75 minutes; however, students may take an additional 30 minutes to complete the test. Students are **not** allowed to use dictionaries, thesauri, or other reference material.

For more information, view the *Grade 9 Social Studies Subject Bulletin* at www.education.gov.ab.ca/k_12/testing/achievement/bulletins.

Sample Questions

1. In automobile manufacturing, the introduction of a moving assembly line was a technological change that increased
- A. employee job satisfaction
 - B. costs for the consumer
 - C. costs for the worker
 - D. worker productivity

2. Which of the following pairs of terms is correctly matched?

Term 1		Term 2
A. New Economic Policy	↔	Public enterprise
B. Collective farms	↔	Private operations
C. Five year plans	↔	Planned economy
D. State farms	↔	Private plots

Use the following information to answer question 3.

Decisions are made by three groups—consumers, producers, and government. Consumers (buyers) have the right to decide their own goals, where to work, and how and where to spend their money. Producers (sellers) decide what products to produce, how and when to produce them, and whether to go into or get out of a particular business. These decisions are made primarily by buyers and sellers in the marketplace. [Government makes regulations for the common good.]

—from *Our Economy: How It Works*

3. Which type of **model** economy is being described in this information?
- A. Mixed economy
 - B. Market economy
 - C. Free enterprise economy
 - D. Centrally planned economy

Clawson, Elmer U. *Our Economy: How It Works*. Menlo Park, Calif.: Addison Wesley Publishing Company, 1980. Reprinted with permission of Dr. Elmer U. Clawson.

Use the following information to answer question 4.

- Speaker I**
The state should provide for all citizens. The resources of the state should be shared equally.
- Speaker II**
The state has no place in the economy. The market should be governed by the laws of supply and demand.
- Speaker III**
The economy of the state is subject to high and low periods. This is a normal part of the business cycle.
- Speaker IV**
The state should regulate abuses in the economy. They should set minimum wages, ensure competition, and set safety standards. The market should also play a strong role in the economy.

4. Which two speakers **disagree most** about the role of government in the economy?
- A. Speakers I and II
B. Speakers I and IV
C. Speakers II and III
D. Speakers II and IV
-
5. Former Soviet leader Mikhail Gorbachev’s policy of perestroika, introduced in 1985, was an attempt to
- A. allow factory managers greater input into government decisions
B. restructure the economy to introduce market economy ideas
C. allow individuals increased freedom to criticize the state
D. strengthen the system of central planning of production

Use the following cartoon to answer question 6.



—adapted from *Ulschak’s Marketplace*

6. This cartoon illustrates the point that in a market economy,
- A. scarcity can create consumer demand
B. advertising can create consumer demand
C. consumer demand can create an abundant supply
D. consumer demand can create a reduction in price

Ulschak, Edd. *Ulschak’s Marketplace*. Edmonton: Alberta Consumer & Corporate Affairs, 1980. Used with permission from ULUSCHAK CREATIVE CONCEPTS INC.

Answers to Sample Questions

<i>English Language Arts</i>	<i>Mathematics</i>	<i>Science</i>	<i>Social Studies</i>
1. A	Multiple Choice	Multiple Choice	1. D
2. D	1. D	1. A	2. C
3. B	2. C	2. C	3. A
4. A	3. D	3. B	4. A
5. A	4. A	4. D	5. B
	5. D	Numerical-Response	6. B
	Numerical-Response	1. 3142	
	1. 36.3 m		

Excerpts from the Curriculum Handbook for Parents, Grade 9

The following excerpts from the *Curriculum Handbook for Parents* (2005–06) provide a brief description and short list of what students should know and be able to do in English language arts, mathematics, science, and social studies by the end of Grade 9.

English Language Arts

English Language Arts

The aim of the English language arts program is to enable students to understand and appreciate language, and to use it confidently and competently in a variety of situations for communication, personal satisfaction and learning.

From Kindergarten to Grade 12, students are developing knowledge, skills and attitudes in six language arts strands: Listening and Speaking; Reading and Writing; Viewing and Representing. Students learn to compose, comprehend, and respond to oral, print and other media texts. They experience a variety of texts from many cultural traditions.

The following learning outcomes are selected from the Grade 9 English Language Arts Program of Studies.

Explore thoughts, ideas, feelings and experiences

- talk with others and experience a variety of oral, print and other media texts to explore, develop and justify own opinions and points of view
- reflect on own growth in language learning and use, by considering progress over time and the attainment of personal goals
- integrate own perspectives and interpretations with new understandings developed through discussing and through experiencing a variety of oral, print and other media texts
- examine and re-examine ideas, information and experiences from different points of view to find patterns and see relationships

Comprehend and respond personally and critically to oral, print and other media texts

- discuss how interpretations of the same text might vary, according to the prior knowledge and experiences of various readers
- identify explicit and implicit ideas and information in texts; listen and respond to various interpretations of the same text
- apply and explain effective procedures for identifying and comprehending words in context; adjust procedures according to the purpose for reading and the complexity of the texts

Manage ideas and information

- synthesize ideas and information from a variety of sources to develop own opinions, points of view and general impressions
- select types and sources of information to achieve an effective balance between researched information and own ideas
- distinguish between primary and secondary sources, and determine the usefulness of each for research purposes
- use own words to summarize and record information in a variety of forms; paraphrase and/or quote relevant facts and opinions; reference sources
- communicate ideas and information in a variety of oral, print and other media texts, such as media scripts, multimedia presentations, panel discussions and articles
- reflect on the research process, identifying areas of strength and ways to improve further research activities

Enhance the clarity and artistry of communication

- revise to ensure effective introductions, consistent points of view, effective transitions between ideas and appropriate conclusions
- develop personal handwriting styles appropriate for a variety of purposes
- identify and experiment with some principles of design that enhance the presentation of texts
- use a variety of strategies to make effective transitions between sentences and paragraphs in own writing
- demonstrate the deliberate, conscientious and independent application of a variety of editing and proofreading strategies to confirm spellings in own writing
- select, organize and present information to appeal to the interests and background knowledge of various readers or audiences
- follow the train of thought, and evaluate the credibility of the presenter and the evidence provided

Respect, support and collaborate with others

- analyze how oral, print and other media texts reflect the traditions, beliefs, and technologies of different cultures, communities or periods in history
- create or use oral, print and other media texts in ways that are respectful of people, opinions, communities and cultures
- contribute to group efforts to reach consensus or conclusions, by engaging in dialogue to understand the ideas and viewpoints of others
- share responsibility for the completion of team projects by establishing clear purpose and procedures for solving problems, monitoring progress and making modifications to meet stated objectives

View a complete copy of the *Curriculum Handbook for Parents* at www.education.gov.ab.ca/parents/handbooks.

Mathematics

Mathematics

The aim of the mathematics program is to prepare students to:

- use mathematics confidently to solve problems
- communicate and reason mathematically
- appreciate and value mathematics
- commit themselves to lifelong learning
- become mathematically literate adults, using mathematics to contribute to society

Students learn to use the following mathematical processes:

- communicate mathematically
- connect mathematical ideas to everyday experiences and to other subject areas
- use estimation and mental mathematics where appropriate
- apply new mathematical knowledge to problem solving
- reason and justify their thinking
- use appropriate technologies
- use visualization to assist in problem solving, processing information and making connections

The following learning outcomes are selected from the Grade 9 Mathematics Program of Studies.

Number

- explain and illustrate the structure and the interrelationship of the sets of numbers within the rational number system
- develop a number sense of powers with integral exponents and rational bases
- use a scientific calculator or a computer to solve problems involving rational numbers
- explain how exponents can be used to bring meaning to large and small numbers, and use calculators or computers to perform calculations involving these numbers

Patterns and Relations

- generalize, design and justify mathematical procedures, using appropriate patterns, models and technology
- solve and verify linear equations and inequalities in one variable
- generalize arithmetic operations from the set of rational numbers to the set of polynomials

Shape and Space

- use trigonometric ratios to solve problems involving a right triangle
- describe the effects of dimension changes in related 2-D shapes and 3-D objects in solving problems involving area, perimeter, surface area and volume
- specify conditions under which triangles may be similar or congruent, and use these conditions to solve problems
- use spatial problem solving in building, describing and analyzing geometric shapes
- apply coordinate geometry and pattern recognition to predict the effects of translations, rotations, reflections and dilatations on 1-D lines and 2-D shapes

Statistics and Probability

- collect and analyze experimental results expressed in two variables, using technology, as required
- explain the use of probability and statistics in the solution of complex problems

View a complete copy of the *Curriculum Handbook for Parents* at www.education.gov.ab.ca/parents/handbooks.

Science

Science

The secondary science program is guided by the vision that all students have the opportunity to develop scientific literacy. The goal of scientific literacy is to develop the science-related knowledge, skills, and attitudes that students need to solve problems and make decisions, and at the same time, help them become lifelong learners—maintaining their sense of wonder about the world around them.

The program is designed to help students understand the nature and role of science, as well as develop a solid grounding in science knowledge, skills and attitudes. Throughout the program students learn that:

- Science provides an ordered way of studying the natural world.
- Scientific discovery often leads to the development of new technologies and new technologies can lead to new fields of scientific investigation.
- Science takes place in a social context and responds to human needs. Science and technology have both intended and unintended consequences for humans and the environment

The program develops **skills** in four major areas:

Initiating and Planning

Students devise plans to investigate

- science inquiry questions
- practical problems
- science-related issues

Performing and Recording

Students conduct investigations through

- observation
- recording data
- researching information

Analyzing and Interpreting

Students develop, analyze, and assess possible explanations through

- data display
- inference
- evaluation

Communication and Teamwork

Students work collaboratively to

- communicate questions, ideas, procedures, and results
- evaluate individual and group processes
- defend a position or conclusion, based on their findings

To support their learning students are encouraged to develop positive **attitudes** in the following six areas:

- continuing interest in science
- respect for the ideas of people with various backgrounds and views
- support for scientific processes
- collaboration with others
- stewardship for the natural environment
- safety in science

Students will study five units during their Grade 9 year. The **topics** studied and the **major outcomes** for each are:

Biological Diversity

- investigate the diversity of living things, and describe the role of diversity in species survival
- describe processes for reproduction and for transmission of species characteristics from generation to generation
- describe the role of genetic materials in determining species characteristics, and investigate technologies used to modify species characteristics
- identify ways that human action can affect species variation and species survival, and analyze related issues

Matter and Chemical Change

- investigate materials and describe materials in terms of their physical and chemical properties
- describe and interpret patterns in chemical reactions
- describe ideas used to explain the chemical properties of materials, and identify evidence for these ideas
- use simple chemical nomenclature in describing elements, compounds, and chemical reactions

Environmental Chemistry

- investigate and describe the role of chemical substances in environments and living things
- identify processes for measuring the quantity of different substances in the environment and for monitoring air and water quality
- analyze and evaluate ways to limit the distribution and effect of potentially harmful substances within an environment

Electrical Principles and Technologies

- describe the operation of devices that produce electrical energy from other forms of energy, and that convert electrical energy to other forms
- describe technologies used to transfer and control electrical energy
- identify energy inputs and outputs from technological devices, and evaluate the efficiency of energy conversions
- describe the social and environmental implications of electrical energy use

Space Exploration

- describe how technological developments have advanced human understanding of Earth and space
- describe problems and challenges encountered in developing the potential for space exploration and for life in space
- describe the scientific principles of devices such as optical and radio telescopes, space probes and remote sensing technologies
- identify issues and opportunities resulting from the use of space technology, and analyze some of the issues involved

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Social Studies

Social Studies

The aim of the social studies program is to help students gain basic knowledge, skills and attitudes needed to become responsible citizens and contributing members of society. Social studies includes the study of history, geography, economics, the behavioural sciences and humanities.

Grade 9 social studies focuses on different perspectives of economic growth. The content is organized around three topics; and in each topic, students are expected to address at least one issue and one question for inquiry.

The following learning outcomes are selected from the Grade 9 Social Studies Program of Studies.

Economic Growth: U.S.A.

- describe some important influences upon industrialization in the United States
- explain the role technology, labour, government and specific individuals have played in the economic growth of the United States
- evaluate the effect of a market economy on the individual
- identify points of view expressed in cartoons, pictures and photographs
- appreciate the need for a balance between freedom and responsibility
- have empathy for people who have been affected by change

Economic Growth: A Case Study of the Former U.S.S.R.

- describe how geography and history influenced the industrial development of the former Soviet Union
- explain the role that government and significant individuals had in developing the economy of the former Soviet Union
- evaluate the effect of a centrally planned economy on the individual and on economic growth
- appreciate the ways different economic systems meet the needs of people

Canada: Responding to Change

- explain ways that government and individuals can influence technological change
- determine and express an opinion on the extent that governments should influence economic growth
- determine the role of labour and management in responding to technological change
- evaluate the effect of continued economic growth on the physical and social environments
- read and interpret maps to uncover relationships between geography and industrialization in Canada
- classify industries as primary, secondary and tertiary
- identify, understand and discuss issues of significance to the future of Canada and Canadians

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