

Alberta Provincial
Achievement Testing

Subject
Bulletin
2011–2012

GRADE
9

Science

we educate
éduquer

Government
of Alberta ■

Alberta ■

Freedom To Create. Spirit To Achieve.

This document was written primarily for:

Students	
Teachers	✓ of Grade 9 Science
Administrators	✓
Parents	
General Audience	
Others	

Distribution: This document is posted on the Alberta Education website at education.alberta.ca.

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Contents

Grade 9 Science Assessment	1
General Description	1
Blueprint.....	1
Description of Science Assessment Standards	2
Preparing Students for the Science Test	3
Suggestions for Preparing Students	3
Suggestions for Answering Questions	3
Opportunities to Participate in Test Development Activities	4
Field Testing	4
Working Groups	5
Test Development	5
Appendix: Science 9 Data Sheet	6
Contacts.....	8

You can find achievement test-related materials on the Alberta Education website at education.alberta.ca, then follow the pathway: Administrators > Provincial Testing > [Achievement Tests](#).

Throughout this subject bulletin, references to specific sections of the [General Information Bulletin](#) are italicized. These references will provide further information.

Grade 9 Science Assessment

General Description

The Grade 9 Science Achievement Test consists of 55 machine-scored questions: 50 multiple-choice questions, each worth one mark, and five numerical-response questions, each worth one mark. The five numerical-response questions are interspersed among the multiple-choice questions.

The test is developed to be completed in 75 minutes; however, students have an additional 30 minutes to complete the test if necessary.

Students record their answers on a tear-out answer sheet.

Students require HB pencils and erasers. A calculator is recommended. See the *General Information Bulletin* for more details.

This assessment is based on science learnings within which the nature of science, technology, and society are integrated components.

Knowledge and skill components are integrated in the test. Knowledge components relate to a fundamental understanding of both the concepts and the processes of science. Skill components relate to the application of science processes and the use of higher-level thinking to solve problems. Skill components consist of three types of skill:

- inquiry skills
- technological problem-solving skills
- societal decision-making skills

If a word that warrants definition is used on a test, it will be defined on the page on which it appears.

A tear-out data sheet will be included with the Grade 9 Science Achievement Test. A sample data sheet is included in the appendices.

Blueprint

The blueprint below shows the topics and reporting categories under which questions are classified. The number of questions in each reporting category is approximate.

Topic	Question Distribution by Reporting Category		Number (Percentage) of Questions
	Knowledge	Skills	
• Biological Diversity	5	6	11 (20%)
• Matter and Chemical Change	5	6	11 (20%)
• Environmental Chemistry	4	7	11 (20%)
• Electrical Principles and Technologies	3	8	11 (20%)
• Space Exploration	5	6	11 (20%)
Number (Percentage) of Questions	22 (40%)	33 (60%)	55 (100%)

Description of Science Assessment Standards

The following statements describe what is expected of Grade 9 students at the *acceptable standard* and the *standard of excellence* based on outcomes in the *Program of Studies*. These statements represent examples of the standards against which student achievement is measured. It is important to remember that one test cannot measure all the outcomes in the *Program of Studies*.

<i>Acceptable Standard</i>	<i>Standard of Excellence</i>
<p>Students who meet the <i>acceptable standard</i> in Grade 9 Science have a basic understanding of the conceptual and procedural knowledge outlined in the Program of Studies. They are able to</p> <ul style="list-style-type: none">• apply concepts and basic procedures to simple and familiar situations, but they may be challenged when applying these concepts and procedures to unfamiliar or complex situations. For example, students are able to describe ongoing changes in biological diversity through extinction and extirpation of native species, but they may have difficulty interpreting the role of environmental factors in causing these changes• apply higher-level thinking skills to familiar situations. However, students may have difficulty applying these skills in new or unfamiliar situations. For example, they are able to predict the effects of linking a familiar and identical electrical load in series or parallel, but they may have difficulty predicting the effects of linking different or unfamiliar types of electrical loads in these circuits• use basic skills to show what they know and solve novel, real-life problems that are simple or that require single-step solutions• apply more advanced skills or follow multi-step procedures to solve familiar real-life problems in which they have had experience. For example, in a problem-solving activity to identify problems in developing technology for life in space, these students will be able to describe technologies for life-support systems. However, they likely will not interpret the scientific principles on which they are based• use the basic procedures of scientific inquiry, technological problem solving, and societal decision making. However, they may have difficulty with the application of more advanced skills, and they may have limited ability to make connections between science, technology, and society	<p>Students who meet the <i>standard of excellence</i> in Grade 9 Science have an exceptional understanding of the conceptual and procedural knowledge outlined in the Program of Studies. They are able to</p> <ul style="list-style-type: none">• apply knowledge in complex and novel situations. For example, not only can they identify the chemical factors that affect the health and distribution of living things, but they can also predict the possible outcomes of changing chemical factors on living things and evaluate their effects on the quality of the environment• apply higher-level thinking skills to unfamiliar situations. In addition, they can easily and quickly solve problems that they have direct experience with and that require single-step or multi-step solutions• solve problems in more than one way and see more than one solution to some problems. For example, not only are they familiar with the basic operation of an electric motor, but they can also modify the design to meet various performance criteria and evaluate the effects of these changes on the working motor. Their problem-solving approach may involve more than one manipulated variable and may include logical explanations of procedures and results• persistently solve problems and view a situation from a number of perspectives. Not only do they have a high level of awareness and understanding of how science and technology affect them personally, but they can also apply this awareness and understanding to societal issues• skillfully use the basic procedures of scientific inquiry, technological problem solving, and societal decision making• use advanced skills and make connections between science, technology, and society

Preparing Students for the Science Test

Suggestions for Preparing Students

The best way to prepare students for writing the achievement test is to teach the curriculum well and to ensure that students know what is expected. Many of the skills and attitudes that support test writing are, in fact, good skills and strategies for approaching all kinds of learning tasks.

Note that the questions on the science test are placed in real-life contexts.

Teachers are encouraged to familiarize their students with the types of questions that will appear on the test. Every second year, beginning in the fall of 2007, a released Science Achievement Test will be posted to education.ab.ca.

Teachers are also encouraged to share the following information with their students to help them prepare for the Grade 9 Science Achievement Test.

Suggestions for Answering Questions

- Before you begin, find out how much time you have.
- Ask questions if you are unsure of anything.
- Skim through the whole test before beginning. Find out how many questions there are and plan your time accordingly.
- Answer the easier questions first; then go back to the more difficult ones.
- Do not spend too much time on any one question. Make a mark (* or ?) beside any questions you have difficulty with and go back to them if you have time.
- Read each question carefully, underline or highlight key words, and try to determine an answer before looking at the choices.
- Read all the choices and see which one best fits the answer.
- When you are not sure which answer is correct, cross out any choices that are wrong, and then select the best of the remaining choices.
- If time permits, recheck your answers.
- Double-check to make sure that you have answered everything before handing in the test.
- Read the information given using the strategy that works best for you. You should either
 - look at all the information and think carefully about it before you try to answer the question
 - or**
 - read the questions first and then look at the information, keeping in mind the questions you need to answer
- Make sure that you look at all forms of the information given. Information may be given in words, charts, pictures, graphs, or maps.
- When information is given for more than one question, go back to the information before answering each question.
- Check your work when you calculate an answer, even when your answer is one of the choices.
- When answering “best answer” questions, be sure to carefully read all four alternatives (A, B, C, and D) before choosing the answer that you think is best. These questions will always include a bold-faced qualifier such as **best**, **most strongly**, or **most clearly** in their stems. All the alternatives (A, B, C, and D) are, to some degree, correct, but one of the alternatives will be “best” in that it takes more of the information into account or can be supported most strongly by reference to the information.

Opportunities to Participate in Test Development Activities

Field Testing

All Achievement Testing Program test questions are field tested before use. By “testing” the test questions, students who write field tests have an opportunity for a practice run at writing portions of an achievement test. As well, the teachers have an opportunity to comment on the appropriateness and quality of the test questions.

[Request forms](#) for Grade 9 Science and Sciences 9^e année field tests that will be administered in May and June can be found on the Alberta Education website by following this link: education.alberta.ca/admin/testing/forms.aspx. Principals and teachers who wish to participate in the field-testing program must complete and return request forms to the Field-Test Coordinator at field.test@gov.ab.ca.

Once the completed request forms are received by the Assessment Sector, classes will be selected to ensure a representative and sufficiently large sample of students from across the province take part in the field test. Every effort will be made to place field tests as requested; however, because field tests are administered to a prescribed number of students, it may not be possible to fill all requests. Once the field tests are placed, a confirmation letter of test placements will be sent to each principal in early April, with memos to the teachers who will be participating in the field testing.

New: Starting in October 2011, online unit field testing for all five units of study will be available. Each unit test will consist of approximately 25 questions and is to be completed in 40 minutes. Unit field tests will be made available to teachers upon completion of the particular unit and with 10 working days notice. Teachers are encouraged to have their classes participate in all five online unit field tests.

For further information about achievement field testing, see the *Field Testing* and *Samples/Forms/Letters* sections of the [General Information Bulletin](#).

Working Groups

Teacher involvement in the development of provincial achievement tests is important because it helps to ensure the validity and appropriateness of the assessments.

To be selected to participate in a working group, a teacher must be nominated by a school administrator or superintendent, and that nomination must be approved by the superintendent. To ensure that selected working-group members have appropriate subject matter training and teaching experience, nominees are asked to provide their information to their school administrator so that it can be forwarded to the Assessment Sector at Alberta Education through the superintendent.

Test Development

Teacher working groups are used throughout the test development process to create raw forms of test questions and to review and revise draft forms of provincial achievement tests. These working groups usually meet for one or two days, two or three times per year. Occasionally, these meetings are held on weekends or in the summer.

To be eligible to serve on a test development working group, a teacher must currently be teaching Grade 9 Science and must have a minimum of two years' experience teaching the course.

Teachers participating in test development and/or test review working groups are selected from the working-group nominees provided by superintendents of school jurisdictions.

Appendix: Science 9 Data Sheet

Science 9 Two-Sided Data Sheet (Electricity Formulas on Back)

Periodic Table of the First Eighteen Elements

1	1.01 1+ 1-	H hydrogen	2	4.00	He helium
3	6.94 1+	Li lithium	4	9.01 2+	Be beryllium
11	22.99 1+	Na sodium	12	24.31 2+	Mg magnesium
5	10.81	B boron	6	12.01	C carbon
13	26.98 3+	Al aluminum	14	28.09	Si silicon
7	14.01 3-	N nitrogen	15	30.97 3-	P phosphorus
15	30.97 3-	P phosphorus	16	32.07 2-	S sulfur
8	16.00 2-	O oxygen	17	35.45 1-	Cl chlorine
9	19.00 1-	F fluorine	18	39.95	Ar argon
10	20.18	Ne neon			

Legend for Elements

Solid	Gas	Liquid
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Note: The legend denotes the states of elements at a temperature of 25 °C.

Key

Atomic number	6.94	Atomic molar mass	6.94
Symbol	Li	Common ion charges (most common first)	1+
		Name	lithium

Electricity Formulas

$$R = \frac{V}{I}$$

$$E = Pt$$

$$P = IV$$

$$\text{efficiency} = \left(\frac{\text{output}}{\text{input}} \right) \times 100\%$$

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