Alberta Provincial Achievement Testing

Assessment Highlights 2013–2014

GRADE 9

Science

This document contains assessment highlights from the 2014 Grade 9 Science Achievement Test.

The *Assessment Highlights* document provides information about the overall test, the test blueprint, and student performance on the 2014 Grade 9 Science Achievement Test. Also provided is commentary on areas of strength and weakness in student performance at the *acceptable standard* and the *standard of excellence* on selected items from the 2014 achievement tests. This information is intended for teachers and is best used in conjunction with the multi-year and detailed school reports that are available to schools via the extranet. *Assessment Highlights* reports for all achievement test subjects and grades are posted on the Alberta Education website every year in the fall.

The examination statistics that are included in this document represent all writers: both French and English. If you would like to obtain English-only statistics or French-only statistics that apply to your school, please refer to your detailed reports, which are available on the Extranet.

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The Alberta Education Internet address is education.alberta.ca.

This document was written primarily for:

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

Contents

The 2014 Grade 9 Science Achievement Test

This report provides teachers, school administrators, and the public with an overview of the performance of those students who wrote the 2014 Grade 9 Science Achievement Test. It complements the detailed school and jurisdiction reports.

How Many Students Wrote the Test?

A total of 39 268 students wrote the 2014 Grade 9 Science Achievement Test.

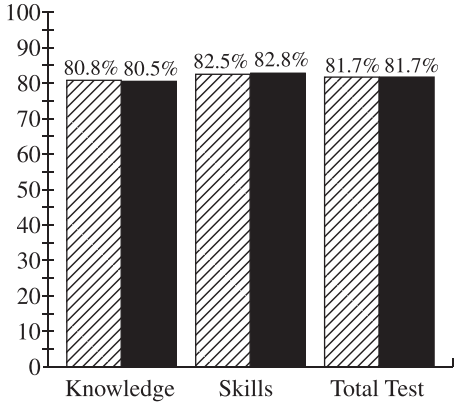
What Was the Test Like?

The 2014 Grade 9 Science Achievement Test consisted of 50 multiple-choice items and 5 numerical-response items based on five science topics: Biological Diversity, Matter and Chemical Change, Environmental Chemistry, Electrical Principles and Technologies, and Space Exploration.

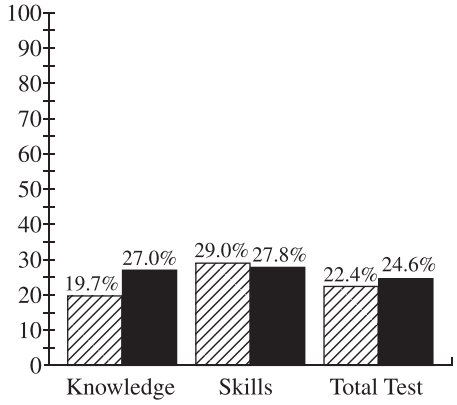
How Well Did Students Do?

The percentages of students meeting the *acceptable standard* and the *standard of excellence* in 2014 compared with 2013 are shown in the graphs below. Out of a total possible score of 55, the provincial average was 36.0 (65.5%). The results presented in this report are based on scores achieved by all students who wrote the test. Detailed provincial assessment results are provided in school and jurisdiction reports.

Percentage of Students Meeting the Acceptable Standard (%)



Percentage of Students Meeting the Standard of Excellence (%)



2013 Achievement Standards: The percentage of students in the province who met the *acceptable standard* and the *standard of excellence* on the 2013 Grade 9 Science Achievement Test (based on those who wrote).

2014 Achievement Standards: The percentage of students in the province who met the *acceptable standard* and the *standard of excellence* on the 2014 Grade 9 Science Achievement Test (based on those who wrote).

2014 Test Blueprint and Student Achievement

In 2014, 81.7% of students who wrote the Grade 9 Science Achievement Test achieved the *acceptable standard*, and 24.6% of students who wrote achieved the *standard of excellence*. These results are consistent with previous administrations of the achievement test.

Student achievement on the 2014 Grade 9 Science Achievement Test averaged 36.0 out of a total score of 55 (65.5%).

The blueprint below shows the reporting categories and topics by which 2014 summary data are reported to schools and school authorities, and it shows the provincial average of student achievement by both raw score and percentage.

Topics	**Reporting Category**		**Provincial Student Achievement Average (Raw Score and Percentage)**
	Knowledge	**Skills**	
	Fundamental understanding of both the concepts and the processes of science	Application of science processes and the use of higher-level thinking to solve problems	
Biological Diversity			**7.1/11 (64.5%)**
Matter and Chemical Change			**7.1/11 (64.5%)**
Environmental Chemistry			**6.8/11 (61.8%)**
Electrical Principles and Technologies			**6.9/11 (62.7%)**
Space Exploration			**8.1/11 (73.6%)**
Provincial Student Achievement Average Raw Score and Percentage for Students Who Wrote the Test	**13.6/21 (64.8%)**	**22.4/34 (65.9%)**	**Total Test 36.0/55 (65.5%)**

Commentary on 2014 Student Achievement

The following is a brief summary of the areas where most students demonstrated strengths and experienced difficulties on the 2014 Grade 9 Science Achievement Test. Four sample items are also provided to highlight some of these areas. These items are no longer secured and will not be reused on future achievement tests.

Students demonstrated relative strength by being able to:

- Analyze molecular models and match them with chemical names/formulas
- Identify a lighting circuit diagram that satisfies a given set of conditions
- Analyze a scenario to determine the type of interaction between two organisms
- Interpret data represented in an invertebrate population study

For **multiple-choice question 11**, a Knowledge item, students had to predict, from a list of elements, the elements that would possess specified properties. Approximately 80.6% of students who met the *acceptable standard* and 94.5% of students who met the *standard of excellence* answered this item correctly.

Use the following information to answer question 11.

Some Elements in the Periodic Table

W	Hydrogen
X	Magnesium
Y	Aluminum
Z	Chlorine

11. Which two elements listed above would be malleable and have a high melting point?

A. Elements W and X
B. Elements W and Z
C. Elements X and Y
D. Elements Y and Z

7.3% of students chose A
6.7% of students chose B
79.8% of students chose C (correct answer)
6.2% of students chose D

For **multiple-choice item 41**, a Skills item, students had to analyze the descriptions of four celestial bodies and identify a potential risk to space exploration. Approximately 84.0% of students who met the *acceptable standard* and 96.6% of students who met the *standard of excellence* answered this item correctly.

Use the following information to answer question 41.

Four Celestial Objects

Celestial Object	Description
Asteroid	A small, rocky solar system body that moves through space along a predictable path between the orbits of Mars and Jupiter
Meteoroid	A sand- to boulder-sized piece of rock that moves through space on no particular path
Meteor	A meteoroid that enters Earth's atmosphere and burns up
Meteorite	A piece of rock that reaches Earth's surface after entering Earth's atmosphere as a meteoroid

41. Which of the four celestial objects listed above poses the greatest danger to space exploration technologies and astronauts in the space environment?

A. Asteroid
B. Meteoroid
C. Meteor
D. Meteorite

7.7% of students chose A
80.3% of students chose B (correct answer)
6.4% of students chose C
5.6% of students chose D

Students demonstrated relative difficulty when asked to:

- Compare and describe the difference in the number of chromosomes in a skin cell versus a sperm cell
- Identify the controlled variables in an experiment
- Determine characteristics of a vehicle traffic model that would be used to describe current and resistance
- Identify the substrate from a given example

For *multiple-choice question 14*, a Skills item, students had to formulate the chemical formula for a given ionic compound. Approximately 36.8% of students who met the *acceptable standard* and 66.0% of students who met the *standard of excellence* answered this item correctly.

Use the following information and the data sheet to answer question 14.

Lithium phosphide is formed during a reaction between lithium and phosphorus.

14. Which of the following formulas accurately represents the product described above?

A. Li_3P_3

B. Li_3P

C. LiP_3

D. LiP

6.5% of students chose A
43.1% of students chose B (correct answer)
18.3% of students chose C
32.1% of students chose D

For **multiple-choice question 16**, a Skills item, students had to identify the final mass of reactants using the Law of Conservation of Mass. Approximately 52.0% of students who met the *acceptable standard* and 85.7% of students who met the *standard of excellence* answered this item correctly.

Use the following information to answer question 16.

> Commercial cold packs are typically composed of two different chemicals that are stored separately within a sealed plastic bag. When the bag is squeezed, the barrier between the chemicals breaks, and the chemicals mix and react in an endothermic reaction.

16. The final mass of the cold pack after it has been activated is

A. half of the original mass
B. equal to the original mass
C. slightly less than the original mass
D. slightly more than the original mass

8.5% of students chose A
55.2% of students chose B (correct answer)
15.7% of students chose C
20.6% of students chose D

Achievement Testing Program Support Documents

The Alberta Education website contains several documents that provide valuable information about various aspects of the achievement testing program. To access these documents, go to the Alberta Education website at education.alberta.ca. From the home page, follow the path *Teachers > Provincial Testing > Provincial Achievement Tests (PAT)*, and then click on one of the specific links to access the following documents.

Achievement Testing Program *General Information Bulletin*

The *General Information Bulletin* is a compilation of several documents produced by Alberta Education and is intended to provide superintendents, principals, and teachers with easy access to information about all aspects of the achievement testing program. Sections in the bulletin contain information pertaining to schedules and significant dates; security and test rules; test administration directives, guidelines, and procedures; calculator and computer policies; test accommodations; test marking and results; field testing; resources and web documents; forms and samples; and Assessment Sector contacts.

Subject Bulletins

At the beginning of each school year, subject bulletins are posted on the Alberta Education website for all achievement test subjects for grades 6 and 9. Each bulletin provides descriptions of assessment standards, test design and blueprinting, and scoring guides (where applicable) as well as suggestions for preparing students to write the tests and information about how teachers can participate in test development activities.

Examples of the Standards for Students' Writing

For achievement tests in grades 6 and 9 English Language Arts and Français/French Language Arts, writing samples have been designed to be used by teachers and students to enhance students' writing and to assess this writing relative to the standards inherent in the scoring guides for the achievement tests. The exemplars documents contain sample responses with scoring rationales that relate student work to the scoring categories and scoring criteria.

Previous Achievement Tests and Answer Keys

All January achievement tests (parts A and B) for Grade 9 semestered students are secured and must be returned to Alberta Education. All May/June achievement tests are secured except Part A of grades 6 and 9 English Language Arts and Français/French Language Arts. Unused or extra copies of only these Part A tests may be kept at the school after administration. Teachers may also use the released items and/or tests that are posted on the Alberta Education website.

Parent Guides

Each school year, versions of the Alberta Provincial Achievement Testing Parent Guide for grades 6 and 9 are posted on the Alberta Education website. Each guide presents answers to frequently asked questions about the achievement testing program as well as descriptions of and sample questions for each achievement test subject.

Involvement of Teachers

Teachers of grades 6 and 9 are encouraged to take part in activities related to the achievement testing program. These activities include item development, test validation, field testing, and marking. In addition, arrangements can be made through the Alberta Regional Professional Development Consortia for teacher in-service workshops on topics such as Interpreting Achievement Test Results to Improve Student Learning.