



Grade 9  
Assessment Highlights  
Science

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Alberta Provincial Achievement Testing 2018–2019

This document was written primarily for:

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

Alberta Education, Government of Alberta

2019–2020

*Grade 9 Science Assessment Highlights*

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You can find [provincial achievement test-related materials](#) on the Alberta Education website.

Additional topics of interest are found in the [General Information Bulletin](#).

This document contains assessment highlights from the *2019 Grade 9 Science Provincial Achievement Test*.

*Assessment Highlights* provides information about the overall test, the test blueprint, and student performance on the provincial achievement test that was administered in 2019. Also provided is information on student performance at the acceptable standard and the standard of excellence on selected items from the *2019 Grade 9 Science Provincial Achievement Test*. This information is intended for teachers and is best used in conjunction with multi-year and detailed school reports that are available to schools via the Stakeholder File Exchange (SFX). *Assessment Highlights* for all provincial 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 both French and English writers. 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 Stakeholder File Exchange (SFX).

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# The 2019 Grade 9 Science Provincial Achievement Test

This report provides teachers, school administrators, and the public with an overview of the performance of those students who wrote the *2019 Grade 9 Science Provincial Achievement Test*. It complements the detailed school and jurisdiction reports.

## How many students wrote the test?

A total of 42 280 students in Alberta wrote the *2019 Grade 9 Science Provincial Achievement Test*.

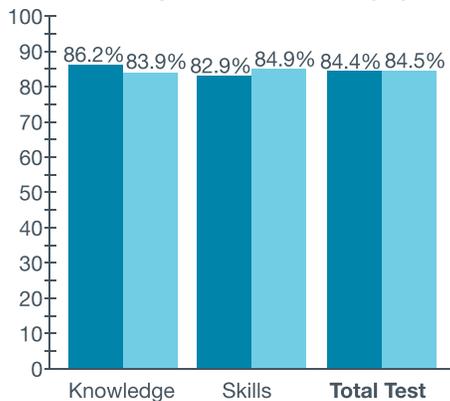
## What was the test like?

The *2019 Grade 9 Science Provincial 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.

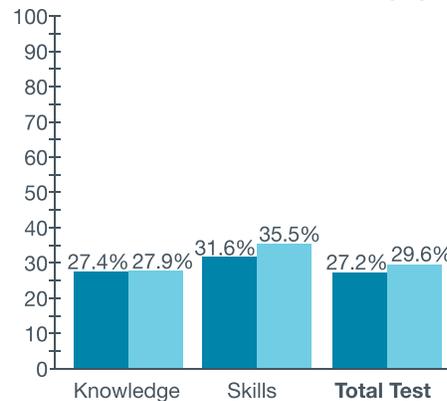
## How well did students do?

The percentages of students meeting the acceptable standard and the standard of excellence in 2019 compared with 2018 are shown in the graphs below. Out of a total possible score of 55, the provincial average was 37.6 (68.4%). The examination statistics that are included in this document represent both French and English writers. If you would like to obtain English-only or French-only statistics that apply to your school, please refer to the detailed reports that are available on the Stakeholder File Exchange (SFX).

**Percentage of Students Meeting the Acceptable Standard (%)**



**Percentage of Students Meeting the Standard of Excellence (%)**



-  2018 Achievement Standards: The percentage of students in the province that met the acceptable standard and the standard of excellence on the *2018 Grade 9 Science Provincial Achievement Test* (based on those who wrote)
-  2019 Achievement Standards: The percentage of students in the province that met the acceptable standard and the standard of excellence on the *2019 Grade 9 Science Provincial Achievement Test* (based on those who wrote)

# 2019 Test Blueprint and Student Achievement

In 2019, 84.5% of students who wrote the *Grade 9 Science Provincial Achievement Test* achieved the acceptable standard, and 29.6% of students who wrote achieved the standard of excellence. These results are consistent with previous administrations of the provincial achievement test.

Student achievement on the *2019 Grade 9 Science Provincial Achievement Test* averaged 37.6 out of a total score of 55 (68.4%).

The blueprint below shows the reporting categories and topics by which 2019 summary data are reported to schools and school authorities and lists 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			7.8/11 (70.9%)
Matter and Chemical Change			7.4/11 (67.3%)
Environmental Chemistry			7.5/11 (68.2%)
Electrical Principles and Technologies			7.3/11 (66.4%)
Space Exploration			7.6/11 (69.0%)
Provincial Student Achievement Average (Raw Score and Percentage)	14.9/22 (67.7%)	22.7/33 (68.8%)	Total Test 37.6/55 (68.4%)

# Commentary on 2019 Student Achievement

The following is a brief summary of the areas where most students demonstrated strengths and experienced difficulties on the *2019 Grade 9 Science Provincial 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 provincial achievement tests.

Students demonstrated relative strength by being able to

- evaluate strategies for minimizing loss of a specific species
- calculate the mass of a reactant based on information provided about the mass of products and other reactants
- identify the types of energy transfer occurring in a given circuit
- identify the use of parallax in astronomy

For **multiple-choice question 30**, a Skills item, students had to analyze experimental data about biodegradation and identify a conclusion supported by that data. Approximately 79.4% of students who met the acceptable standard and 95.1% of students who met the standard of excellence answered this item correctly.

*Use the following information to answer question 30.*

Scientists conducted an experiment to determine the rates at which different bacteria biodegrade crude oil. Data from the experiment are shown in the table below.

**Percentage of Crude Oil Biodegraded by Bacteria at 22 °C**

Type of Bacteria	Crude Oil Biodegraded (%)			
	5 Days	10 Days	15 Days	20 Days
Type I	53.86	67.37	71.36	78.86
Type II	38.07	59.26	66.04	72.05
Type III	47.35	63.36	69.30	77.84
Mixture of Type I, Type II, and Type III	77.10	81.27	83.86	86.93

- 30.** Which of the following conclusions is supported by the data above?
- A.** Type I is the least efficient bacteria to biodegrade crude oil.
  - B.** Bacterial biodegradation of crude oil is most efficient at 22 °C.
  - C.** More than 30% of crude oil is not biodegraded by bacteria after 20 days.
  - D.** A mixture of the three types of bacteria increases the rate of crude oil biodegradation.

7.4% of the students chose A  
6.5% of the students chose B  
8.3% of the students chose C  
77.6% of the students chose D (correct answer)

For **numerical-response question 5**, a Skills item, students had to analyze some issues regarding a mission to Mars with respect to perspectives. Approximately 83.9% of students who met the acceptable standard and 97.7% of students who met the standard of excellence answered this item correctly.

*Use the following information to answer numerical-response question 5.*

**Some Issues Regarding a Mission to Mars**

- Issue 1** Funding a Mars mission is expensive.
- Issue 2** Humans will influence ecosystems that may exist on Mars.
- Issue 3** People sent to Mars will likely not return to Earth.
- Issue 4** Nations disagree about the purpose of a Mars mission.

**Numerical Response**

- 5.** Match each of the issues numbered above with the corresponding perspective listed below. (Use each number only once.)

**Number:** \_\_\_\_\_

**Perspective:**

**Political**

(Record in the  
**first** column)

**Environmental**

(Record in the  
**second** column)

**Ethical**

(Record in the  
**third** column)

**Economic**

(Record in the  
**fourth** column)

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

81.3% of the students chose 4231 (correct answer)

The top two incorrect answers were 1234 and 4213.

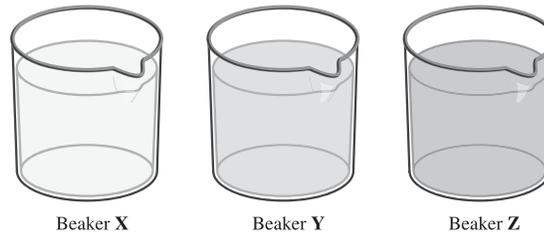
Students demonstrated relative difficulty when asked to

- analyze a given demonstration and identify if the reaction is endothermic or exothermic
- compare organic and inorganic substances in relation to their role in the health and growth of living things
- identify the effective use of an ammeter and a voltmeter in a circuit
- recognize the responding variable in a study

For **multiple-choice question 24**, a Skills item, students had to determine the relative concentrations of three solutions in parts per million or parts per trillion. Approximately 43.1% of students who met the acceptable standard and 80.3% of students who met the standard of excellence answered this item correctly.

*Use the following information to answer question 24.*

During a lesson on the concentration of solutions, a teacher added different amounts of the same food colouring to three beakers with equal volumes of water.



**24.** Which of the following rows shows the possible relative concentrations of the solutions?

<b>A.</b>			
<b>B.</b>			
<b>C.</b>			
<b>D.</b>			

28.7% of the students chose A  
 9.5% of the students chose B  
 51.0% of the students chose C (correct answer)  
 10.7% of the students chose D

For **multiple-choice question 44**, a Skills item, students had to identify examples of remote sensing, given a context. Approximately 39.1% of students who met the acceptable standard and 79.0% of students who met the standard of excellence answered this item correctly.

*Use the following information to answer question 44.*

### **Some of Canada's Contributions to Space Exploration in 2015**

- January 31:** The Canadian Space Agency (CSA) funded five Canadian universities to take part in the NASA mission that used a satellite to measure and map the amount of water in the top 5 cm of soil everywhere on Earth's surface.
- April 14:** Canadian astronaut David Saint-Jacques stayed on Earth to communicate with the resupply ship to the International Space Station (ISS). Supplies included tomato seeds, Canadian parts for an instrument used to study disease, and a Canadian device to transfer parts to Canadarm2.
- December 6–9:** *Cygnus*, a resupply craft for the ISS, was captured by Canadarm2. It carried two Canadian experiments and a device for the Canadian robot Dextre.
- December 11:** The Indian Space Research Organization UVIT space telescope took its first picture. CSA provided ultraviolet detectors for this telescope.
- December 17:** CSA provided an instrument to map the surface of the asteroid Bennu.

- 44.** Which dates from the information above refer to contributions related to remote sensing?
- A.** January 31 and December 6–9
  - B.** January 31 and December 17
  - C.** April 14 and December 6–9
  - D.** April 14 and December 17

15.6% of the students chose A  
48.1% of the students chose B (correct answer)  
20.6% of the students chose C  
15.4% of the students chose D

# Provincial Achievement Testing Program Support Documents

The Alberta Education website contains several documents that provide valuable information about various aspects of the provincial achievement testing program. To access these documents, go to the [Alberta Education website](#). Click on one of the specific links to access the following documents.

## **Provincial 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 Provincial Achievement Test 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 Provincial Assessment Sector contacts.

## **Subject bulletins**

At the beginning of each school year, subject bulletins are posted on the Alberta Education website for all provincial 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 provincial achievement tests in grades 6 and 9 English Language Arts and Français/French Language Arts, writing samples are designed for teachers and students to enhance students' writing and to assess this writing relative to the standards inherent in the scoring guides. The exemplars documents contain sample responses with scoring rationales that relate student work to the scoring categories and scoring criteria.

## **Previous provincial achievement tests and answer keys**

All January provincial achievement tests (parts A and B) for Grade 9 semestered students are secured and must be returned to Alberta Education. All May/June provincial 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 answers frequently asked questions about the Provincial Achievement Test Program and provides descriptions of and sample questions for each provincial achievement test subject.

## Involvement of teachers

Teachers of grades 6 and 9 are encouraged to take part in activities related to the Provincial Achievement Test 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 provincial achievement test results to improve student learning.