This document contains assessment highlights from the 2012 Grade 9 Science Achievement Test.

The Assessment Highlights document provides information about the overall test, the test blueprint, and student performance on the 2012 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 2012 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.

For further information, contact Sean Wells, Grades 6 and 9 Science Assessment Standards Team Leader, at Sean.Wells@gov.ab.ca, or Ken Marcellus, Director, Achievement Testing, at Ken.Marcellus@gov.ab.ca at the Assessment Sector, or call (780) 427-0010. To call toll-free from outside Edmonton, dial 310-0000.

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

This document was written primarily for:

<table>
<thead>
<tr>
<th>Students</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>✓ of Grade 9 Science</td>
</tr>
<tr>
<td>Administrators</td>
<td>✓</td>
</tr>
<tr>
<td>Parents</td>
<td></td>
</tr>
<tr>
<td>General Audience</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
</tbody>
</table>

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Contents

The 2012 Grade 9 Science Achievement Test.................................................................1
2012 Test Blueprint and Student Achievement ................................................................2
Commentary on 2012 Student Achievement ....................................................................3
Achievement Testing Program Support Documents........................................................7
The 2012 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 2012 Grade 9 Science Achievement Test. It complements the detailed school and jurisdiction reports.

How Many Students Wrote the Test?

A total of 38,136 students wrote the 2012 Grade 9 Science Achievement Test.

What Was the Test Like?

The 2012 Grade 9 Science Achievement Test consisted of 50 multiple-choice questions and 5 numerical-response questions 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 2012 compared with 2011 are shown in the graphs below. Out of a total possible score of 55, the provincial average was 35.6 (64.7%). 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.

2011 Achievement Standards: The percentage of students in the province who met the acceptable standard and the standard of excellence on the 2011 Grade 9 Science Achievement Test (based on those who wrote).

2012 Achievement Standards: The percentage of students in the province who met the acceptable standard and the standard of excellence on the 2012 Grade 9 Science Achievement Test (based on those who wrote).
## 2012 Test Blueprint and Student Achievement

In 2012, 82.3% of students who wrote the Grade 9 Science Achievement Test achieved the *acceptable standard*, and 24.9% of students who wrote achieved the *standard of excellence*. These results are consistent with previous administrations of the achievement test.

Student achievement on the 2012 Grade 9 Science Achievement Test averaged 35.6 out of a total score of 55 (64.7%).

The blueprint below shows the reporting categories and topics by which 2012 summary data are reported to schools and school authorities, and it shows the provincial average of student achievement by both raw score and percentage.

<table>
<thead>
<tr>
<th>Topics</th>
<th>Reporting Category</th>
<th>Provincial Student Achievement Average (Raw Score and Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Knowledge</td>
<td>Skills</td>
</tr>
<tr>
<td></td>
<td>Fundamental</td>
<td>Application of science processes and the use of higher-level thinking to solve problems</td>
</tr>
<tr>
<td></td>
<td>understanding of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>both the concepts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and the processes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of science</td>
<td></td>
</tr>
<tr>
<td>Biological Diversity</td>
<td></td>
<td>7.1/11 (64.7%)</td>
</tr>
<tr>
<td>Matter and Chemical Change</td>
<td></td>
<td>7.1/11 (64.7%)</td>
</tr>
<tr>
<td>Environmental Chemistry</td>
<td></td>
<td>7.4/11 (67.4%)</td>
</tr>
<tr>
<td>Electrical Principles and Technologies</td>
<td></td>
<td>6.9/11 (62.7%)</td>
</tr>
<tr>
<td>Space Exploration</td>
<td></td>
<td>7.1/11 (64.7%)</td>
</tr>
<tr>
<td>Provincial Student Achievement Average</td>
<td>Raw Score and Percentage for Students Who Wrote the Test</td>
<td>14.4/22 (65.5%) 21.2/33 (64.1%)</td>
</tr>
</tbody>
</table>
Commentary on 2012 Student Achievement

The following is a brief summary of the areas where most students demonstrated strengths and experienced difficulties on the 2012 Grade 9 Science Achievement Test. Four sample questions are also provided to highlight some of these areas. These questions are no longer secured and will not be reused on future achievement tests.

Students demonstrated relative strength by being able to:

• Analyze a graph and determine patterns in a predator/prey relationship
• Recognize an example of a physical change in matter
• Calculate the energy used in a device for a given period of time
• Identify the orbit size of a celestial object based on information in a chart

For multiple-choice question 24, a Knowledge question, students had to identify an organic nutrient located in a concept map. Approximately 78.7% of students who met the acceptable standard and 96.1% of students who met the standard of excellence answered this question correctly.

Use the following information to answer question 24.

![Concept Map]

24. The nutrient that fits into space II is classified as a

A. lipid  
B. protein  
C. trace element  
D. macronutrient

76.3% of students chose A (correct answer)  
14.6% of students chose B  
2.8% of students chose C  
6.3% of students chose D
For **multiple-choice question 32**, a Skills question, students had to determine the component that is protected by a circuit breaker in a schematic diagram. Approximately 81.3% of students who met the *acceptable standard* and 95.1% of students who met the *standard of excellence* answered this question correctly.

*Use the following information to answer question 32.*

![Electrical Circuit of a Garage](image)

**32.** The component that is protected by the circuit breaker when both switches are closed is the

- A. furnace motor
- B. exhaust fan
- C. heater
- D. light

79.5% of students chose A (correct answer)
5.1% of students chose B
9.6% of students chose C
5.8% of students chose D
Students demonstrated relative difficulty with:

- Determining controlled variables in an investigation
- Determining ways to reduce the resistance of a wire
- Interpreting and identifying models of the universe
- Identifying celestial objects based on given definitions

For multiple-choice question 4, a Knowledge question, students had to identify the reproductive stage that has half the total number of chromosomes. Approximately 40.9% of students who met the acceptable standard and 82.6% of students who met the standard of excellence answered this question correctly.

*Use the following information to answer question 4.*

<table>
<thead>
<tr>
<th>Stages of Sexual Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage</td>
</tr>
<tr>
<td>Adult</td>
</tr>
</tbody>
</table>

4. *One of the stages in which cells contain the normal number of chromosomes is labelled \( i \), and the stage in which cells contain only half the normal number of chromosomes is labelled \( ii \).*

The statement above is completed by the information in row

<table>
<thead>
<tr>
<th>Row</th>
<th>( i )</th>
<th>( ii )</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>adult</td>
<td>zygote</td>
</tr>
<tr>
<td>B.</td>
<td>zygote</td>
<td>sex cells</td>
</tr>
<tr>
<td>C.</td>
<td>sex cells</td>
<td>embryo</td>
</tr>
<tr>
<td>D.</td>
<td>embryo</td>
<td>adult</td>
</tr>
</tbody>
</table>

32.5% of students chose A
48.3% of students chose B (correct answer)
14.0% of students chose C
5.2% of students chose D
For **multiple-choice question 13**, a Skills question, students had to identify a correctly named chemical formula. Approximately 37.1% of students who met the *acceptable standard* and 71.1% of students who met the *standard of excellence* answered this question correctly.

*Use the following information to answer question 13.*

Chris listed four chemical formulas and their matching chemical names in his notebook, as shown below.

<table>
<thead>
<tr>
<th>Writing Chemical Formulas and Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Formula</td>
</tr>
<tr>
<td>I</td>
</tr>
<tr>
<td>II</td>
</tr>
<tr>
<td>III</td>
</tr>
<tr>
<td>IV</td>
</tr>
</tbody>
</table>

According to Chris’ teacher, he named only one of the compounds correctly.

13. Which of the compounds did Chris correctly name?

A.  I  
B.  II  
C.  III  
D.  IV

14.8% of students chose A  
11.0% of students chose B  
42.6% of students chose C (correct answer)  
31.6% 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 this path: Teachers > Provincial Testing > Achievement Tests, and then click on one of the specific links under the Achievement Tests heading 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 3, 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 3, 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 3, 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 Parent Guide to Provincial Achievement Testing for grades 3, 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 3, 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.