

# Grade 9 Science

## Information Bulletin Supplement

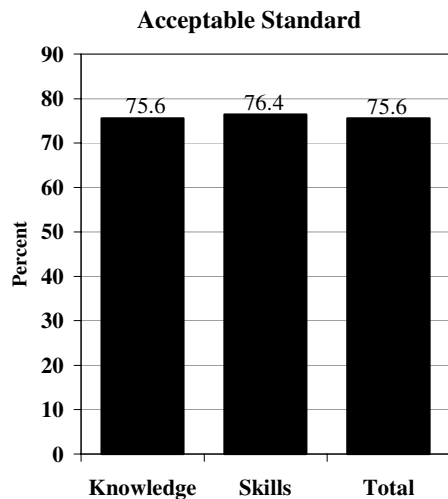
June 2003—Form B Achievement Test Results and Released Questions

This report, written by the Grade 9 Science Examination Manager, provides classroom teachers with information about the June 2003 Grade 9 Science Form B Provincial Achievement Test. This test is based on the *Science Grades 7–8–9 Program of Studies* (2003), that was in an optional year of implementation in the 2002–03 school year. This document is intended to support classroom teachers who are teaching the new mandatory *Science Grades 7–8–9 Program of Studies* (2003) for the first time in the 2003–04 school year. The outcomes being tested are found on pages 51–73 of the *Science Grades 7–8–9 Program of Studies* (2003). This report contains information about how students performed on this test as well as released questions for classroom use.

### *Description of the Achievement Test*

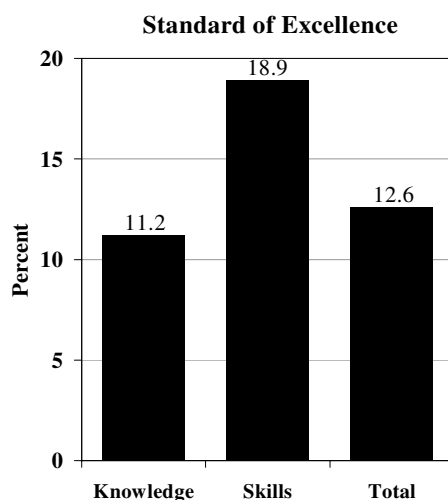
The Grade 9 Science Achievement Test Form B consisted of 50 multiple-choice questions and five numerical-response questions. The emphases for the reporting categories was 40% knowledge and 60% skill. Twenty-one of the items on this test also appeared on the Grade 9 Science Achievement Test Form A in June 2003.

### *Achievement of Standards on the June 2003 Achievement Test (Form B)*



The information in this report is based on the achievement test scores achieved by 13 808 students (49.0% female, 51.0% male) who wrote the June 2003 Form B test.

- 75.6% of these students achieved the *acceptable standard* (an achievement test score of 29 or higher)



- 12.6% of these students achieved the *standard of excellence* (an achievement test score of 48 or higher)

## Test Blueprint and Results

The following test blueprint reflects the topics as found on pages 51–73 of the *Science Grades 7–8–9 Program of Studies* (2003). The blueprint includes all of the machine-scored and numerical-response questions on this test.

### Topic

<b>A</b>	Biological Diversity	<b>D</b>	Electrical Principles
<b>B</b>	Matter and Chemical Change	<b>E</b>	Space Exploration
<b>C</b>	Environmental Chemistry		

**Key:** MC—Multiple-Choice; NR—Numerical-Response

The test has a value of 55 marks, one mark for each multiple-choice and numerical-response question. Each question is classified in two ways: by the curricular content (unit) being tested and by the knowledge and skill required to answer the question. The blueprint illustrates the distribution of questions on this test.

Unit	Reporting Category		Number (Percentage) of Questions
	Knowledge	Skills	
Biological Diversity	5	6	11 (20%)
Matter and Chemical Change	4	5	09 (16%)
Environmental Chemistry	4	9	13 (24%)
Electrical Principles and Technologies	5	7	12 (22%)
Space Exploration	4	6	10 (18%)
Number (Percentage) of Questions	22 (40%)	33 (60%)	55 (100%)

### General Descriptors of Test Questions by Unit

#### Unit A: Biological Diversity (Social and Environmental Emphasis)

Question	*Diff. %	Reporting Category	Curriculum Standard
MC24	0.834	Knowledge	Distinguish between natural and artificial selection
MC25	0.691	Knowledge	Recognize variation of characteristics within a species
MC26	0.651	Knowledge	Identify how dependencies among species link to species survival
MC30	0.731	Knowledge	Identify the advantage of asexual over sexual reproduction
MC31	0.649	Knowledge	Distinguish between sexual and asexual reproduction in a species
NR3	0.658	Skills	Interpret how diversity contributes to species survival
MC27	0.535	Skills	Apply knowledge of sexual reproduction in plants
MC28	0.755	Skills	Interpret a graph to infer environmental factors that cause change
MC29	0.853	Skills	Interpret the relationships between and among observable variables
MC32	0.625	Skills	Apply knowledge of artificial selection
MC33	0.606	Skills	Apply genetic information

<b>Unit B: Matter and Chemical Change (Nature of Science Emphasis)</b>			
MC35	0.530	Knowledge	Identify physical properties
MC36	0.719	Knowledge	Understand the conditions that affect rates of reactions
MC37	0.720	Knowledge	Identify conditions under which properties of materials are changed
MC39	0.857	Knowledge	Identify exothermic and endothermic reactions
MC34	0.698	Skills	Apply knowledge to materials in terms of their physical properties
MC38	0.913	Skills	Recognize product safety symbols
MC40	0.763	Skills	Interpret a graph to draw a conclusion
MC41	0.817	Skills	Identify reactions involving oxygen
NR4	0.934	Skills	Apply knowledge of product safety symbols
<b>Unit C: Environmental Chemistry (Social and Environmental Emphasis)</b>			
MC1	0.930	Knowledge	Distinguish information on the biodegradability of materials
MC8	0.550	Knowledge	Recognize chemical factors harmful to the environment
MC9	0.560	Knowledge	Recognize the effect of chemicals ingested by organisms
MC12	0.786	Knowledge	Identify harmful substances that affect an environment
MC2	0.644	Skills	Evaluate methods used to dispose of hazardous household chemicals
MC3	0.629	Skills	Understand the effects of acid-base reactions
MC4	0.637	Skills	Identify chemical factors in an environment
MC5	0.643	Skills	Interpret a chart in order to draw conclusions about acidity
MC6	0.545	Skills	Understand the process by which chemicals are introduced to the environment
MC7	0.634	Skills	Apply knowledge of the effect that different substances have on living things
MC10	0.756	Skills	Interpret a graph and infer the relationship between variables
MC11	0.596	Skills	Infer the effect of organic substances in a living environment
NR1	0.438	Skills	Identify the types of variables in an experiment
<b>Unit D: Electrical Principles and Technologies (Science and Technology Emphasis)</b>			
MC13	0.768	Knowledge	Recognize the use of a generator to convert a form of energy to electrical energy
MC15	0.572	Knowledge	Apply knowledge of resistance to electrical flow
MC16	0.613	Knowledge	Describe technology for the control of electrical energy
MC20	0.400	Knowledge	Identify alternate sources of electrical energy
MC14	0.377	Skills	Identify the use of switches to control electrical flow
MC17	0.662	Skills	Measure amperages in circuits
MC18	0.553	Skills	Identify the diagram of a given circuit
MC19	0.769	Skills	Recognize the effect of circuit designs for a variety of specific purposes
MC21	0.624	Skills	Apply knowledge of different chemicals and designs for electrical storage cells

MC22	0.490	Skills	Interpret a graph to analyze the efficiency of an energy device
MC23	0.640	Skills	Understand how energy conversion takes place in a thermocouple
NR2	0.620	Knowledge	Recognize the potential danger of electrical devices
<b>Unit E: Space Exploration (Science and Technology Emphasis)</b>			
MC45	0.668	Knowledge	Recognize the use of telescopes in space exploration
MC48	0.570	Knowledge	Recognize characteristics of bodies in the solar system
MC49	0.522	Knowledge	Identify characteristics of planets
MC42	0.444	Skills	Interpret a graph to draw a conclusion about bodies within the solar system
MC43	0.669	Skills	Identify characteristics that make up the solar system
MC44	0.632	Skills	Interpret the information in a chart in order to draw a conclusion
MC46	0.635	Skills	Interpret a map to determine the position and motion of objects in space
MC47	0.523	Skills	Identify the use of angular coordinates of objects in space
MC50	0.649	Skills	Interpret the relationships between and among observable variables
NR5	0.530	Knowledge	Identify the operation of a telescope

\***Difficulty** – percentage of students answering the question correctly

ITEMS RELEASED ITEMS RELEASED

# *Science 9 Form B*

*Grade 9 Provincial Achievement Test 2003*

ITEMS RELEASED ITEMS RELEASED

For further information, contact Jordan Anderson [Jordan.Anderson@gov.ab.ca](mailto:Jordan.Anderson@gov.ab.ca) or Michele Samuel [Michele.Samuel@gov.ab.ca](mailto:Michele.Samuel@gov.ab.ca) at the Learner Assessment Branch at (780) 427-0010. To call toll-free from outside of Edmonton, dial 310-0000.

Our Internet address is <http://www.learning.gov.ab.ca>.

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## ***Released Questions***

The following 10 released questions reflect the nature and complexity of the questions that will appear on the Grade 9 Science Achievement Test in 2004.

We encourage teachers to familiarize students with the assessment by having them work through these released questions. These questions are representative of a limited amount of the general learner expectations (GLEs) outlined in the *Science Grades 7–8–9 Program of Studies* (2003).

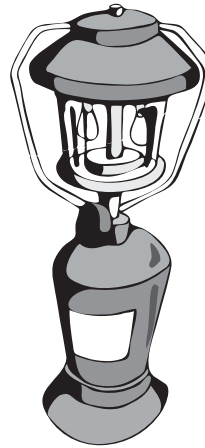
Every fall we will release a proportion of test questions and post them on our web site. These questions will be representative of the entire set of questions that form the Science 9 achievement test. All subject areas will have a new document entitled Assessment Highlights that will be prepared to summarize the examination manager perceptions of annual test administration results.

A table of the key and descriptors for the released questions follow.

***Science 9  
Released Questions June 2003***

*Use the following information to answer the next question.*

Campers often use propane-fuelled lanterns to light their campsites in the evening.

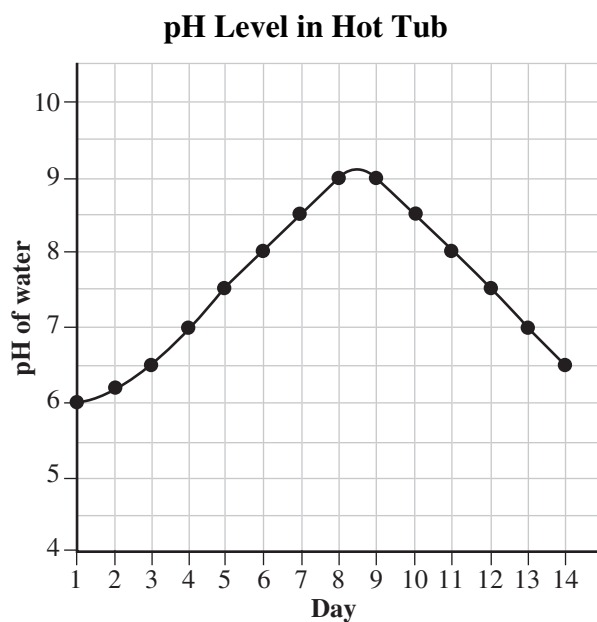


1. As propane burns, it undergoes a change that is
  - A. chemical and exothermic
  - B. physical and endothermic
  - C. potential and endothermic
  - D. mechanical and exothermic



Use the following information to answer the next question.

Resort owners know that because so many people use resort hot tubs, the pH of the water is always changing and must be tested regularly. The graph below shows the changes in the pH levels in a particular hot tub over 14 days.



2. The days on which the water **was recorded** as being basic were
- A. days 1 to 3
  - B. days 13 to 14
  - C. days 5 to 12
  - D. days 1 to 8

Use the following information to answer the next question.

The results of four tests of the pH of the water in a hot tub are given below.

	Indicator	Final colour
Test 1	Red litmus	Blue
	Blue litmus	Blue
Test 2	Red litmus	Blue
	Blue litmus	Red
Test 3	Red litmus	Red
	Blue litmus	Blue
Test 4	Red litmus	Red
	Blue litmus	Red

3. Which test result shows that the hot tub water is acidic?

- A. Test 1
- B. Test 2
- C. Test 3
- D. Test 4

Use the following information to answer the next question.

The following chart lists the results of water-quality tests performed at four different locations along a river.

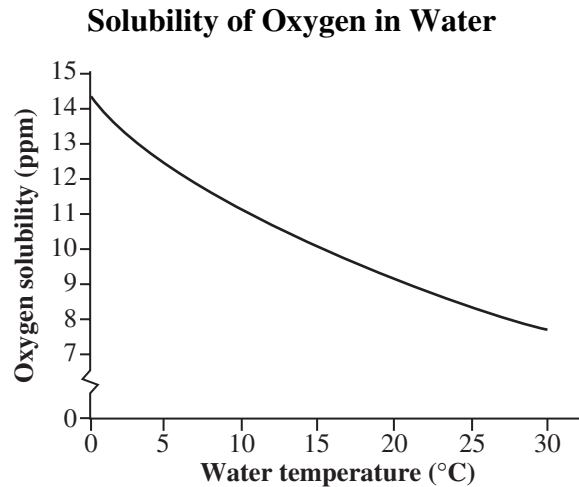
Test	Location 1	Location 2	Location 3	Location 4
pH level	5.6	6.0	7.1	7.3
Nitrates (mg/L)	0.9	0.7	0.003	0.05
Dissolved oxygen (mg/L)	3.0	6.0	9.0	10.0
Phosphates (mg/L)	28.0	12.0	7.0	5.0

4. At which of the four locations would there likely be the **least** diversity of species?

- A. Location 1
- B. Location 2
- C. Location 3
- D. Location 4

Use the following information to answer the next question.

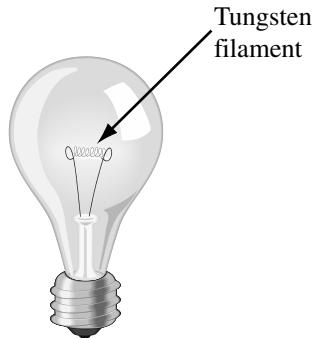
The manager of a trout hatchery is studying trout populations. She knows that trout require a minimum oxygen level of 10 ppm. She displays the following graph of the relationship between water temperature and oxygen solubility.



5. According to the graph, the minimum oxygen level required by trout is found in water with a temperature of
- A. 10°C
  - B. 12°C
  - C. 16°C
  - D. 20°C
- 
6. Acid rain is a form of pollution that is harmful to lakes. Which of the following sources of pollution is a major contributor to the creation of acid rain?
- A. Coal-fired power generating stations
  - B. Primary sewage treatment plants
  - C. Sanitary landfill sites
  - D. Animal feedlots
7. When a dam's generators are in use, they convert
- A. chemical energy into mechanical energy
  - B. solar energy into electrical energy
  - C. chemical energy into electrical energy
  - D. mechanical energy into electrical energy

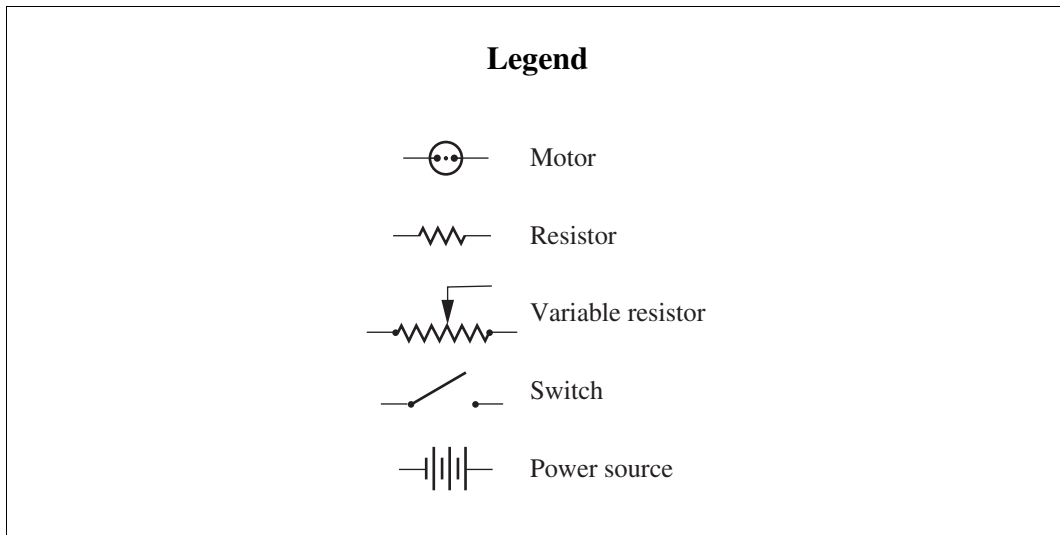
Use the following information to answer the next question.

Many light bulbs have a filament that is made from tungsten.

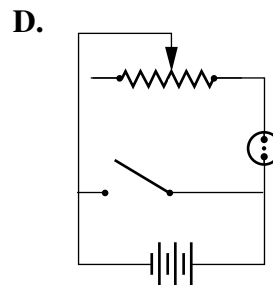
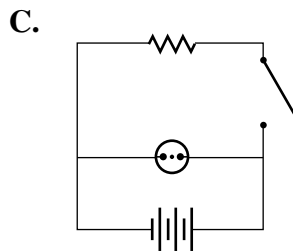
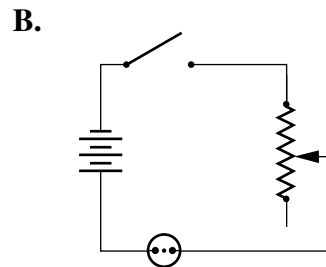
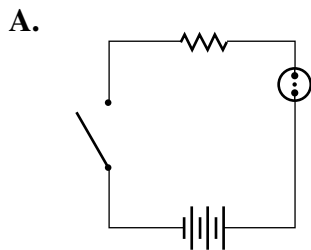


8. In a light bulb, the tungsten filament functions as a
- A. diode
  - B. resistor
  - C. rheostat
  - D. transistor
- 
9. To prevent a circuit from overloading, it must be protected by a
- A. resistor, because a resistor decreases the amount of current in the circuit
  - B. fuse, because a fuse limits the amount of current in the circuit
  - C. transistor, because a transistor is used to control the electron flow in the circuit
  - D. ground wire, because a ground wire conducts electricity in the circuit

Use the following legend to answer the next question.



10. One type of electric drill is designed so that its motor speed can be changed. Which of the following diagrams represents the circuit of a drill of this type?



## ***Key and Descriptors for Released Questions***

<b>Question</b>	<b>Key</b>	<b>Unit</b>	<b>Reporting Category</b>	<b>Curriculum Standard</b>
1	A	Matter and Chemical Change	Knowledge	Identify exothermic and endothermic reactions
2	C	Environmental Chemistry	Skill	Identify chemical factors in an environment
3	D	Environmental Chemistry	Skill	Interpret a chart in order to draw conclusions about acidity
4	A	Environmental Chemistry	Skill	Apply knowledge of the effect that different substances have on living things
5	C	Environmental Chemistry	Skill	Interpret a graph and infer the relationship between variables
6	A	Environmental Chemistry	Knowledge	Identify harmful substances that affect an environment
7	D	Electrical Principles and Technology	Knowledge	Recognize the use of a generator to convert a form of energy to electrical energy
8	B	Electrical Principles and Technology	Knowledge	Apply knowledge of resistance to electrical flow
9	B	Electrical Principles and Technology	Knowledge	Describe technology for the control of electrical energy
10	B	Electrical Principles and Technology	Skill	Identify the diagram of a given circuit