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# Grade 9 Subject Bulletin Science

Alberta Provincial Achievement Testing **2025-2026**

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**This document was written primarily for**

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Students

Teachers                    ✓        Grade 9 Science

Administrators            ✓

Parents

General Audience

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**2025–2026 Science 9 Subject Bulletin**

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You can find provincial achievement test-related materials and additional topics of interest at [Provincial Achievement Tests](#).

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# ***Grade 9 Science Provincial Achievement Test***

## **General description**

The *Grade 9 Science Provincial Achievement Test* is based on science learnings in which the nature of science, technology, and society are integrated components. It is important to remember that one test cannot measure all the components within the learning outcomes in the Science 9 Program of Studies.

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

The test consists of 55 questions of various formats supported by the digital assessment platform, each worth one mark.

The test is developed to be completed in 75 minutes; however, students have up to 150 minutes to complete the test should they need it.

A calculator is recommended. A ruler and protractor are not required for successful completion of the assessment but are permitted. A calculator, a ruler, and a protractor are available in the digital assessment platform.

Students may not use a dictionary, a thesaurus, or other reference materials when writing the test.

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

A data sheet will be included with the *Grade 9 Science Provincial Achievement Test*. A sample data sheet is included in the appendix.

## Description of Grade 9 Science provincial 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.

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### Acceptable Standard

Students who meet the acceptable standard in Grade 9 Science have a basic understanding of the conceptual and procedural knowledge outlined in the program of studies. They are able to

- 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.
- 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, students likely will not interpret the scientific principles on which the technologies 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.

### Standard of Excellence

Students who meet the standard of excellence in Grade 9 Science have an exceptional understanding of the conceptual and procedural knowledge outlined in the program of studies. They are able to

- 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. 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
- 

## Scoring and reporting

Test scores will be available to teachers after students submit their tests on the digital assessment platform. Teachers are expected to record and report the raw scores achieved on the test by their students to parents.

## 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.

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Topic	QUESTION DISTRIBUTION BY REPORTING CATEGORY		
	Knowledge	Skills	Number (Percentage) of Questions
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%)
<b>Number (Percentage) of Questions</b>	<b>22 (40%)</b>	<b>33 (60%)</b>	<b>55 (100%)</b>

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# Preparing Students for the Provincial Achievement Test

## Suggestions for preparing students

The best way to prepare students for writing the provincial 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. [Released materials](#) from previously secured tests are available on the Alberta Education and Childcare website under the Subject area resources heading.

[Practice tests](#) are available on the digital assessment platform. These practice tests include accommodations such as text-to-speech, coloured backgrounds, and a zoom feature for increasing the size of the font.

## Special-format practice tests

To give students an opportunity to practice provincial achievement test-style questions and content in Braille, large print, or coloured print versions, Alberta Education and Childcare produces special-format practice tests for all subjects that have a provincial achievement test. Alberta schools with registered Alberta K–12 students may place orders for these tests. Braille versions are available in English and, by request, in French. All tests are provided free of charge, but limits may be placed on order volumes to ensure access for all students.

For the greatest benefit, special-format practice tests should be written under conditions similar to those of the corresponding provincial achievement test. The same rules regarding the use of resources and devices should be followed.

Braille versions must be returned to Alberta Education and Childcare after use.

More information about special format practice tests can be found in the *General Information Bulletin*. To order special format practice tests, complete this [form](#).

## 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. Flag 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 alternatives.
- Read all the alternatives and see which one best fits the answer.
- When you are not sure which answer is correct, eliminate any alternatives that are wrong and then select the best of the remaining alternatives.
- If time permits, recheck your answers.
- Double-check to make sure that you have answered all questions before submitting 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 alternatives.
- When answering “best answer” questions, be sure to carefully read all the choices before selecting the answer that you think is best. These questions will always include a boldfaced qualifier such as **best**, **most strongly**, or **most clearly** in their stems. More than one of the choices may be, to some degree, correct, but one of the choices will be “best” in that it takes more of the information into account or can be supported most strongly by reference to the information.

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# Opportunities to Participate in Test-development Activities

## Field testing

Field testing is a critical process in assessment design with the objective of testing the test items before they appear on a provincial assessment. Field testing ensures that Alberta Education and Childcare provincial assessments are fair, reliable, and valid. Teachers and students can be reassured that the items on provincial assessments have undergone a rigorous process of development, improvement, and validation.

Field tests provide benefits for teachers and students by exposing them to examples of the style and content of items that may appear on provincial assessments. Through the field-testing experience, students experience provincial assessment rules and procedures, as well as a conventional large-scale standardized writing environment. This exposure and familiarization have the potential to reduce test anxiety.

Teachers can sign up for field testing on the [digital assessment platform](#). A [user guide](#) to signing up for field testing has been developed to answer any questions you may have.

All of the rules and procedures that are specified in the [General Information Bulletin](#) apply to the administration of field tests. Prior to participating in field testing, school staff will be required to attest to a declaration related to assessment confidentiality.

Detailed information can be found in the [Field Testing Program: Rules and Guide](#).

## 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.

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.

To be eligible to serve on a working group, a teacher must currently be teaching the course in question or must have taught the course within the past three years.

Teachers participating in working groups are selected from the working-group nominees approved by superintendents of school jurisdictions. The call for nominations usually occurs in September. However, we will accept further nominations throughout the year. In some subjects, more teachers may be nominated for working groups than are needed. When teachers are selected, there must be a balance of first-time and experienced working-group members and regional representation by zone, school authority, and school. Unfortunately, not everyone whose name is submitted will be selected.

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## Depth of Coverage

### Mechanical energy

A clear understanding of the transformations of energy before its intended use is necessary to discuss efficiency comparisons. The mechanical energy of an object or a system is the sum of the potential and kinetic energy of the object or system.

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## WHMIS 2015

As of the 2018–2019 school year, any Workplace Hazardous Materials Information System (WHMIS) pictograms that appear on provincial assessments will be WHMIS 2015 pictograms. WHMIS has been used in Canada since 1988 for labelling and classifying hazardous workplace chemicals. Countries around the world are adopting the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) to enable a consistent international chemical classification and labelling system. WHMIS 1988 in Canada was amended in February 2015 to incorporate the GHS. The new system is called WHMIS 2015.

WHMIS 2015 includes changes to

- pictograms
- labels
- hazard classes and categories
- safety data sheets
- education and training

Further information about these changes can be found at [Science \(7–9\) Program Supports](#) under the heading Health and Safety in the Science Classroom.

## Pictograms

### WHMIS 2015

**Flame**



For fire hazards

**Flame Over Circle**



For oxidizing hazards

**Gas Cylinder**



For gases under pressure

**Exploding Bomb**



For explosion or reactivity hazards

**Biohazardous Infectious Materials**



For organisms or toxins that can cause diseases in people or animals

**Corrosion**



For corrosive damage to metals, as well as skin, eyes

**Exclamation Mark**



May cause less serious health effects

**Health Hazard**



May cause or suspected of causing serious health effects

**Skull and Crossbones**



Can cause death or toxicity with short exposure to small amounts

# Appendix 1: Science 9 Data Sheet

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

### Periodic Table of the First Eighteen Elements

		<b>Key</b>			
		Atomic number	Symbol	Atomic mass	Most common ion charge
		3	Li	6.94	1+
		lithium			
		<b>Note:</b> The legend denotes the states of elements at a temperature of 25 °C.			
		<b>Solid</b>	<b>Gas</b>	<b>Liquid</b>	
1	1.01 1+ 1-	H	hydrogen		
2					
3	6.94 1+	Li	lithium		
4	9.01 2+	Be	beryllium		
5	22.99 1+	Na	sodium		
6	24.31 2+	Mg	magnesium		
7					
8					
9					
10					
11					
12					
13	26.98 3+	Al	aluminum		
14	12.01 4-	C	carbon		
15	14.01 3-	N	nitrogen		
16	16.00 2-	O	oxygen		
17	19.00 1-	F	fluorine		
18	4.00 0	He	helium		
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## Electricity Formulas

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

$$E = Pt$$

$$P = IV$$

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

## Appendix 2: Example of Grade 9 Science Instruction Pages

Navigate the assessment ▾

Instructions

- Instructions
- Copyright
- References

[Continue to Questions](#)

In the test, the diagram to the left will appear on the left side of the screen. Click on each bulleted item to view its contents.

When you have finished viewing the bulleted items, click on “Continue to Questions” to begin taking the test.


### Instructions

#### Grade 9 Provincial Achievement Test *Science*

##### *Description*

**Time: 75 minutes.** This test was developed to be completed in 75 minutes. You have up to 150 minutes to complete this test should you need it.

This test consists of 55 machine-scored questions, each worth 1 mark.

Data sheets can be viewed by clicking the document icon  on the right side of the screen.

##### *Instructions*

- Review the “Try the Tools” instructions.
- Calculators are recommended but not required.
- You may **not** use a dictionary, a thesaurus, or other reference material.
- Read each question carefully, and choose the **correct** or **best** answer.
- If you change an answer, your test will be automatically updated.
- Answer every question.
- If an answer is a value between 0 and 1 (e.g., 0.25), then be sure to record the 0 before the decimal place.
- To submit your **final** answers, click “Submit” on the left side of the screen.
- You will **not** be able to return to the test once the test is submitted.

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## **Appendix 3: Examples of Descriptions for Text to Speech on the Grade 9 Science Provincial Achievement Test**

This appendix has been prepared by Provincial Assessment, Alberta Education and Childcare. The purpose of this appendix is to provide school staff with examples of the descriptions of diagrams, illustrations, and visuals used in provincial achievement test text to speech, which are available to students as an accommodation. These examples are neither exhaustive nor prescriptive. Test content is shown in black text and descriptions in blue text.

For students who are enrolled with a school, and who typically use audio for their coursework, no application is required to receive this accommodation when writing provincial achievement tests

Scripting notes are written to describe sources that contain more than just text. Visual sources are described to maintain fairness for all students. However, some visual sources are not scripted, as students may be required to visually analyze a source to determine trends or extrapolate a conclusion. In these situations, the scripting notes would instruct students to examine the image on the test.

Additional information on how to prepare for science exams can be found on the Alberta Education and Childcare website under Support documents, Science—General, *Examples of Descriptions Used in Audio Versions of Science Diploma Exams*, at [Writing diploma exams](#).

## Units

Unit	Read as
s	seconds
min	minutes
AU or au	astronomical units
m	metres
m <sup>2</sup>	square metres
L	litres
mmHg	millimetres of mercury
m/s	metres per second
km/h	kilometres per hour
m/s <sup>2</sup>	metres per second squared
g	grams
ppm	parts per million
ppb	parts per billion
°C	degrees Celsius
V	volts
A	amperes
Ω	ohms
W	watts
J	joules

**Note:** This table includes SI units and non-SI units. Names of SI base units and SI-derived units are from National Institute of Standards and Technology, 2020.

## Unit prefixes

Unit Prefix	Read as
k	kilo
m	milli
c	centi
M	mega

## Symbols

Symbols	Read as
+	plus
−	minus
±	plus or minus
÷	divided by
×	times
<	is less than
>	is greater than
=	is equal to
\$	dollars
%	percent
→	produces

## Numerical values

Numerical Value	Read as
183.48	one hundred eighty-three decimal four eight
2 321	two thousand three hundred twenty-one
$\frac{3}{5}$	three over five
−5	negative five
+5	positive five

**Note:** Common fractions, such as  $\frac{1}{2}$ , may be read as “one over two” or “one half.”

## Chemical formulas

Chemical Formula	Read as
Fe(s)	F E solid
Mg(s)	M G solid
Fe <sup>2+</sup> (aq)	F E two positive aqueous
H <sub>2</sub> O(l)	H two O liquid
Ni <sub>2</sub> O <sub>3</sub> (s)	N I two O three solid
SO <sub>4</sub> <sup>2-</sup> (aq)	S O subscript four, superscript two negative aqueous
PO <sub>4</sub> <sup>3-</sup> (aq)	P O subscript four, superscript three negative aqueous
(NH <sub>4</sub> ) <sub>2</sub> S(aq)	open bracket N H four closed bracket two S aqueous

**Note:** Read “[subscript](#)” and “[superscript](#)” only when a formula has **both** subscripted numbers indicating the number of atoms in the species and superscripted numbers indicating the ion charge (e.g., PO<sub>4</sub><sup>3-</sup>).

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## Tables

Introduce the table starting with the title, and then identify the number of columns and rows. Tables can be read in two different ways. One way is to list the column headings and any corresponding units first. Next, read across each row from left to right, stating the column heading before reading the data in each cell. Read empty spaces in tables as “blank.”

**Some Common Substances**

Chemical Name	Chemical Formula	Common Name
Iron	Fe(s)	Iron
Sucrose	C <sub>12</sub> H <sub>22</sub> O <sub>11</sub> (s)	Table sugar
Sodium chloride	NaCl(s)	Table salt
Magnesium hydroxide	Mg(OH) <sub>2</sub> (s)	Milk of magnesia

There is a table titled “Some Common Substances” with three columns and four rows. The column headings are “Chemical Name,” “Chemical Formula,” and “Common Name.” The information in the table is as follows:

Chemical Name: Iron; Chemical Formula: F E solid; Common Name: Iron

Chemical Name: Sucrose; Chemical Formula: C twelve H twenty-two O eleven solid;  
Common Name: Table sugar

Chemical Name: Sodium chloride; Chemical Formula: N A C L solid; Common Name: Table salt

Chemical Name: Magnesium hydroxide; Chemical Formula: M G open bracket O H closed bracket two solid;  
Common Name: Milk of magnesia

	Earth	Mars
Distance from the Sun	1.0 AU (astronomical unit) (150 000 000 km)	1.5 AU (astronomical unit) (225 000 000 km)
Time required for radio waves to travel from the Sun	8.3 min	?

There is a table with two columns and two rows. The column headings are “Earth” and “Mars.” The row headings are “Distance from the Sun” and “Time required for radio waves to travel from the Sun.” The information in the table is as follows:

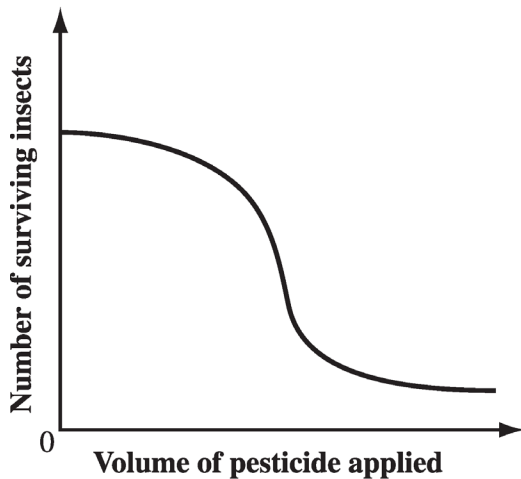
Distance from the Sun: Earth – one A U, or astronomical unit, or one hundred fifty million kilometres; Mars – one decimal five A U or astronomical units or two hundred twenty-five million kilometres.

Time required for radio waves to travel from the Sun: Earth – eight decimal three minutes; Mars – question mark.

## Graphs

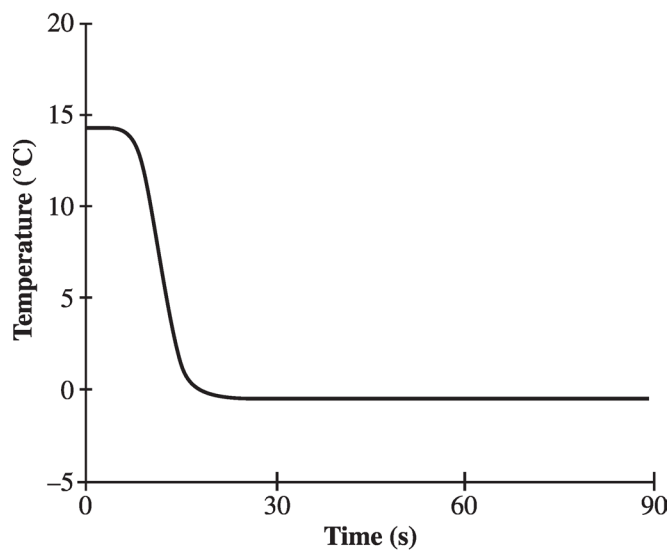
Introduce the graph starting with the title, if there is one, and then describe the labels and scales for the horizontal axis and the vertical axis. If there are no marks or scale on the axis, state so. To describe the shape of the line representing the data, reference the axis and use descriptive words such as *top*, *bottom*, *right*, *left*, *downward*, *upward*, *rises*, and *falls*. When there are four graphs for each of the multiple-choice options (A, B, C, and D), describe the labels and scales for the similarities between the graphs, such as the horizontal axis and the vertical axis, and then describe the shape of the line for each of the choices.

### Relationship Between Pesticide Application and Insect Death



There is a graph titled “Relationship Between Pesticide Application and Insect Death.” The horizontal axis is labelled “Volume of pesticide applied” and the vertical axis is labelled “Number of surviving insects.” There are no marks or scale on the axes. The line starts nearly horizontal close to the top left of the graph and curves downward until the line is nearly vertical at approximately the centre of the graph. The line then begins to curve upward until it is nearly horizontal close to the bottom right of the graph.

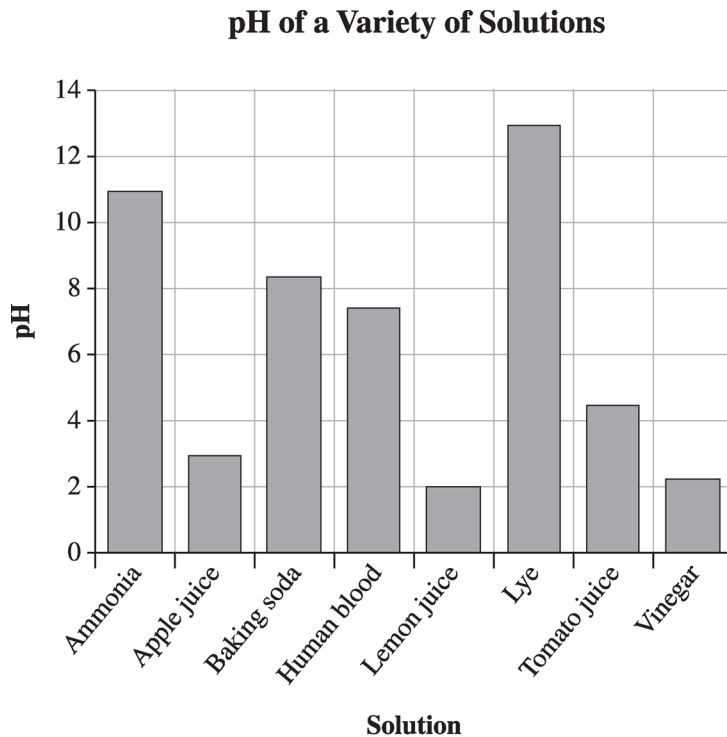
## Temperature of a Solution During a Chemical Reaction



There is a line graph titled “Temperature of a Solution During a Chemical Reaction.” The horizontal axis is labelled “Time” in seconds, scaled from zero to ninety, marked and labelled in increments of thirty. The vertical axis is labelled “Temperature” in degrees Celsius, scaled from negative five to twenty, and marked and labelled in increments of five. The line begins on the vertical axis at approximately fourteen degrees Celsius. It then falls at approximately ten seconds to become almost vertical. It then becomes horizontal, once again, at approximately twenty seconds and zero degrees Celsius and remains horizontal until it reaches the right side of the graph.

## Bar graphs

Introduce the graph starting with the title, describe the label for the horizontal axis, list the label for each bar, and then describe the label and scale for the vertical axis. Describe the height to which each labelled bar rises.



There is a bar graph titled “pH of a Variety of Solutions.” The horizontal axis is labelled “Solution” and from left to right the bars are labelled “Ammonia,” “Apple juice,” “Baking soda,” “Human blood,” “Lemon juice,” “Lye,” “Tomato juice,” and “Vinegar.” The vertical axis is labelled “pH” scaled from zero to fourteen marked and labelled in increments of two.

The bars on the graph read as follows.

Ammonia – pH approximately eleven

Apple juice – pH approximately three

Baking soda – pH approximately eight decimal two

Human blood – pH approximately seven decimal five

Lemon juice – pH exactly two

Lye – pH approximately thirteen

Tomato juice – pH approximately four decimal five

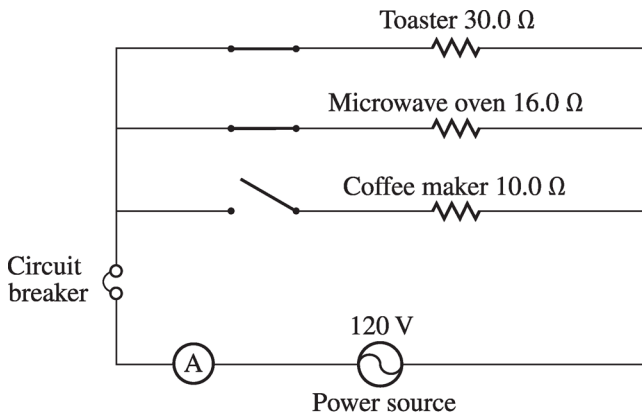
Vinegar – pH approximately two decimal two

## WHMIS pictograms

WHMIS pictogram	Name	Read as
	Gas Cylinder	A diamond containing a gas cylinder
	Flame	A diamond containing flames
	Flame over Circle	A diamond containing a burning letter O
	Corrosion	A diamond containing a test tube spilling a substance onto a surface and a test tube spilling a substance onto a human hand. Where the substance touches the surface and the hand, holes are forming and heat waves are shown.
	Skull and Crossbones	A diamond containing a skull and crossbones
	Health Hazard	A diamond containing the head and upper body of a person with a hole in the centre of the chest. The hole radiates outward in several directions.
	Biohazardous Infectious Materials	A circle containing a biohazard symbol
	Exploding Bomb	A diamond containing an exploding bomb
	Exclamation Mark	A diamond containing an exclamation mark

## Circuit diagrams

If the purpose of the question is to interpret the diagram in order to perform a calculation or identify the correct configuration of components, then the components should be identified (e.g., resistor, ammeter, voltmeter). If the purpose of the question is to identify the name or the role of the components shown, then the representation of the components should be described (e.g., a zigzag line, a circle containing an uppercase letter A).



There is a rectangular circuit shown with four horizontal wires and two vertical wires. Each of the top three wires has a switch on the left side and a resistor on the right side. The horizontal wires will be described from top to bottom as follows. On the top wire, the switch is closed and the resistor is labelled "Toaster, thirty decimal zero ohms." On the second wire, the switch is closed and the resistor is labelled "Microwave oven, sixteen decimal zero ohms." On the third wire, the switch is open and the resistor is labelled "Coffee maker, ten decimal zero ohms." The bottom wire shows an ammeter on the left and a power source labelled "Power source, one hundred twenty volts" in the middle of the wire. The vertical wire on the left side contains a labelled "Circuit breaker" located between the third and bottom horizontal wires. There are no components on the vertical wire on the right side.

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# Provincial Assessment Contacts

## Provincial Achievement Tests Help Desk

Email: [EDC.PATS@gov.ab.ca](mailto:EDC.PATS@gov.ab.ca)

## Literacy & Numeracy Screening Help Desk

Email: [litnumscreening@gov.ab.ca](mailto:litnumscreening@gov.ab.ca)

## Provincial Assessment mailing address

Provincial Assessment, Alberta Education and Childcare  
44 Capital Boulevard  
10044 108 Street NW  
Edmonton AB T5J 5E6

Alberta Education and Childcare website: [alberta.ca/education-and-childcare](http://alberta.ca/education-and-childcare)

## Online Assessment (for technical assistance)

Email: [online.assessment@gov.ab.ca](mailto:online.assessment@gov.ab.ca)

Office hours:

Monday through Friday, 8:15 a.m. to 4:30 p.m.