



Teachers' Answer Key

**For educators, group leaders
and volunteer guides**

GRADE 4 and under RESOURCES AND YOU

APEGA

What are reclamation costs?

The amount of money spent on toothpicks Your cell phone bill

- **The money spent on returning land to a natural state**

Canadian Association of Geophysical Contractors

What animals do we see on seismic jobs in Canada?

- **Grizzly Bears**
- **Elk**
- Penguins
- **Moose**
- **Beavers**
- **Bald Eagles**
- Camels

Canadian Natural

What types of rocks are oil and natural gas found in here in Alberta?

- Igneous
- Metamorphic
- **Sedimentary**

Inside Education (Monday, Tuesday)

Which of the following is a renewable resource?

- Coal
- **Wind**
- Natural gas
- Oil

Mining Matters

What do you think minerals and rocks mined in Alberta are used for?

- Creating energy
- Making roads
- Jewelry
- **All of these**

Women in Science and Engineering U Calgary

Which of the following would be the most viscous substance?

- Milk
- **Honey**
- Oil
- Water

GRADE 4 and under ENERGY FOR US

Canadian Nuclear Society

What is Canada's rank among world Uranium producers?

- 10 7 • 3 5

Canadian Rockies Earth Science Resource Centre

What device is used for detecting seismic events?

- Geophone Radio Microscope

Canadian Society of Petroleum Geologists

What do petroleum geologists explore for?

- Oil and Natural gas Uranium Gold

E3 Lithium

What is the lightest metal on the periodic table?

- Gold • Lithium Helium Unobtainium

ESfS Trilobite Fossil Station

Trilobites are some of the oldest fossils on earth. How many years old are they?

- 5,000 100 million • 500 million 900 million

Natural Resources Canada - Geological Survey of Canada (Calgary)

Match the regions with the most common types of rock(s) found there

- A. Prairies: Igneous rocks Metamorphic rocks • Sedimentary rocks
All types of rocks
- B. Canadian Shield: • Igneous rocks • Metamorphic rocks Sedimentary rocks
All types of rocks
- C. Rocky and Appalachian Mountains: Igneous rocks Metamorphic rocks Sedimentary rocks
• All types of rocks
- D. Offshore: Igneous rocks Metamorphic rocks • Sedimentary rocks All types of rocks

GRADE 4 and under ONE DYNAMIC EARTH

Alberta Palaeontological Society

Match the fossil specimen from our game with the type of fossil it is:

1) Dinosaur bone:	Imprint	Actual remains	Trace fossil	● Replacement
2) Ripple marks:	Imprint	Actual remains	● Trace fossil	Replacement
3) Fossil leaves:	● Imprint	Actual remains	Trace fossil	Replacement
4) Mammoth tusk:	Imprint	● Actual remains	Trace fossil	Replacement

Calgary Rock and Lapidary Club

What is the most common colour of the mineral 'quartz', and of the mineral 'feldspar' ?

Quartz:	red	grey	● white	green
Feldspar:	yellow	● pink	white	blue

Canadian Society of Exploration Geophysicists

Geophysicists use several different scientific tools and methods to study the Earth. Which of these is used most in the oil and gas industry?

- **Seismic** Magnetism Gravity Magnifying glass Ground penetrating radar iPhone

Department of Geoscience, University of Calgary

Which continuous Earth process causes mountains to become smaller with the passage of time?

- Earthquakes Volcanic eruptions ● **Erosion** Landslides

Drumheller Rocks GeoTours

What is the most common mineral in Earth's crust?

- **Quartz** Feldspar Uraninite Mica

E3 Project – Earthquake Early Warning Systems Education

What should you not do during an earthquake?

- Stay still during an earthquake Be calm and know what to do during the earthquake
● **Evacuate the building – run outside during the shaking** Drop. Cover and Hold On

GRADE 4 and under OUR FUTURE!

Journey 2050

How much water does it take to make a pair of blue jeans?

1100 litres 5000 litres ● **11 000 litres** 50 000 litres

Ocean Networks Canada

Ocean Networks Canada uses scientific instruments, such as hydrophones, to study the ocean. Which one of the choices below CANNOT be heard with a hydrophone?

Earthquakes Marine mammals (e.g. whales and dolphins)
Snowmobiles ● **Jellyfish swimming**

RASC Calgary

What is a simple thing you could look for if you think a rock is a meteorite from space?

Fossils Air bubbles ● **Magnetic minerals**

Ten Peaks

What type of renewable energy uses heat from deep inside the earth to produce electricity?

Wind Hydro-electricity Natural gas ● **Geothermal**

The Evict Radon National Study and Radon West

What is the radiation type that turned Bruce Banner into the Hulk?

Ultraviolet ● **Gamma rays** Microwave Alpha particles

University of Calgary Biogeoscience Institute

What is one of the main types of rock that makes up the Rocky Mountains?

Lava rock ● **Limestone** Sandstone Gemstone

Canada From Space Canadian Geographic Giant Floor Map

What is the name of Canada's most northern ocean?

Atlantic Ocean Pacific Ocean ● **Arctic Ocean** Superior Ocean

GRADE 5 and over RESOURCES AND YOU

APEGA

What does a magnetometer record?

- How big something is • **The strength of different magnetic fields**
Coins in the ground Chocolate chips in your cookies

Canadian Association of Geophysical Contractors

Which of the following can be found using sound waves in Seismic Exploration?

- **Oil** • **Gas** Wine • **Potash** Fruit • **Buried Treasure** • **Helium** • **Salt**

Canadian Natural

What is the name of the carbon capture storage facility that has captured over 5 million tonnes of CO₂?

- Crusade • **Quest** Pursuit

Inside Education (Monday, Tuesday)

What natural resource does Alberta use for most of its electricity?

- Coal Wind • **Natural gas** Oil

Mining Matters

Which of the following critical minerals or elements are used to manufacture a Smartphone battery?

- Lithium (Li) Nickel (Ni) Cobalt (Co) • **All of these**

Women in Science and Engineering U Calgary

Which of the following do you think is a non-Newtonian fluid? (particles that are suspended/'stuck'?)

- Water • **Paint** Oil Rubbing Alcohol

GRADE 5 and over ENERGY FOR US

Canadian Nuclear Society

How many years can nuclear energy sustain our civilization?

- 10 100 1000 • **Until the sun explodes (billions of years)**

Canadian Rockies Earth Science Resource Centre

Name the most common geophysical method used for accurately locating targets to drill in the subsurface.

- **Seismic Survey** Aeromagnetic Survey Gravity Survey

Canadian Society of Petroleum Geologists

How do petroleum geologists find oil and natural gas?

- By hitting rocks with hammers By surveying with a divining rod
• **By drilling wells and working with exploration geophysicists and engineers**

E3 Lithium

Where in Canada is one of the largest (globally) lithium brine deposits?

- British Columbia Ontario Quebec • **Alberta**

ESFS Trilobite Fossil Station

When trilobites grow and shed their shell it is called....

- Growth Spurt Shell Removal • **Moulting** Dead Skin

Natural Resources Canada - Geological Survey of Canada

Match the regions with the types of energy extracted or produced there:

- | | | | | | | |
|-----------------------|----------------------|---------------|------------------|-------------------------|---------------|----------------|
| A. Sedimentary Basins | • Oil and Gas | • Coal | Nuclear | Hydro-electric | • Wind | • Solar |
| B. Canadian Shield | Oil and Gas | Coal | • Nuclear | • Hydro-electric | • Wind | • Solar |
| C. Mountains | • Oil and Gas | • Coal | Nuclear | • Hydro-electric | • Wind | • Solar |
| D. Offshore | • Oil and Gas | Coal | Nuclear | Hydro-electric | • Wind | Solar |

GRADE 5 and over ONE DYNAMIC EARTH

Alberta Palaeontological Society

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Fossil leaves:	● Imprint	Actual remains	Trace fossil	Replacement
Mammoth tusk:	Imprint	● Actual remains	Trace fossil	Replacement

Calgary Rock and Lapidary Club

What common Alberta rock contains: quartz, feldspar, and mica?

Sandstone Limestone ● **Granite**

Canadian Society of Exploration Geophysicists

There are many different types of seismic waves. Identify 2 from the following list:

- **P-wave or Compressional Wave** Tsunami waves ● **S-wave or Shear Wave**
- Turbulence Queen Elizabeth II's friendly royal wave

Department of Geoscience, University of Calgary

Why does the Earth's surface contain fewer impact craters than the surface of the Moon?

- Earth is younger than Moon and so has suffered fewer impacts
- Earth's ocean covers most of the craters
- Earth was hit by fewer meteorites

- **Craters on Earth were erased by erosion and other processes**

Drumheller Rocks GeoTours

What is the most common element in Earth's core?

Nickel ● **Iron** Silicon Oxygen

E3 Project – Earthquake Early Warning Systems Education

What does EEWS stand for?

- Environmental Early Warning System
- Energy, Environment, Water and Sustainability
- **Earthquake Early Warning System**
- Eye and Ear Wash and Shower combination

GRADE 5 and over OUR FUTURE!

Journey 2050

How much water does it take to make a pair of blue jeans?

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Ocean Networks Canada

Ocean Networks Canada uses scientific instruments, such as hydrophones, to study the ocean. Which one of the choices below is an anthropogenic (human-made) source of sound that a hydrophones can record?

Earthquakes ● **Boats** Marine mammals (e.g. whales and dolphins) Fish

RASC Calgary

Which is the best answer for “Why are impact craters more common on the Moon than on the Earth even though both bodies sit within the inner Solar System?”

- a. The Moon has no atmosphere and most small asteroids and comets burn up in the Earth’s atmosphere before hitting the surface
- b. There is essentially no erosion on the Moon and thus just about any impact can be preserved forever
- c. The Moon’s compact size means that its gravity is stronger than that of Earth’s
- d. Plate tectonics on Earth helps erase some older craters
- e. ● **All answers EXCEPT c. are correct**

Ten Peaks

Where does the Alberta Carbon Trunk Line (the world's largest carbon capture, utilization and storage project) begin and end?

Redwater, AB, to an injection site near Red Deer, AB ● **Redwater, AB, to an injection site near Clive, AB**
Edmonton, AB, to an injection site near Red Deer, AB Edmonton, AB, to an injection site near Clive, AB

The Evict Radon National Study and Radon West

What is the atomic number for radon?

222 35 79 ● **86**

University of Calgary Biogeoscience Institute

A glacially deposited rock differing from the type of rock native to the area in which it rests is called...

A moraine A glacier ● **An erratic** A pebble

Canada From Space Canadian Geographic Giant Floor Map

What is the name of Canada’s most northern ocean?

Atlantic Ocean Pacific Ocean ● **Arctic Ocean** Superior Ocean

Supplemental Questions

Calgary Rock and Lapidary Club

What is a common use of granite?

Kitchen counter tops; boat hulls; aeroplane wings

Correct answer: kitchen counter tops

Canadian Association of Geophysical Contractors

What year was the Canadian Association of Geophysical Contractors formed?

Clue: Elvis died and the Voyager Space probes were launched into space.

Correct answer: 1977

Canadian Nuclear Society

How many reactors are there in the world? Is it more than:

100 200 300 400*

There are over 400 operating civilian nuclear power reactors in the world. Plus a number of research reactors and naval reactors

<https://world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>

How many civilian nuclear power reactors are under construction worldwide? Is it more than:

20 30 40 50*

55 reactors are currently under construction, the majority of which are in China.

<https://world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx>

What is an SMR?

Superman Returns Super Massive Reactor Single Male Retired Small Modular Reactor*

Small Modular Reactors. SMRs already exist and are a proven technology. Currently used primarily by the worlds advanced navies in submarines and aircraft carriers. SMRs are beginning to break into the civilian market. Unlike the big reactors like the 600+ megawatt CANDU, the 1100 megawatt AP-1000 or the 1600 Megawatt French EPR, Small Modular Reactors are in the 50 to 300 megawatt range. They will be manufactured in factories and then transported by road or rail to the powerplant. They can be used alone or in six or 12-pack configurations. Many of them can be cooled by just air flowing around them and some of them are even designed to operate with molten liquid fuel, which means they cannot meltdown.

<https://www.energy.gov/ne/advanced-small-modular-reactors-smrs>

How many new reactors are currently planned for Canada?

5 8 7 2*

There are currently two new Small Modular Reactors (SMR) being planned in Canada. One will be built next to the existing CANDU Reactors at Darlington Nuclear Generating Station just outside Toronto and Saskatchewan has selected a design and is currently developing a regulatory framework.

<https://www.saskatchewan.ca/government/news-and-media/2022/march/28/provinces-release-strategic-plan-to-advance-small-modular-reactors>

Canadian Society of Exploration Geophysicists

In what Canadian city will you find the greatest concentration of geophysicists?

a) Edmonton b) Toronto c) Calgary d) Ottawa e) Halifax

Correct answer: c) Calgary

Department of Geoscience, University of Calgary

Which is the most common rock that forms Earth's crust?

Granite Basalt Limestone Sandstone

Correct answer: Basalt

Drumheller Rocks GeoTours

What is the most abundant rock type on Earth's crust?

Granite Limestone Basalt Sandstone

Correct answer: Basalt

Journey 2050

What kind of light makes barite glow through fluorescence?

Infrared Radio waves Ultraviolet Orange

Correct answer: Ultraviolet

Ocean Networks Canada

Which one of the choices below is a way in which marine organisms use sound?

For communication For hunting Neither of these Both of these

Correct answer: Both of these

The Evict Radon National Study and Radon West

What is the leading cause of lung cancer for non-smokers?

Answer: Radon

Is radon located to one geographical area?

Answer: No, it is in all areas.

What does radon smell like?

A. Answer: It has no odor, colour or taste. The only way to tell if you have radon in your home, is to test.

Which house type would have higher radon?

A normal house A boat house A tree house The international space station

Correct answer A normal house

Women in Science and Engineering (WISE)

WISE's demo is about Newtonian (new-tow-knee-un) and non-Newtonian fluids. Newtonian fluids are liquids that behave 'normally, such as water. Brainstorm for a minute, how does water behave when you apply pressure to it? Does it easily run through your fingers? Of course it does! Does it become solid or thicker when you splash about in a pool? Of course not! Non-Newtonian fluids are harder to describe than water, including our ooze.

This ooze is made up of small particles of cornstarch that are suspended/ "stuck" floating in the water, not dissolving. When you squish it or poke it, what do you notice? That is right, it changes from liquid to solid! When you touch it, you are applying pressure to the ooze. This pressure forces the cornstarch particles closer together and push the water away. The cornstarch doesn't move as easily and makes the cornstarch thicker/more viscous and act like a solid!

This is what makes our ooze 'non-Newtonian'. Non-Newtonian fluids behave differently under different conditions, including pressure. Some of them, like our ooze, get thicker under pressure while others become runnier.