



ESfS Earth Science
for Society



Resources and You



Energy for Us



One Dynamic Earth



Our Future!

March 15, 16, 17, 2020
Big Four Building
Stampede Park

FREE admission!

Open to the public

11:30 am - 5:00 pm Sunday March 15
8:45 am - 2:30 pm Monday March 16
6:00 pm - 9:00 pm Monday March 16
8:45 am - 2:30 pm Tuesday March 17

Scavenger Booklet
Grade 5 and over

sponsored by

Canadian
Geological
Foundation



Fondation
géologique
du Canada

ESfS is hosted by



Earth Science for Society

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Exhibitors

Resources and You (Grade 5 and over: p S4-S5 Grade 4 and under: p J2-J3)

Alberta Palaeontological Society (Sunday only)
Canadian Natural
CREWES, University of Calgary
Inside Education (Monday and Tuesday only)
Mining Matters
Natural Resources Canada - Geological Survey of Canada
Yukon Dan Gold Panning

Energy for Us (Grade 5 and over: p S6-S7 Grade 4 and under: p J4-J5)

Canada Action
Canadian Association of Geophysical Contractors
Canadian Nuclear Society
Canadian Rockies Earth Science Resource Centre (CRESRC)
CSPG Foundation
ESFS Trilobite Fossil Station
Let's Talk Science
PetroLMI
Society of Petroleum Engineers Calgary Section

***Visit the 4 pavilions and
answer any exhibitor's
question to get a stamp!***

One Dynamic Earth (Grade 5 and over: p S8-S9 Grade 4 and under: p J6-J7)

Burgess Shale Geoscience Foundation
Calgary Rock and Lapidary Club
Calgary Zoo
Canmore Museum and Geoscience Centre
Department of Geoscience
Frank Slide Interpretive Centre
Ocean Networks Canada
Parks Canada Agency
Roots 2 STEM

Our Future! (Grade 5 and over: p S10-S11 Grade 4 and under: p J8-J9)

AirTerra Inc.
Canadian Society of Exploration Geophysicists
Canadian Space Agency / Agence spatiale canadienne
Earth Science Stories
Energy Production and Transmission Canadian Geographic Giant Floor Map
Evict Radon
Journey 2050
Lafarge Canada Inc.
Rothney Astrophysical Observatory
Royal Astronomical Society of Canada
Women in Science and Engineering (WISE)

***Answer the questions for
the prize draw (page 13)
and you may win!***

Pavilion exhibits subject to change



Resources and You

Grade 5 and over

Canadian Natural

What are the two main types of data used by Geoscientists to identify possible locations of hydrocarbon reservoirs underground?

- Well logs Density curves Gravity maps Seismic data

CREWES, University of Calgary

What are three types of man-made seismic sources?

- Dynamite Vibroseis Weight-drop Earthquakes

Inside Education (Monday and Tuesday only)

Which of the following non-renewable resources are used to produce energy?

- Coal Natural gas Oil Uranium All of these



Resources and You

Grade 5 and over

Mining Matters

Why would a scientist want to look at a thin section of rock under a microscope?

- To see the shape of the particles To see the different minerals in the rock
 To better understand some of Earth's processes All of these

Natural Resources Canada - Geological Survey of Canada

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

- | | | | |
|--------------------|--------------------------------------|----------------------------|-------------------------------|
| Sedimentary Basins | <input type="radio"/> Oil and Gas | <input type="radio"/> Coal | <input type="radio"/> Nuclear |
| | <input type="radio"/> Hydro-electric | <input type="radio"/> Wind | <input type="radio"/> Solar |
| Canadian Shield | <input type="radio"/> Oil and Gas | <input type="radio"/> Coal | <input type="radio"/> Nuclear |
| | <input type="radio"/> Hydro-electric | <input type="radio"/> Wind | <input type="radio"/> Solar |
| Mountains | <input type="radio"/> Oil and Gas | <input type="radio"/> Coal | <input type="radio"/> Nuclear |
| | <input type="radio"/> Hydro-electric | <input type="radio"/> Wind | <input type="radio"/> Solar |
| Offshore | <input type="radio"/> Oil and Gas | <input type="radio"/> Coal | <input type="radio"/> Nuclear |
| | <input type="radio"/> Hydro-electric | <input type="radio"/> Wind | <input type="radio"/> Solar |

Yukon Dan Gold Panning

What mineral tricked many people?

- Sulphur Calcite Iron pyrite (fool's gold)



Energy for Us

Grade 5 and over

Canada Action

After oil is retrieved from the ground, it is refined into many products we use every day. Which of these are made from petroleum?

- Plastics Asphalt for roads Cellphones, computers All of these

Canadian Association of Geophysical Contractors

Which of these jobs do we do on a seismic program?

- Safety Manager Driller Doctor Permit man
 Surveyor Helicopter Pilot Jug Hound Architect

Canadian Nuclear Society

How many years can nuclear energy sustain our civilization?

- 100 1000 10,000 100,000 Over 1,000,000

Canadian Rockies Earth Science Resource Centre (CRESRC)

Which is the most common geophysical method used for accurately locating oil in the Earth?

- Seismic Survey Aeromagnetic Survey Gravity Survey

CSPG Foundation

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



Energy for Us

Grade 5 and over

ESFS Trilobite Fossil Station

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

- Growth Spurt Shell Removal Moulting Dead Skin

Let's Talk Science

What is the purpose of the gearbox in a horizontal-axis wind turbine?

- Scare away birds Convert wind power to electricity
 Increase rotation speeds of the shaft to maximize generator activity

PetroLMI

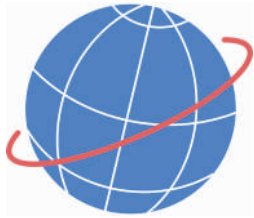
What products are made available because of oil and gas?

- Gasoline and diesel fuel for cars, trucks, buses, trains, boats, jet fuel for airplanes, natural gas to heat homes
 Toothpaste, telephones, garden tools, lipstick.
 Plastics, synthetic rubber, lubricants, paints, solvents, asphalt and roofing, insulation and fertilizers.
 All of these

Society of Petroleum Engineers Calgary Section

How does the oil and gas industry make use of carbon dioxide?

- It can be injected into oil wells to help push the oil to surface and increase recovery
 It is mixed with other gases to reduce its effect It is added to refined petroleum



One Dynamic Earth

Grade 5 and over

Burgess Shale Geoscience Foundation

About how old are the Burgess Shale fossils?

510 Centuries

510 Thousand years

510 Million years

Calgary Rock and Lapidary Club

What category is the rock limestone from?

Igneous

Metamorphic

Sedimentary

Calgary Zoo

Organisms preserve as fossils differently depending on the structure of the organism and where they laid for preservation.

Choose the order of best preservation for the following organisms:

Whooping crane feather, turtle shell, gorilla metatarsal (hand bone), red wiggler worm

Turtle shell, gorilla metatarsal (hand bone), whooping crane feather, red wiggler worm

Gorilla metatarsal (hand bone), turtle shell, whooping crane feather, red wiggler worm

Turtle shell, gorilla metatarsal (hand bone), red wiggler worm, whooping crane feather

Canmore Museum and Geoscience Centre

What rock found in the Bow Valley is made from compressed organic material?

Limestone

Sandstone

Coal

Department of Geoscience

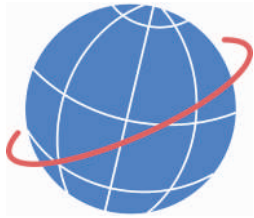
Why are there fewer craters on the surface of the Earth compared to the Moon?

Earth is younger than the Moon

Earth's oceans cover the craters

Earth was hit by fewer meteorites

Craters on Earth were erased by erosion and other processes



One Dynamic Earth

Grade 5 and over

Frank Slide Interpretive Centre

An estimated _____ tonnes of rock fell from Turtle Mountain in _____ seconds.

- 1 billion tonnes / 450 seconds
- 33 million tonnes / 30 seconds
- 500 tonnes / 5 minutes
- 110 million tonnes / 90 seconds

Ocean Networks Canada

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

- Earthquakes
- Marine mammals such as whales and dolphins
- Snowmobiles
- Jellyfish swimming

Parks Canada Agency

Find a fossil trilobite and look at it carefully. Why is it called a trilobite?

- It has a big mouth to bite things
- It has three body parts (lobes)
- The person who found the first one and named it was called Trilob

Roots 2 STEM

What is the most abundant element in the Earth's crust?

- Carbon
- Oxygen
- Nitrogen



Our Future!

Grade 5 and over

AirTerra Inc.

What are the ingredients plants need for Photosynthesis to take place?

- Carbon Dioxide Water Light All of these

Canadian Society of Exploration Geophysicists

What are two types of Seismic Waves?

- P-waves Tsunamis S-waves Turbulence

Canadian Space Agency / Agence spatiale canadienne

How far away from Earth do satellites orbit?

- 50-100 km 400- 36000 km 10 000-100 000 km

Earth Stories

What killed all the dinosaurs?

- A Meteorite impact A disease Human activity

Energy Production and Transmission Canadian Geographic Giant Floor Map

Most oil and natural gas is transported from Alberta to the rest of Canada and the USA by

- Trains Trucks Airplanes Pipelines

Evict Radon

Radon is the leading cause of which type of cancer?

- Skin Lung Liver Stomach

Journey 2050

What is it called when you grow plants without soil?

- Indoor gardening Aquaculture Hydroponics



Our Future!

Grade 5 and over

Lafarge Canada Inc.

What natural processes would help to deposit sand and gravel?

- Glaciers Rivers Wind All of these

Rothney Astrophysical Observatory

What is a satellite?

- A human-made machine that orbits the earth An asteroid
 A meteorite

Royal Astronomical Society of Canada

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

- Most smaller asteroids and comets burn up in the Earth's atmosphere before hitting the surface but the Moon has no atmosphere to do this
 There is essentially no erosion on the Moon and thus just about any impact can be preserved forever
 The Moon's compact size means that its gravity is stronger than that of the Earth
 Plate tectonics on Earth helps erase some older craters

Women in Science and Engineering (WISE)

Which of the following do you think is a non-Newtonian fluid?

(Hint: Which one has particles that are suspended / 'stuck'?)

- Water Paint Oil Rubbing Alcohol?

Geo-Theatre Presentations

Dr Dale Leckie 1:00 pm and 3:00 pm Sunday

Rocks, Ridges, and Rivers Why are Canada's mountain parks so spectacular?

Award-winning geologist and best-selling author Dr. Dale Leckie guides you through the Canadian Rocky Mountain National Parks. Geology and geomorphology have created that amazing scenery in Banff, Yoho and Jasper National Parks.



The story of the Rockies, its rivers and valleys, glaciers and hot springs, caves and karst, mountain building and erosion unfolds. With eye-catching illustrations, art work, and photographs, this presentation blends story telling with science and natural beauty with easy to understand explanations.

Mr Dean White (Roots 2 STEM) 2:00 pm Sunday
Search for Life in Space

Dean White is the Founder and CEO of Roots 2 STEM. His career has taken him around the world, from the North Sea to Nigeria, from Alberta's Oil Patch to the Arctic. He has worked on telecommunication and navigation systems around the world, military projects and CATV networks here in Canada.



In addition, Dean is an inventor, holding a patent for a low-profile wind turbine. After a successful career as a professional engineer, Dean decided to create a learning centre where students could learn about engineering and technology in a hands-on environment long before they leave high school.

Visit the Mars Rover on the exhibit floor

Alberta Palaeontological Society Visit us on Sunday to get a special stamp

Prize draw contest for K-12 students
Answer the questions to be eligible to win a prize!

What did you learn about today?

you can check more than one answer

- | | |
|---|--|
| <input type="checkbox"/> Gold/gold panning | <input type="checkbox"/> Seismic energy |
| <input type="checkbox"/> Rocks and minerals | <input type="checkbox"/> Space |
| <input type="checkbox"/> Fossils/trilobites | <input type="checkbox"/> Uses of natural resources |
| <input type="checkbox"/> Oil and Gas | <input type="checkbox"/> Natural disasters |
| <input type="checkbox"/> Renewable resources | <input type="checkbox"/> Earth processes |
| <input type="checkbox"/> Oceans | <input type="checkbox"/> Plants/vegetation |
| <input type="checkbox"/> Technology/Instruments | <input type="checkbox"/> Animals |
| <input type="checkbox"/> Possible careers | <input type="checkbox"/> Other |

What did you like best about ESfS?

you can check more than one answer

- | | |
|--|---|
| <input type="checkbox"/> Hands-on activities | <input type="checkbox"/> It made science fun |
| <input type="checkbox"/> Lots of cool information | <input type="checkbox"/> Lots of awesome topics |
| <input type="checkbox"/> Friendly/informative people | <input type="checkbox"/> Different themes |
| <input type="checkbox"/> Atmosphere/freedom | <input type="checkbox"/> Career info |
| <input type="checkbox"/> Models/displays | <input type="checkbox"/> Freebies |
| <input type="checkbox"/> Scavenger book/stamps | <input type="checkbox"/> It made learning fun |
| <input type="checkbox"/> Info about the Earth | <input type="checkbox"/> I learned cool new stuff |
| <input type="checkbox"/> Other | |

Has this visit increased your interest in science & engineering?

Yes No

Has this visit increased your understanding of science & engineering?

Yes No

Do you think you will study science or engineering?

Yes No

Would you consider a career in science or engineering?

Yes No

Tell us something about your experience today

So we can contact you if you win: (please print clearly)

Name _____ Age _____

School/youth groups only: School/Youth group _____

Public visitors only: Parent/Guardian name _____

and Home phone _____

Tear out this page and drop it in the box or give it to your guide

Exhibitors' Websites

AirTerra Inc.	http://airterra.ca/
Alberta Palaeontological Society	http://www.albertapaleo.org/
Burgess Shale Geoscience Foundation	https://www.burgess-shale.bc.ca/
Calgary Rock and Lapidary Club	https://crlc.ca/
Calgary Zoo	https://www.calgaryzoo.com
Canada Action	https://www.canadaaction.ca/
Canadian Association of Geophysical Contractors	http://www.cagc.ca/
Canadian Geographic Education	https://cangeoeducation.ca/
Canadian Natural	https://www.cnrl.com/
Canadian Nuclear Society	https://www.cns-snc.ca/
Canadian Rockies Earth Science Resource Centre	http://www.cresrc.ca/
Canadian Society of Exploration Geophysicists	https://cseg.ca/outreach
Canadian Space Agency / Agence spatiale canadienne	https://asc-csa.gc.ca/eng/default.asp
Canmore Museum and Geoscience Centre	http://www.canmoremuseum.com/
CREWES, University of Calgary	https://www.crewes.org/
CSPG Foundation	http://cspg.org/CSPG/foundation/
Dale Leckie (Geo-Theatre soaker)	https://brokenpoplars.ca/
Department of Geoscience	https://geoscience.ucalgary.ca/
Earth Science for Society	https://esfscanada.com/
Evict Radon	https://evictradon.ca/
Explor Geophysical	https://explor.net/
Frank Slide Interpretive Centre	https://www.frankslide.ca/
Inside Education	http://www.insideeducation.ca/
Journey 2050	http://www.journey2050.com/
Lafarge Canada Inc.	https://www.lafarge.ca/en
Let's Talk Science	http://outreach.letstalkscience.ca/ucalgary.html
Mining Matters	http://miningmatters.ca/
Natural Resources Canada-Geological Survey of Canada	https://www.nrcan.gc.ca/home/
Ocean Networks Canada	http://www.oceannetworks.ca/
Parks Canada Agency	https://www.pc.gc.ca/en/pn-np/bc/yoho/activ/burgess
PetroLMI	https://www.careersinoilandgas.com/
Roots 2 STEM	http://www.roots2stem.ca/
Rothney Astrophysical Observatory	https://www.ucalgary.ca/rao/
Royal Astronomical Society	https://calgary.rasc.ca/
Society of Petroleum Engineers Calgary Section	http://calgary.spe.org/home
Women in Science and Engineering (WISE)	https://www.uofcwise.com/
Yukon Dan Gold Panning	http://www.yukondan.com/

ESfS Organizing Committee

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Annette Milbradt (Budget and Finance chair)

Bruce Moore (Sponsorship chair)

Daniela Waldbott von Bassenheim (Speakers chair)

Glenn Malcolm (ESfS in Motion chair)

Helen Isaac (Program Delivery chair)

Hilary Schumacher (Volunteers chair)

Judith Chan (Volunteers vice-chair)

Julia Davison (Sponsorship vice-chair)

Monica Magbanua (Program delivery vice-chair)

Rebecca Haspel (Venue/Logistics chair)

Ryan Day (Marketing chair)

Taylor Foret (Venue/Exhibits chair & Logistics vice-chair)

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Patrick Lagasca

Phil Harms

Renu Sahota

Rick Wierzbicki

Richard Chow

Siobhan McGoldrick

Steven Lynch

Sydney Thomson



Our Future!

Grade 4 and under

Journey 2050

How much water is needed to make a pair of jeans?

- 110 litres
- 1,100 litres
- 11,000 litres (small swimming pool)

Lafarge Canada Inc.

Where do you find everyday uses for sand and gravel?

- Buildings (houses, school, etc.)
- Roads
- Sidewalks
- All of these

Rothney Astrophysical Observatory

What is a satellite?

- A human made machine that orbits the earth
- An asteroid
- A meteorite

Royal Astronomical Society of Canada

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

- Fossils
- Air bubbles
- Magnetic minerals

Women in Science and Engineering (WISE)

Which of the following would be the most viscous substance?

- Milk
- Honey
- Oil
- Water



Our Future! is sponsored by ESFS



Our Future!

Grade 4 and under

AirTerra Inc.

Something plants do not need to survive

- Water
- Sunlight
- Sugar
- Nutrients
- Carbon Dioxide

Canadian Society of Exploration Geophysicists

How old is planet Earth?

- 4000 years
- 4.6 million years
- 4.6 billion years

Canadian Space Agency

True or false: Farmers can use radar images to monitor their crops.

- True
- False

Earth Science Stories

What is an ammonite?

- A type of meteorite
- A rock
- A sea-shell creature that died out with the dinosaurs

Energy Production and Transmission Canadian Geographic Giant Floor Map

Most oil and natural gas is transported from Alberta to the rest of Canada and the USA by

- Trains
- Trucks
- Airplanes
- Pipelines

Evict Radon

Is radon?

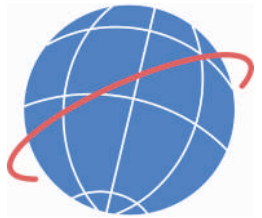
- Solid
- Liquid
- Gas

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Page 18

One Dynamic Earth

Grade 4 and under



Frank Slide Interpretive Centre

What is the primary type of rock that fell from the top of Turtle Mountain?
 Sandstone Shale Conglomerate Limestone

Ocean Networks Canada

Ocean Networks Canada uses scientific instruments, such as hydrophones, to study the ocean. One of the choices below CANNOT be heard on a hydrophone. Which one is it?
 Earthquakes Marine mammals such as whales and dolphins
 Snowmobiles Jellyfish swimming

Parks Canada Agency

Find a Burgess Shale fossil. How old is it?
 500 thousand years 500 million years 500 years

Roots 2 STEM

What is the only type of rock that can float on water?
 Sandstone Pumice Granite

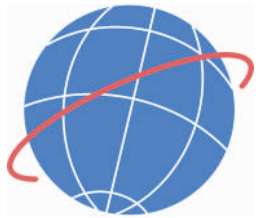
One Dynamic Earth is sponsored by

Canadian Society of Exploration Geophysicists Foundation



One Dynamic Earth

Grade 4 and under



Burgess Shale Geoscience Foundation

About how old is the Earth?

- 4.5 Thousand years
- 4.5 Million years
- 4.5 Billion years

Calgary Rock and Lapidary Club

What is a common rock that can be easily found in Calgary?

- Granite
- Basalt
- Agate
- Limestone
- Quartz
- Sandstone

Calgary Zoo

Decomposers change soil composition by doing what?

- Breaking down rocks into smaller pieces
- Changing rocks into decaying material
- Breaking down decaying plants and other material into minerals that plants can use
- Changing decaying material into rocks

Canmore Museum and Geoscience Centre

What type of rock is used to make objects you might eat or drink out of?

- Shale
- Limestone
- Sandstone

Department of Geoscience, University of Calgary

Which continually occurring process causes mountains to become smaller with passage of time?

- Earthquakes
- Volcanoes
- Landslides
- Erosion

One Dynamic Earth is sponsored by

Canadian Society of Exploration Geophysicists Foundation



Energy for Us

Grade 4 and under



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

Let's Talk Science

What is the ultimate source of wind energy?

- Thunderstorms
- The moon
- The sun

PetrolMI

What is the most common way to transport Canadian oil and gas?

- Pipeline
- Rail (train)
- Truck
- Ship

Society of Petroleum Engineers Calgary Section

What is petroleum?

- Petroleum is a naturally occurring liquid found beneath the Earth's surface that can be refined into fuel
- The liquid bought at gas station
- A kind of jelly



Energy for Us is sponsored by
Canadian Society of Petroleum Geologists Foundation

Energy for Us

Grade 4 and under



Canada Action

Over millions of years heat and pressure slowly transformed decayed animals and _____ into the fossil fuels we use today.

Crayons Plants Pizza

Canadian Association of Geophysical Contractors

Which of these animals could we encounter when working in Western Canada?

Caribou Camel Lynx Grizzly Bear

Elephant Elk Tiger

Canadian Nuclear Society

What is Canada's rank among world Uranium producers?

1st 2nd 3rd

Canadian Rockies Earth Science Resource Centre

What device is used for detecting seismic waves while exploring for oil and/or natural gas?

Radio Microscope Geophone

CSPG Foundation

What do petroleum geologists explore for?

Oil and Natural gas Uranium Gold



Resources and You

Grade 4 and under



Mining Matters

What can you see by looking at a thin section of a rock under a microscope?

Nothing

Dots

More rocks

The minerals in the rock

Natural Resources Canada - Geological Survey of Canada

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

Prairies:

Igneous rocks Metamorphic rocks

Canadian Shield:

Sedimentary rocks All types of rocks

Rocky and Appalachian Mountains:

Sedimentary rocks All types of rocks

Offshore:

Igneous rocks Metamorphic rocks

Sedimentary rocks All types of rocks

Yukon Dan Gold Panning

What is Gold Fever?

The sickness for gold (money)

Illness suffered by gold miners



Resources and You is sponsored by
Canadian Natural

Resources and You

Grade 4 and under



Canadian Natural

Where are oil and natural gas deposits found underground?
 In underground rivers In large, open caverns
 In open pore spaces between rock grains

CREWS, University of Calgary

What does a seismometer record?
 Earthquakes Music Television programs Sales

Inside Education (Monday and Tuesday)

What is a natural resource?
 Something from nature used to meet human needs
 Something that lasts forever
 Something that disintegrates

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Canadian Natural



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Stampede Park

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Junior Scavenger Booklet Grade 4 and under

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