

NATURE DISCOVERY BACKPACK
GEOLOGY ACTIVITY WORKBOOK

CONNECTING WITH NATURE

A PROGRAM OF:



DELIVERED WITH:



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ACKNOWLEDGEMENTS

This workbook was created together by Watersheds Canada and Gravenhurst Public Library with the common goal to educate students and families about the benefits of healthy waterways, lakes, and the surrounding environment for our collective future. This book is linked to the Ontario curriculum for grades K-8. Photography in this book is provided by Watersheds Canada unless otherwise labelled. Cover photo: Getty Images.

Gravenhurst Public Library (GPL) serves a community of 13,000 people and helps to promote a balance between the protection and the enjoyment of Muskoka's beautiful natural landscape. GPL offers a variety of programs, resources, and services for all ages. It is equipped with Wi-Fi and computers and provides tools like park passes, fishing rods, and adventure packs, for people to explore Muskoka and learn about the environment.

GPL acknowledges that the Anishnaabeg, Haudenosaunee and Metis people were and are still the keepers and caretakers of the land and waters upon which the Town of Gravenhurst now sits. This is covered by the Williams Treaty and the One Dish with One Spoon Treaty. GPL is deeply grateful for the enduring presence of Indigenous Peoples who have shaped and strengthened this community for the benefit of future generations. GPL is committed to moving forward in the spirit of reconciliation and respect.

Watersheds Canada is a federally incorporated charity (863555223RR0001) committed to providing education and stewardship programs to communities and individuals across the country to enhance and protect the health of their lakes, rivers, and shorelines.

This Nature Discovery program is made possible because of support from:



**TD Friends of the
Environment
Foundation**

GETTING READY TO EXPLORE NATURE



Ontario's Badlands. Photo: Getty Images.

We are so excited for you to explore your local nature and the geology of it. You will learn about many different things and how to protect the health of our local natural spaces and beyond!

You can keep this workbook! This workbook will give you tips to safely explore nature, as well as information about geology. You will learn how you can help protect nature. The workbook will teach you what you can do to help nature, with fun activities along the way!

Please return all field materials in the backpack.

If you are interested in learning more about Watersheds Canada, please visit watersheds.ca or scan this QR code!



STAYING SAFE



Here are some things to keep in mind when exploring outside:

- Bring a hat, snacks, reusable bottle with water, sunscreen, and bug spray.
- Tell someone where you are going and when you will be back.
- Watch wildlife from a safe distance. Do not handle wild things!
- Do not climb rocks without coming up with a safe plan with an adult.
- Please leave nature for everyone to enjoy. Do not pick any plants or bring home any wildlife or insects with you.
- Make sure to bring back your garbage so that you can properly get rid of it at home. With the help of an adult, you can also pick up any garbage you find in nature and bring it home for disposal!
- **There are ticks in the area. Wear long sleeves and long pants if walking in a wooded area. Learn more about tick safety: <https://www.ontarioparks.com/parksblog/how-to-protect-yourself-from-ticks/>**

WHAT IS IN MY BACKPACK?

Observation Tools

- Use the trowel kit, magnifying glass, deep soil sieve, and magnifier box to learn about your local soil, rocks, and ecosystems!



Identification Guide

Use the identification guide to learn more about rocks, minerals, gemstones, and fossils. This guide shows photos and information about each kind.



ACTIVITY #1: GEMS AND ROCKS

In this activity, learn new vocabulary that is used in the describing of gems, minerals, and rocks!

S I A G E M H S R
L P A M B O A H O
C G E O L O G Y C
R O I C S U P L K
U O T L K D J T B
M U F A L L U E U
B L L A I I E L B
L E J A G G E D L
Y B S M O O T H R

Geology
Jagged

Speckled
Gem

Rock
Crumbly

Dull
Smooth

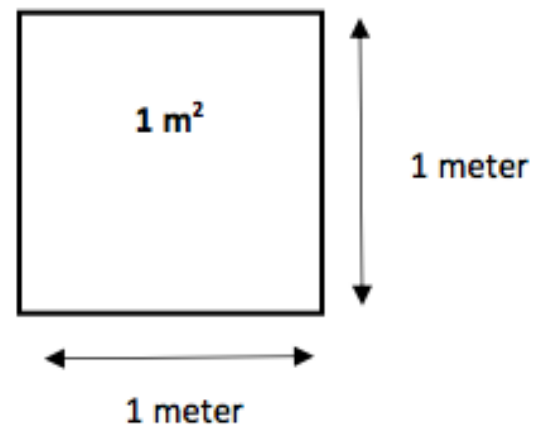
ACTIVITY #2:

LIFE IN A SQUARE

In this activity, you will discover the diversity of living (biotic) species and non-living (abiotic) factors in a specific spot.

Find an area that seems to have a lot of biodiversity present. Your area should be about 1 square meter (m) in size.

On the next page, draw a top view of the area. Draw in any plants, rocks, insects, pollution, leaves, and other features you find.



Kneel next to one side of your spot, and look around carefully. As you draw what you find, label what you can using your identification guides.

If you do not know the name of a species or rock, snap a picture and try figuring it out online using a website like [iNaturalist](#) or by asking a trusted adult.

Date: _____ **Time:** _____

Weather conditions: _____

Follow-up questions:

1. How would you describe the diversity of your spot: high or low?
2. What non-living (abiotic) factors might affect what lives in this spot?

ACTIVITY #3: MAKE A SOIL-ARIUM

Materials:

- A recycled jar with a wide opening and a lid
- Organic yard debris, like fallen leaves, grass clippings, dirt
- Old newspaper
- Fruit and vegetable peels, cores, and scraps from the kitchen
- 1 cup rainwater
- A permanent marker



Photo: Jen Panaro

Instructions:

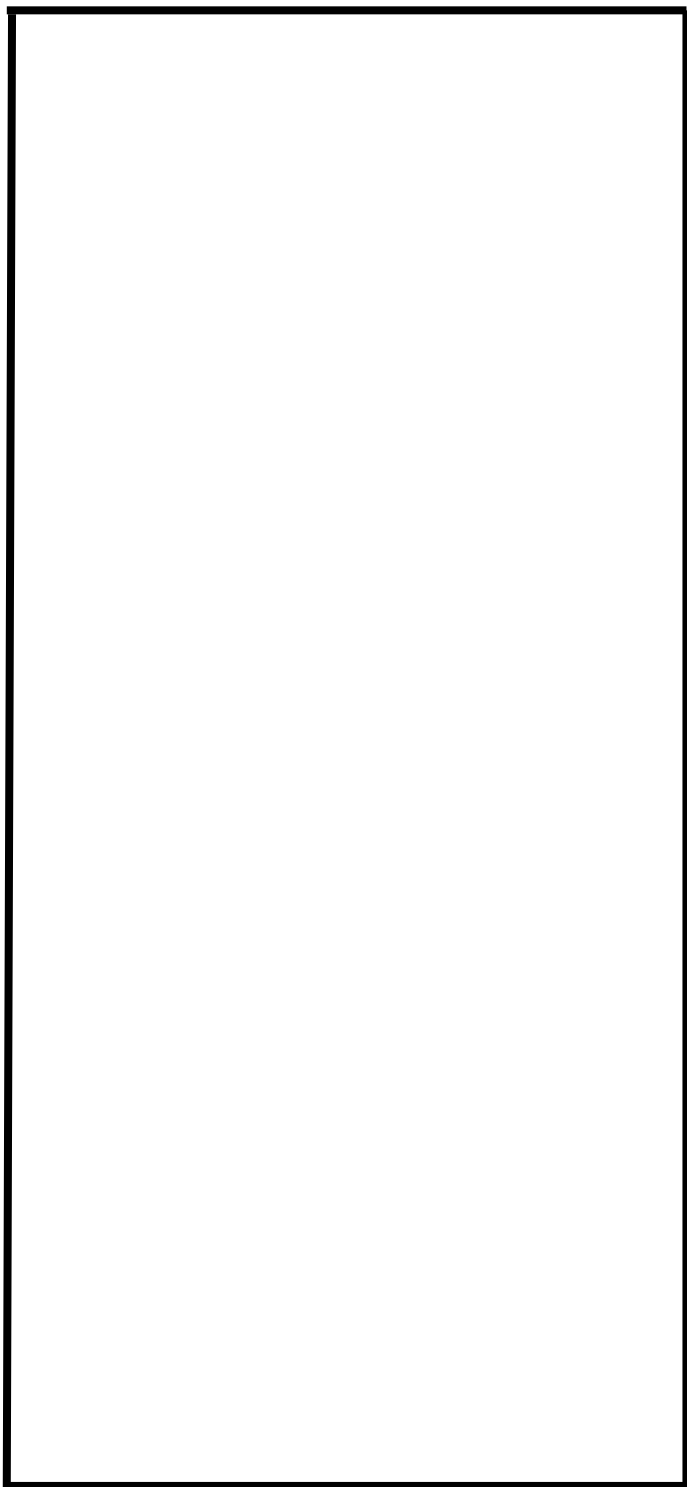
Add your ingredients

Put a handful of soil into the jar. Next, add bits of kitchen scraps and newspaper. Add a layer of leaves and grass. Repeat until the jar is mostly full. Add your rainwater and put the lid on. Poke holes in the lid for airflow. Draw a fill line on the glass to indicate the top of the jumbled ingredients on day 1. Set your bottle on a sunny windowsill!

Watch the progress

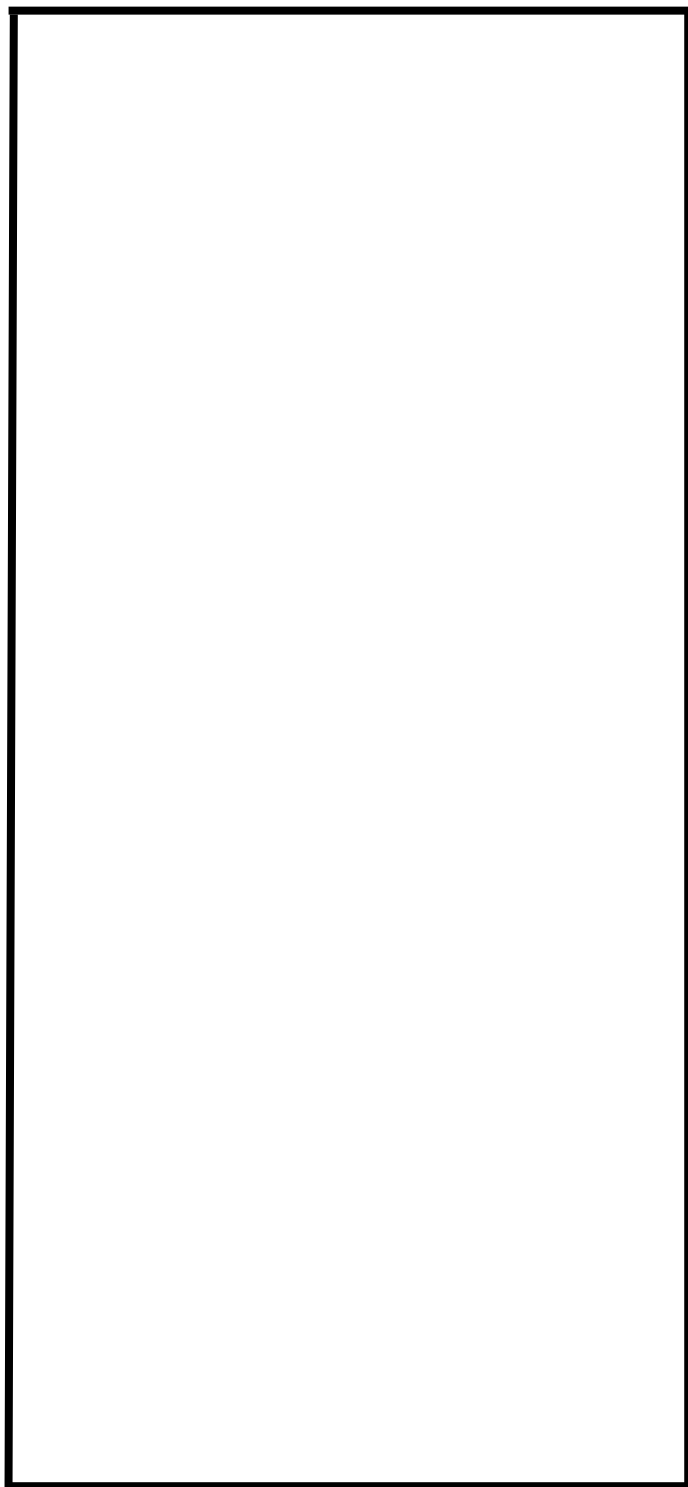
Every 2 weeks, mark a line to show the “new” top as nature works and the contents settle. Be sure to label it with the date so you can track the progress! Before your very eyes, your organic matter will turn into a nutrient-rich soil that will be ready for your garden in 12 weeks!

What day did you start your soil-arium?



11 Draw what it looks like inside! ↗

What day did you stop your soil-arium?



Draw what it looks like inside! ↗

ACTIVITY #4: COMPLETE THE GEOLOGICAL FORMATION

Draw the rest of the rock face the way you think it would look!



Photo: Getty Images

ACTIVITY #5: POETRY

List 6 things that describe what you love about fossils using the first letter of each line. Lines do not have to rhyme in an acrostic poem.

F

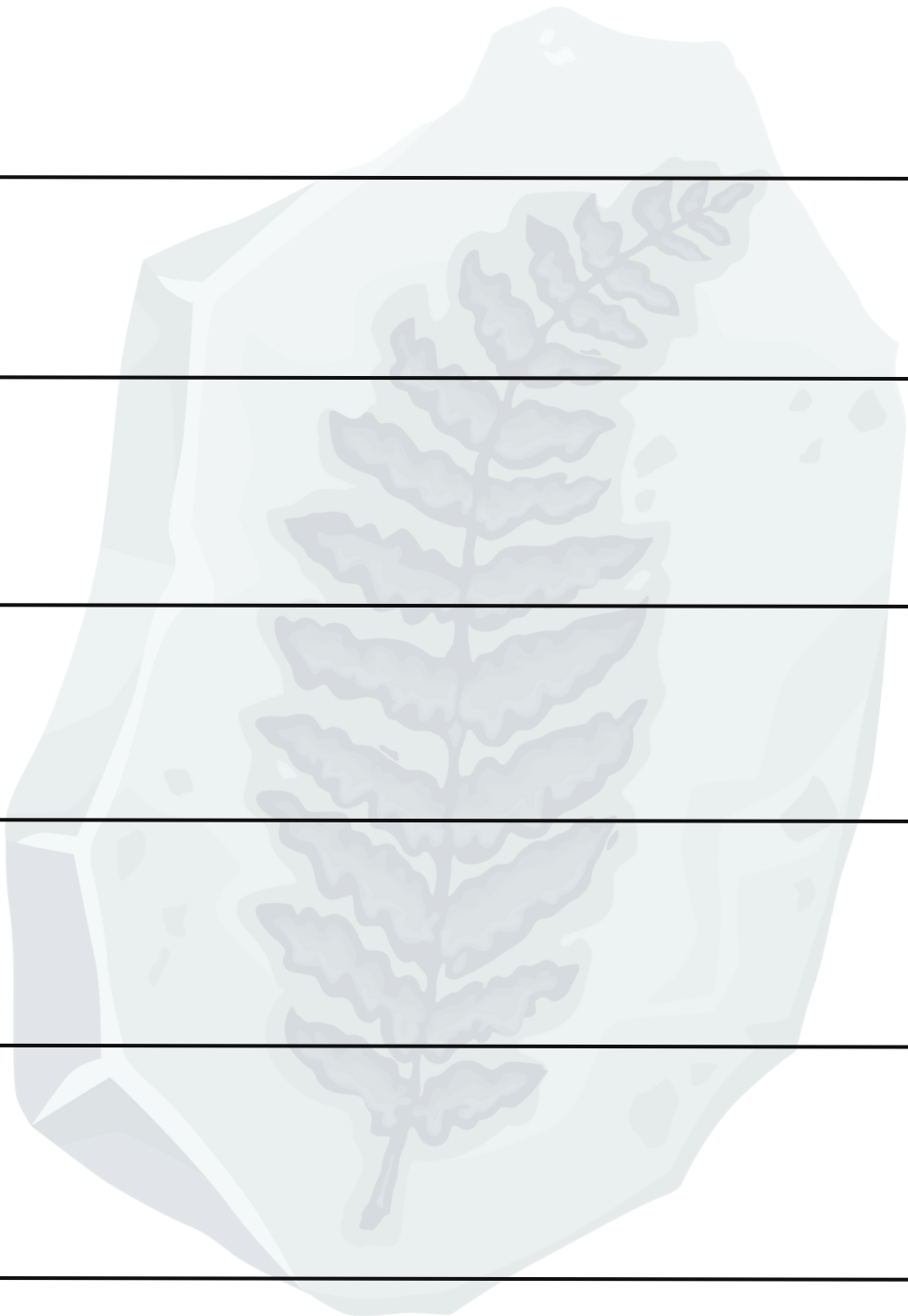
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S

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ACTIVITY #6: ROCK WASH

What can you find in your local soil?

Materials:

- Trowel set
- Sieve
- A bowl of sudsy water
- Sponges, washcloths, or an old toothbrush



Start digging in the dirt using your trowel. Look for 7-9 small stones. You can use the sieve by filling it with dirt and shaking it to find stones hidden in the soil.

Once you have collected your stones, rinse them in the bowl of water. You can use the sponges, washcloths, or a toothbrush to scrub them until they are clean.

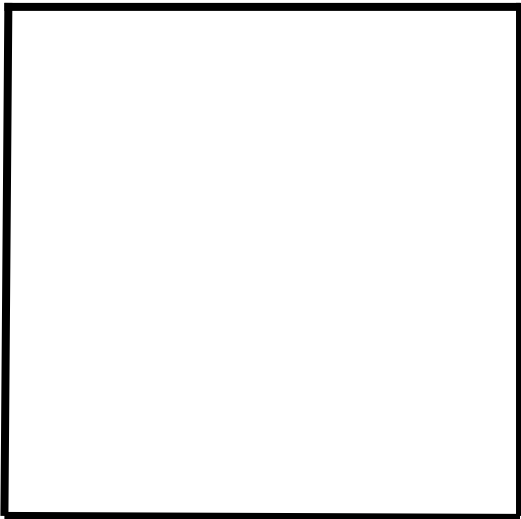
Once all of your rocks are clean, pat them dry.

Use the magnifying glass and magnifier to take a close look at each of them. Make notes of the colour, shape, patterns, texture and anything else you see.

Use the next few pages in this activity book to draw each rock and write down what you see.



Rock #1



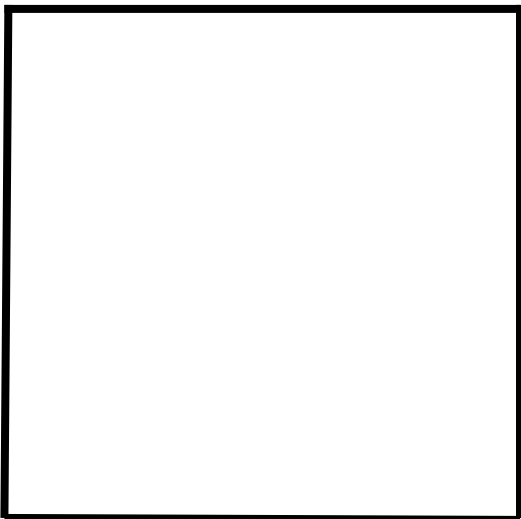
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #2



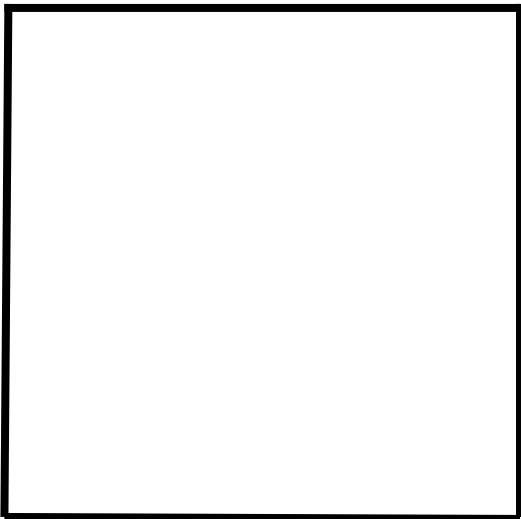
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #3



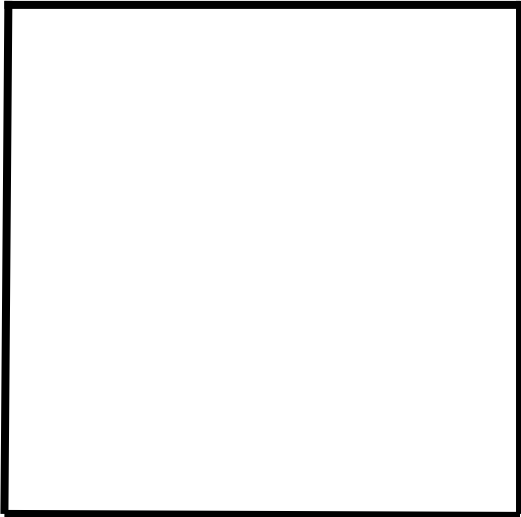
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #4



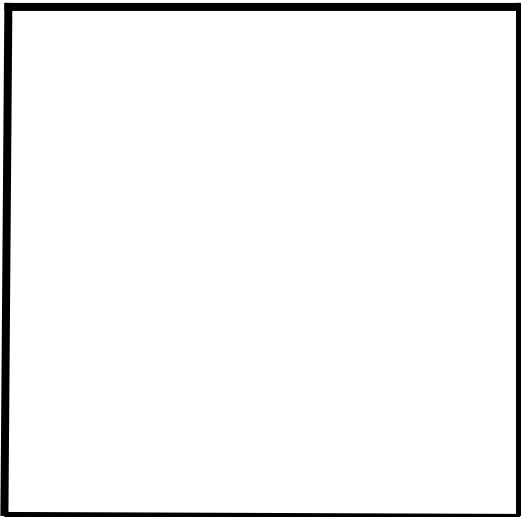
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #5



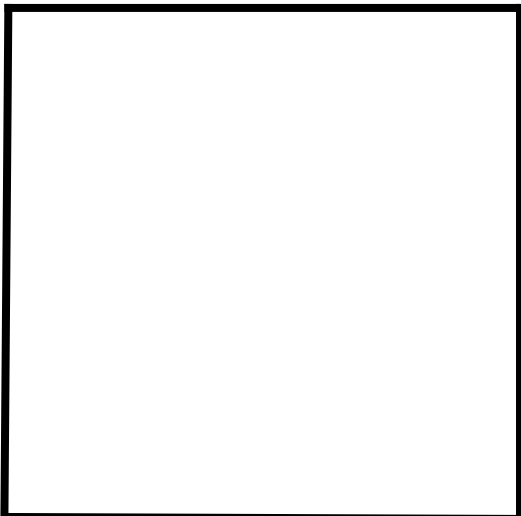
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #6



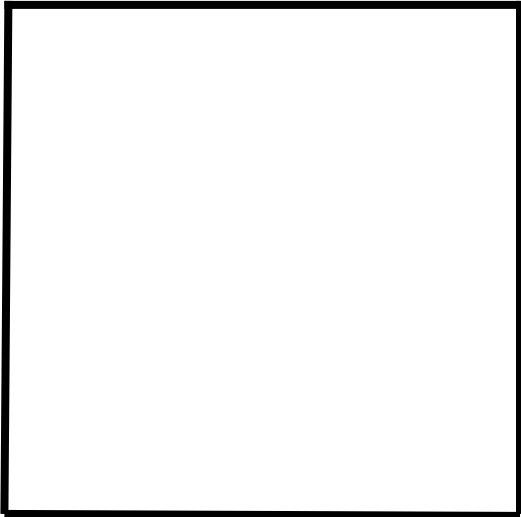
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #7



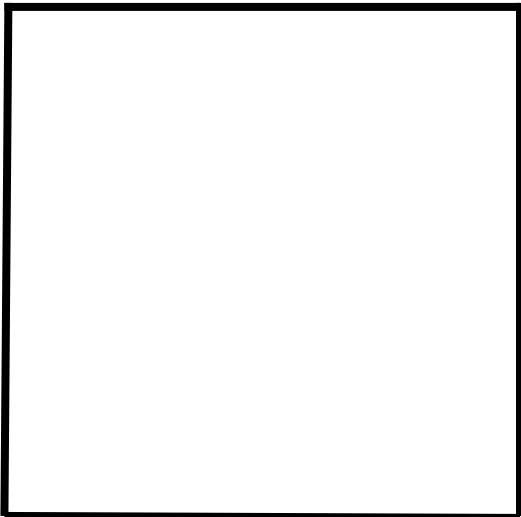
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #8



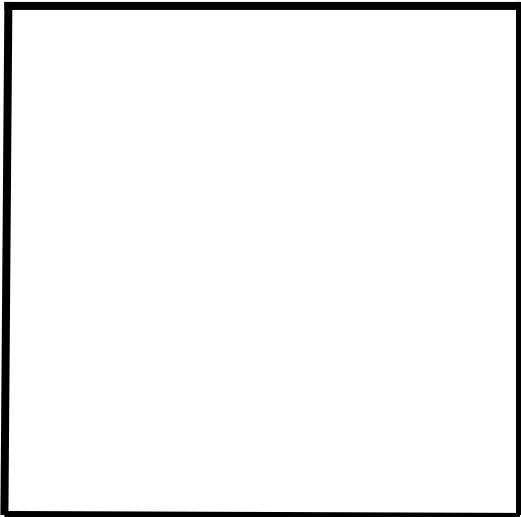
Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

Rock #9



Shape (ex: round, oval, irregular): _____

Colour: _____

Size: _____

Any other observations:

ACTIVITY #7: EARTH'S GEOLOGICAL TIMELINE

Time for you to make a “calendar” for events in Earth’s history!

The geological timescale is a physical representation of Earth’s history. It goes back billions of years! Using different landmasses found on Earth helps us see different layers of history. The rocks and fossils found in each layer tell the story of Earth from when its crust first formed billions of years ago, right up to today when you are alive!

Geologists, scientists who study the structure, composition, and history of Earth, divide geologic time into a series of time called **eras** and **eons**.

Each eon is then further divided into smaller and smaller units of time. Starting with the oldest, there is the:

- **Precambrian era:** about 4.6 billion years ago to 538.8 million years ago
- **Paleozoic era:** 538.7-252 million years ago
- **Mesozoic era:** 251.9 to 66.0 million years ago
- **Cenozoic era:** 66 million years ago to today

In this activity, you will cut out the different events or life forms and place them in their proper era when they were first discovered!





DINOSAURS



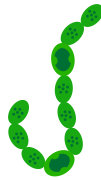
**FIRST LAND
MAMMALS**



**FORMATION
OF EARTH**



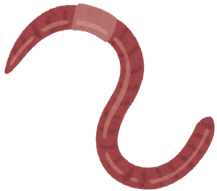
**FIRST LAND
PLANTS**



**MULTICELLULAR
ALGAE**



ICE AGES



**FIRST
INVERTEBRATES**



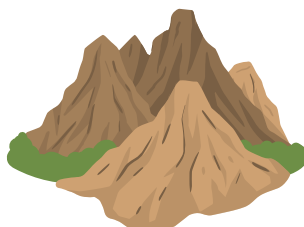
FIRST BIRDS



FIRST AMPHIBIANS



FIRST HUMANS



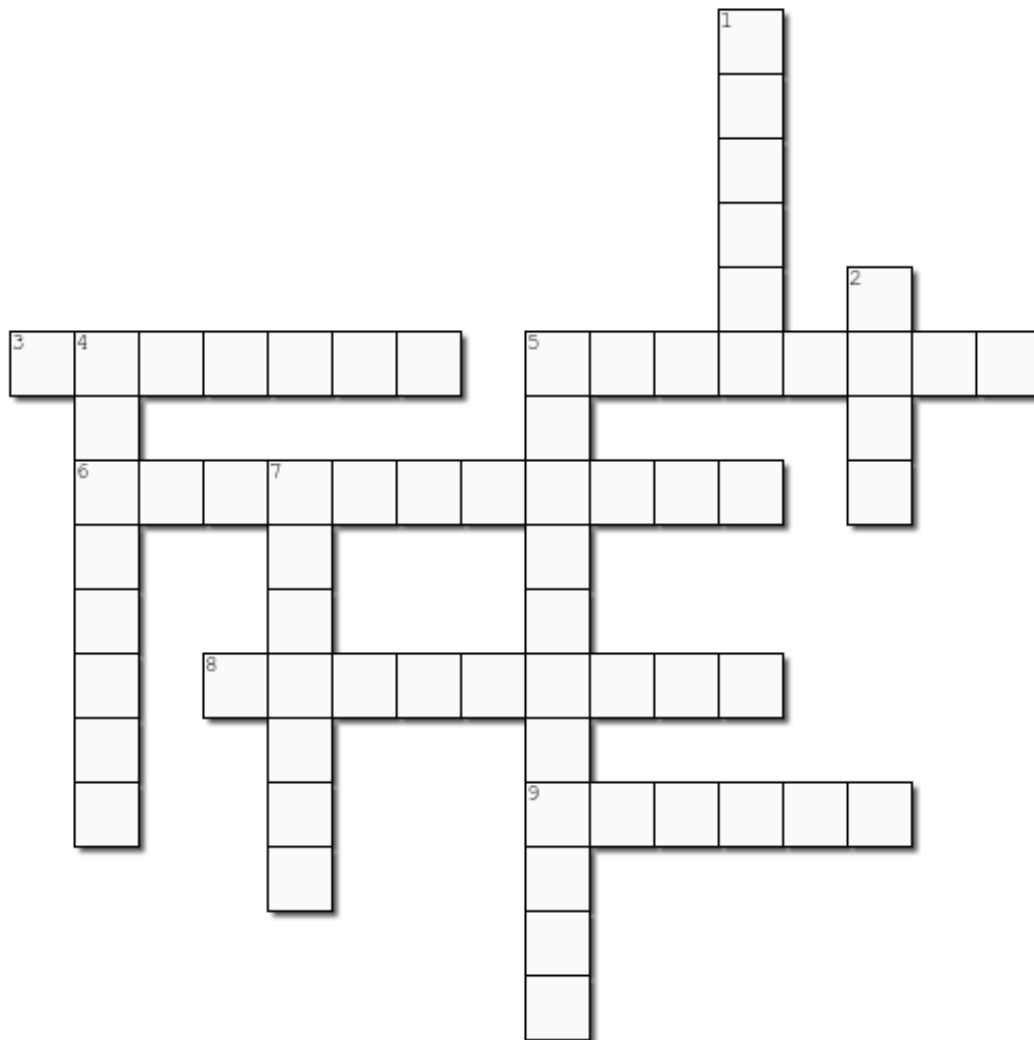
LAND MASSES



FIRST INSECTS

CENOZOIC ERA	MESOZOIC ERA	PALEOZOIC ERA	PRECAMBIAN ERA
First Land Mammals, First Humans	Dinosaurs, First Birds	First Insects, First Invertebrates, First Land Plants, First Amphibians	Formation of Earth, Multicellular Algae, Land Masses, Ice Ages

ACTIVITY #8: ROCKS AND MINERALS CROSSWORD



Across

3. Preserved remains of plants and animals
5. Solid substances that make up the rocks in Earth's crust
6. Rocks composed of small bits of mud, sand, and/or gravel
8. A result of intense heat and pressure inside the Earth
9. Also known as fool's gold

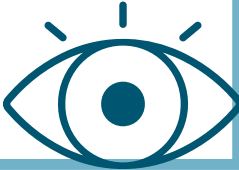



Down

1. Rock that floats on water
2. Often used to carve fine objects
4. Used to make blades of knives and tools
5. Rocks formed when existing rocks are squashed, stretched, and/or cooked to change their appearance and composition
7. Rocks composed of cooling and solidifying molten rock

ACTIVITY #9:

SENSES CONNECTION

Find a spot in nature. What do you find? What can you see? What other senses can you use while spending time in nature? Use your senses and record what you see, hear, smell, and touch.

SEE 	SMELL 
 HEAR	 TOUCH

ACTIVITY #10: MINERALS & ROCKS WORD SEARCH

G	R	N	S	A	N	D	S	T	O	N	E	I	P	W	O	U	G	W	C
D	A	E	J	I	V	A	M	H	G	T	Z	O	E	H	W	G	R	Q	G
F	C	K	A	X	B	X	I	D	J	E	Z	P	W	G	M	V	A	O	E
O	J	I	F	L	C	B	C	J	D	C	D	V	N	E	A	X	P	P	I
R	D	S	V	B	A	S	A	L	T	A	F	Y	K	E	G	X	H	X	F
T	S	H	O	L	B	L	S	N	D	R	Q	X	Q	F	L	L	I	L	I
I	C	I	D	V	E	S	C	N	M	E	I	N	G	A	A	W	T	I	W
G	F	N	W	B	Y	F	H	I	K	F	Y	Y	H	T	V	E	E	N	J
N	V	G	I	X	W	L	I	N	C	M	L	M	S	E	J	M	B	E	E
L	D	Y	L	R	C	D	S	O	Q	L	Q	I	U	H	M	U	T	L	G
A	Q	C	D	K	O	N	T	K	H	I	O	B	F	F	J	O	S	E	I
N	C	L	L	W	A	L	L	J	E	M	L	C	B	E	G	J	K	S	P
H	E	A	I	I	L	P	G	L	X	E	K	N	T	D	F	L	Y	T	S
U	A	S	F	Q	T	S	W	I	R	S	I	N	G	I	L	U	J	A	U
A	A	B	E	U	R	C	R	H	V	T	J	J	T	U	O	M	I	R	L
G	N	I	I	U	H	B	W	I	T	O	Y	C	Y	F	W	N	E	A	F
G	V	C	X	T	Q	M	A	F	R	N	S	H	W	A	T	V	G	T	U
K	K	D	I	A	M	O	N	D	G	E	C	U	G	S	R	V	I	I	R
Q	L	G	R	P	D	T	L	K	Z	F	A	P	L	A	S	Y	C	O	K
X	Y	L	S	T	V	U	C	O	P	P	E	R	O	E	R	F	W	N	U

BASALT
MICA SCHIST
GRAPHITE

DIAMOND
SANDSTONE
COAL

SULFUR
LIMESTONE
COPPER

ACTIVITY #11: THE ROCK CYCLE

Find a rock outside to study.

Using your senses, investigate your rock up close to determine how it feels (its texture), what it looks like, and what it smells like.



Then, describe the adventure of your rock!

Draw a timeline of your rock's life so far with key milestones including where it has travelled over time and how it got there.

WHAT IS A WATERSHED?

- A **watershed** is an area of land that water flows through or across on its way to a particular water body, like a stream, river, wetland, lake, or coastline.
- A watershed is the land where precipitation — like rain — falls and flows to a common, watery place!
- Depending on where you live in Muskoka, you may be in the Muskoka River Watershed or the Black-Severn River Watershed.

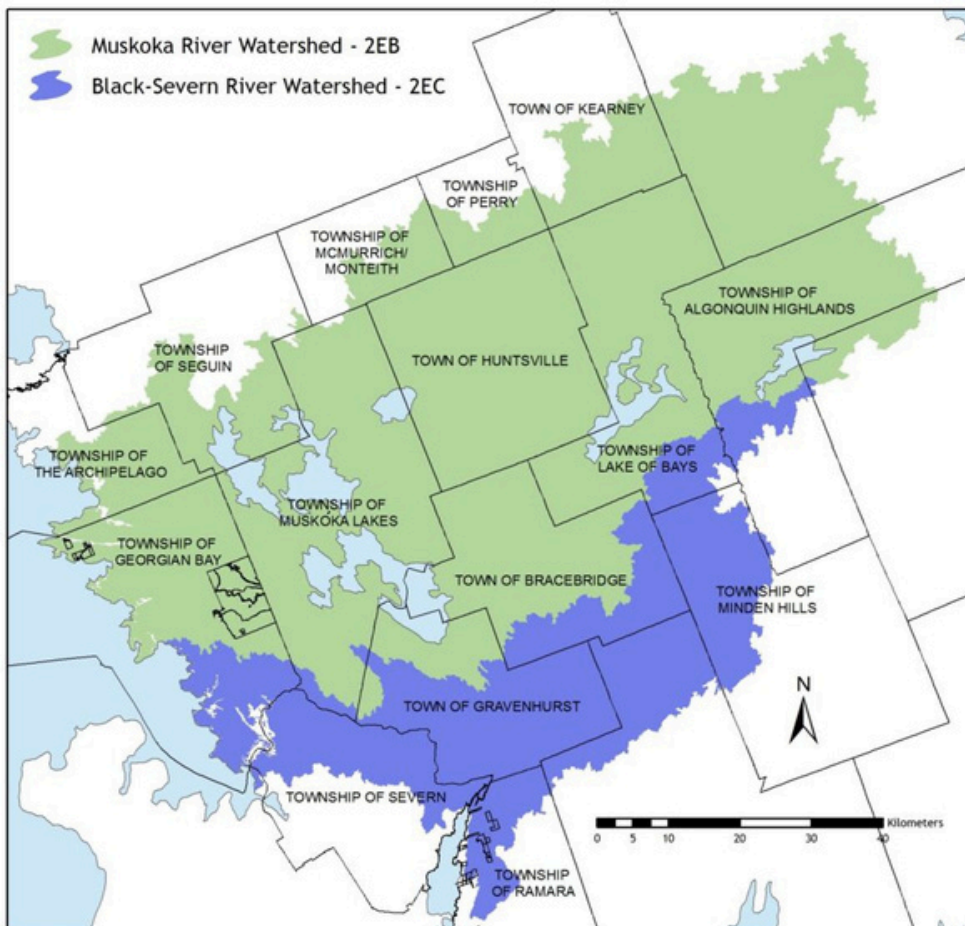


Photo credit: "Muskoka River Watershed".
(n.d.). Muskoka Watershed Council. Internet:
<https://muskokawatershed.org/watersheds/muskoka-river-watershed/>

Save the River!



The river needs a hero like YOU!

What can you do to help save the river from pollution
and storm water runoff?

Write down your action plan here!



HOW ARE PEOPLE IMPACTING NATURE?



As shorelines become more developed, humans are changing the way shorelines look and the species that can live there.

Some threats to wildlife and water health include: plastic pollution, introducing non-native (invasive) species, road mortality, and habitat removal and fragmentation.

One way to help is to replant a shoreline with native plants along the edge. This buffer helps to filter and stop things like fertilizers and pesticides from entering the water. Plant roots also help keep soil together in heavy rainstorms which prevents erosion.



Photo: Stephany Hildebrand

WAYS TO HELP NATURE

- ☐ **Gather data.** Take photos and observations of different animals and plants you see in nature and submit them to an online database like [iNaturalist](#), [eBird](#), [MonarchWatch](#), or [Water Rangers](#).
- ☐ **Help local bees.** The City of Gravenhurst is a certified Bee City! Join in and plant pollinator friendly gardens: [beecitycanada.org/bee-cities/gravenhurst/](#)
- ☐ **Be natural.** Consider adding native plants to provide stabilization, habitat, and food to your property. Learn what native species to plant on your property: [naturaledge.watersheds.ca/plant-database/](#)
- ☐ **Keep it clean.** Prevent the spread of invasive species by staying on trails while hiking and by cleaning equipment after boating. Learn more: [https://ontario.ca/page/invasive-species-fact-sheets](#)
- ☐ **Be respectful.** Take only photos and leave only footprints when exploring in the forest. This lets other people, animals, and plants use the space too.
- ☐ **Get connected locally.** Join the [Muskoka Little Sprouts Eco-Club](#), visit the [Tree Museum](#), follow the [Muskoka Envirohub Climate Corner](#), visit a [local trail or park](#) like Chamberlain Trail or Peninsula Trail, or join [Muskoka Conservancy](#).
- ☐ **Follow Gravenhurst Public Library online!** Hear about collection and program updates by visiting the library website ([gravenhurst.ca/library](#)), or by following on Facebook ([@gravenhurstpubliclibrary](#)) and Instagram ([@gravenhurstlibrary](#)).
- ☐ **Check out more from the Library!** Sign-out [TackleShare Equipment](#), snowshoes, park passes, ice skate shoes, hiking poles, a telescope, and other themed Nature Discovery Backpacks like this one with your Gravenhurst Public Library card.

RESOURCES FOR PARENTS

Fireworks

Although fireworks create a spectacular show enjoyed by many, there are risks to this activity.

Noise and light from fireworks can have a negative impact on wildlife, including nest desertion. The particulate left in the sky after a firework explodes contains heavy metals which can land directly on the lake or be washed into the lake following a rain storm. This has harmful effects on the aquatic food chain. Fires and injuries to people and pets are also possible.



Be 'Wake-Aware'

Lakes and rivers are fragile environments. Fish, wildlife habitat, shorelines, and docks are vulnerable to damage from boat wakes.

- Be aware of the size of your wake while operating a boat. Adjust your speed and directions to minimize your impact on shorelines.
- Distribute passengers throughout the boat to reduce time spent in transition speed.
- Wakeboard and water ski away from shorelines.
- If boat shopping and a motor-free boat is not an option, opt for an outboard motor which gives the driver more control over the amount of water being forced downwards.

LIGHT POLLUTION

Many of us have likely sat out at night and noticed the lights at properties across the way or in the sky. Take a moment to reflect on how this makes you feel and consider if light from your property is also contributing to this. This doesn't mean we have to get rid of all our outdoor lights, though! Perhaps we do not need as many or they can be retrofitted to reduce the glare. Here are some questions to ask:

- Does the area on my property really need to be lit?
- Does it need to be this bright?
- Is the light transmitted further than it needs to be?

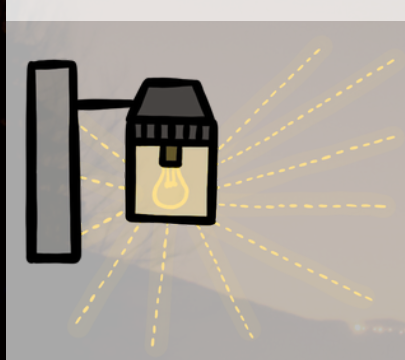
Learn more: <https://watersheds.ca/light>

Not Recommended: Glare Lights

Typical 'Wall Pack'



Typical 'Yard Light'

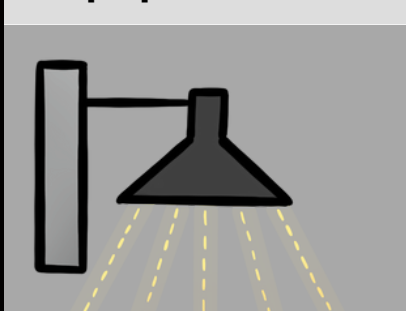


Flood Light



Recommended: Shielded Lights

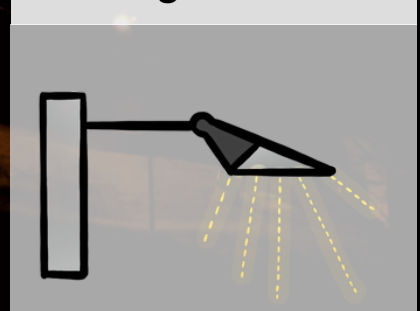
Opaque Reflector



Typical 'Shoebox'



Flood Light with Hood





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C A N A D A

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