

Geological Highway Map Scavenger Hunt

Subject/Grade: Grade 4, 7, 8 Science, Grade 4 Social Studies

Lesson Title: Geological Highway Map Scavenger Hunt

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

Grade 4 Rocks, Minerals and Erosion

RM4.1 Investigate physical properties of rocks and minerals, including those found in their local environment.

- b) Document the locations and characteristics of rocks that exist in their local environment.

RM4.2 Assess how human uses of rocks and minerals impact self, society, and the environment.

- f) Identify locations where minerals, including potash, sodium sulphate, salt, kaolin, uranium, copper, coal, diamond, and gold, have been or might be mined in Saskatchewan.
- g) Discuss economic benefits associated with mineral extraction (mining) and refining, including related careers, in Saskatchewan.

RM4.3 Analyze how weathering, erosion, and fossils provide evidence to support human understanding of the formation of landforms on Earth.

- b) Examine the effects of natural phenomena (e.g., tidal wave, flash flood, hurricane, tornado, earthquake, mudslide, forest fire, avalanche, and meteor impact) that cause rapid and significant changes to the landscape.
- g) Describe possible short- and long-term effects of wind, water, and ice on local, national, and global landscapes (e.g., sandy beaches, coastline erosion, rounded rock formations, sand dunes, river deltas, glacial deposits, and cracks in rocks).
- h) Predict the effects of weathering on various landforms (e.g., butte, cliff, cave, valley, river, waterfall, and beach) in Saskatchewan.
- k) Discuss how fossils and the fossil record provide evidence of Earth's history, including the formation of various landforms.

Grade 7 Earth's Crust and Resources

7ECR7.1 Analyze societal and environmental impacts of historical and current catastrophic geological events, and scientific understanding of movements and forces within Earth's crust.

- e) Describe societal and environmental impacts of some catastrophic geological events, including earthquakes, tsunamis, and volcanic eruptions, which have occurred on or near Earth's surface and predict the impacts of future events.
- f) Work cooperatively with group members to research catastrophic geological events and integrate individual findings into a chronological model or time scale of major events in Earth's geological history.

EC7.2 Identify locations and processes used to extract Earth's geological resources and examine the impacts of those locations and processes on society and the environment.

- d) Identify locations of Saskatchewan's primary mineral resources (e.g., potash, gold, salt, uranium, and copper) and their primary uses.

e) Relate processes used to extract primary mineral resources in Saskatchewan (e.g., open-pit mining, underground mining, and solution mining) to the location, type, and depth of the resource.

EC7.3 Investigate the characteristics and formation of the surface geology of Saskatchewan, including soil, and identify correlations between surface geology and past, present, and possible future land uses.

g) Document the natural surface geological features of the local environment and provide explanations for the origin of those features.

Grade 8 Water Systems

WS8.2 Examine how wind, water, and ice have shaped and continue to shape the Canadian landscape.

f) Create a written, visual, physical, or dramatic representation of the processes that lead to the development of rivers, lakes, continental drainage systems, and ocean basins, including glaciation, continental drift, erosion, and volcanic action. (Indirect)

g) Relate factors that affect glacier formation and reduction and their effects on the environment to the formation of glacial landforms in Saskatchewan (e.g., drumlins, moraines, eskers, and kettle lakes).

SOCIAL STUDIES

Grade 4 Resources and Wealth

RW4.3 Assess the impact of Saskatchewan resources and technological innovations on the provincial, national, and global communities.

b) Locate on a map the major industries in Saskatchewan (e.g., agriculture processing, mining, manufacturing, forestry products, energy refinement, tourism, livestock production).

Key Understandings: ('I Can' statements)

I can appreciate that different parts of the province have different mineral resources. (4)

I can understand how rocks and minerals are used in everyday life. (4)

I can explain how evidence from the earth (fossils, rock types, landforms etc.) is used to understand past geological environments. (4)

I can analyze how past geological events have impacted the earth. (7)

I can identify where specific minerals are extracted from and what they are used for. (7)

Essential Questions:

What kinds of rocks exist in our community? What do they look like and how did they form?

How are rocks and minerals used in my daily life?

How have past geological events changed the earth?

What types of minerals exist in the world and where do they come from? What are these minerals used for?

How did the geological features and landforms in my local environment form?

Teacher Background

Background: The Geological Highway Map of Saskatchewan shows the road system as well as the surface geology and landforms throughout the province. The information on this map will not only help students understand the fascinating origins of the many features that can be seen in Saskatchewan but how important they are to the economy of the province.

Stage 3: Build Learning Plan

Set (Warm-up, Focusing the Learning): Time: 5 min

- Introduce the geological highway map as a tool to understand the geology of Saskatchewan and uses of the natural resources. (digital and paper versions are available)
- Display the map at the front of the classroom or provide each group with a copy. Ask students to locate various things (e.g., Their home city, uranium mines, potash mines, gold mines, etc.)

Development: Time: 25 min

- Hand out one map per pair and a question sheet to each student.
- Have the students work in pairs to answer the questions using the *Saskatchewan Geological Highway map* to find the answers.
- This could be done as a jigsaw with one pair answering the south sheet and another the north sheet then sharing their answers.

Learning Closure: Time: 5 min

- Sticky Note Blast: Bring students together and have them write one “take away” from the scavenger hunt activity. They will share it with the class then place it on the map, close to where they found the information.
- (If Jigsaw) Have each pair share their responses and record what their partners have discovered.

Materials/Equipment:

- One Geological Highway map per group.
- Question Sheet
- Teacher’s Answer Sheet

Key Vocabulary:

- Surface geology
- key/ legend
- Mining
- Minerals
- Fossils
- Oil and gas

Possible Adaptations/ Differentiation

- Present activity as a Jigsaw to encourage collaboration
- Recreate a life-size version of the Saskatchewan Geological Highway Map in the Classroom:
 - photocopy and enlarge text from the map and distribute around the room
 - Display images related to each area (rock samples, land formations, etc.)
 - Provide props/ samples to enhance visual experience and significance of each part of the map (mineral samples, land/tourist destination markers, etc.)

Stage 4: Determine Evidence for Assessing Learning

- **Product:** Assess student’s question sheets
- **Observation:** Class discussion based on the results of scavenger hunt and potential uses of the *Saskatchewan Geological Highway map*

- **Conversation:** Discuss various related topics (uses of minerals, surface geology, natural resources-based industries) while students are working in groups and ask specific questions to check for comprehension and usage of *Saskatchewan Geological Highway Map*

Extensions

Students could use the information on the map to create their own scavenger hunt or game.

Look at the GeoExplore Saskatchewan website

<https://skgeolhighwaymap.maps.arcgis.com/apps/MapSeries/index.html?appid=a845cbb370f7401597806887318e2676> (digital version of the geological highway map) for additional formation and a deeper understanding of the local context.

For background information related to this lesson check out

- Main tab “Geology 101” subtab Sask Geology
- Main tab “Our Resources”

Geological Highway Map Scavenger Hunt (Finding out about Saskatchewan)

To find the answers read the map Legend and information boxes surrounding the map.

North Map:

1. Find the Uranium Mine located in a meteorite impact crater. Describe where it is located. Hint: look for the U symbol.

2. How many impact sites have been found in Saskatchewan?

3. What minerals are mined in the Creighton – Flin Flon area? What are they used for?

4. What % of the value of Saskatchewan's exports are generated from mineral and energy resources?

6. What percentage of the world's electricity comes from nuclear power?

7. How much of the world's supply of Uranium does Saskatchewan produce?

8. What are Saskatchewan's oldest fossils and where are they found?

South Map

1. When did a very salty sea cover southern Saskatchewan?
2. What mineral comes from the rocks that were deposited at that time? Why is it special to Saskatchewan? What is it used for?
3. Where are the main coal mining areas? What is the coal used for?
4. Where do you find hoodoos? What are they? Please draw a picture.
5. When was the end of the age of dinosaurs?
6. What are the names of 3 dinosaurs found in Southern Saskatchewan?
7. Early mammal fossils have been found in what area of the Province? Name three types of mammals found there?
8. Where is the highest point in Canada between Labrador and the Rocky Mountains? How high is it?
9. Areas with oil and gas are shown with a symbol of a little pumpjack in a circle. Name 4 areas in Southern Saskatchewan where oil and/or gas have been found.
10. Diamonds have been found in Saskatchewan. Look for them on the map. What is the name of the city/town that they are nearest to?
11. Some lakes (such as Chaplin Lake) don't drain into rivers, they just evaporate. The white mineral around the lake edge (as well as in the lake) is called Sodium Sulphate. What is this mineral used for? (Give 4 uses)

ANSWERS

North Map:

1. Find the Uranium Mine located in a meteorite impact crater. Describe where it is located.
#33. The Cluff Lake Uranium Deposit is located in the Carswell meteorite impact in the Northwest part of the province. (In the western part of the Athabasca Basin.)
2. How many impact sites have been found in Saskatchewan?
5 Read the section "Out of this World" (#33-35)
3. What metals are mined in the Creighton – Flin Flon area? What are they used for?
48 Copper and zinc. Copper is used for electrical wiring and water pipes; zinc is used for rust-proofing steel, making brass and bronze alloys and for batteries.
4. What % of the value of Saskatchewan's exports are generated from mineral and energy resources? Read: "From Rocks to Riches". Mineral and Energy resources account for about 40% of the values of the province's exports (as of 2002 when this map was produced).
5. How much of the world's electricity comes from nuclear power?
Read: #30. "Saskatchewan Uranium: World's Biggest and Best". About 17% of the world's electricity comes from nuclear power (as of 2002 when this map was produced).
6. How much of the world's supply of Uranium does Saskatchewan supply?
Read: #30. "Saskatchewan Uranium: World's Biggest and Best". Saskatchewan supplies about one-third of the world's uranium (as of 2002 when this map was produced).
7. What are Saskatchewan's oldest fossils and where are they found?
Read: #28 "Early Life". The oldest fossils in Saskatchewan are the stromatolites. They are layered, blue-green algae that look like a cabbage. They are found in the 1800 million year old Martin Group near Uranium City.

South Map

1. When did a very salty sea cover southern Saskatchewan?
Read: "Salty Seas" #18, 19, 20. 400 million years ago.
2. What mineral comes from the rocks that were deposited at that time?
Sylvite KCl (one of the main components of Potash)
Why is it so special?
It is Saskatchewan's official mineral.
What is it used for?
Fertilizer
3. Where are the main coal mining areas?
#16, 17. Read: "Buried Forests". Near Estevan and Coronach.
What is the coal used for? The coal is used to generate 75% of Saskatchewan's electricity.
4. Where do you find hoodoos? Find #14 on the map (North east of Coronach).

Read: "Badlands" What are they? Hoodoos are pillars of soft rock are overlain by a cap of hard rock which protects the softer rock from erosion. Please draw a picture.

5. When was the end of the age of dinosaurs?

Read: "Valley of the Dinosaurs" #10-12. The end of the age of the Dinosaurs was 65 million years ago.

6. What are the names of 3 dinosaurs which roamed around Southern Saskatchewan?

Read: "Valley of the Dinosaurs" #10-12. Triceratops, Tyrannosaurus rex and Edmontosaurus.

7. Early mammal fossils have been found in what area of the Province? Name three types of mammals found there?

Read: "On Top of Our World". #8. Mammals have been found in Cypress Hills. Rhinoceros-like Brontothere, three-toed horses and early dogs evolved around the time of the extinction of the dinosaurs.

8. Where is the highest point in Canada between Labrador and the Rocky Mountains? How high is it?

Read: "On Top of Our World". The Cypress Hills are the highest point between Labrador and the Rocky Mountains. 1466 m.

9. Areas with oil and gas are shown with a symbol of a little pumpjack in a circle. Name 4 areas in Southern Saskatchewan where oil has been found.

Look on the map for the pumpjack sign. Areas are: Marengo, Kindersley, Lloydminster, Beverly (Near Swift Current), Midale, Stoughton, Carlyle (Arcola), Alameda.

10. Diamonds have been found in Saskatchewan. Look for them on the map. What is the name of the city/town that they are nearest to?

Read: "Diamond Elevators" #1. Find the diamond shape on the map. Near Prince Albert (city) answers could be: White Gull Lake, Choceland, Foxford, Atlingly.

11. Some lakes (such as Chaplin Lake) don't drain into rivers, they just evaporate. The white mineral around the lake edge (as well as in the lake) is called Sodium Sulphate. What is this mineral used for? (Give 4 uses)

Read: "Not All Waters Reach the Sea". #5. Sodium Sulphate is used in powdered detergents and in the manufacture of glass, paper and textiles.