



# Geoscape Ottawa-Gatineau

Grade 9 - 11 Lesson Plans to accompany the Geoscape Ottawa-Gatineau poster and website  
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## Theme 13 : OUR PLACE IN THE GEOSCAPE: CULMINATING ACTIVITIES

### OVERVIEW

- Students demonstrate that any 3 or 4 components of the Geoscape are related and that they ultimately affect human use of the Geoscape.
- Students predict where future urban growth will occur and what land use zoning may be needed to maintain a high quality of life.
- Students experience first hand how our Geoscape works during an all-day fieldtrip and report on their findings.

**DURATION** 225 minutes (3 periods)

### ACTIVITY

NB: More than 1 culminating activity may be selected depending on how many other lessons have been experienced. These culminating activities could be delivered by small groups or individuals throughout the semester or they could be presented as summative evaluations.

A. Students, individually or in a small group:

1. Prepare a 15-20 minute PowerPoint Presentation of 20-25 slides that demonstrates the interrelationship of any 3 or 4 components of the Geoscape of Ottawa-Gatineau.
2. Conclude how these interconnections are essential to the wise use of the land.

B Students individually assume the role of an urban and regional planner in assessing future land use change and growth in the Ottawa -Gatineau area.:

1. They prepare an urban and rural land-use zoning map to determine where future urban growth should or should not occur. GIS could be used to prepare the zoning map.
2. They justify these decisions, in a 5 to 7 page report.
3. They summarize what land use zoning requirements will be needed to maintain a high quality of life for the residents. Indicate the role of various levels of government, including the Federal government through the National Capital Commission.

C. Students experience first hand the Ottawa-Gatineau Geoscape on an all-day field excursion to selected locations in the region, Under the direction of their teacher, students examine, analyze and synthesize components of the Geoscape and then complete a field report. Suggested locations are:

- Gatineau Park – Champlain Lookout and King Mountain
- Hogs Back (Prince of Wales Falls)
- Mer Bleue
- Lemieux Landslide, South Nation River
- Carp Ridge
- Chaudiere Falls

A recommended excursion to Gatineau Park and Hogs Back is attached.

Route: Champlain Bridge, King Mountain, Champlain Lookout, Hog's Back Falls.

**FOSSILS AT CHAMPLAIN BRIDGE**

Note: Stromatolite fossils are exposed in the fall when the water level of the Ottawa River is low. Park in the Samuel de Champlain parking lot, about 100 m west of the Champlain Bridge (north side). Follow the path, back towards the bridge.



1. Stromatolites represent the most primitive life forms and are neither plants nor animals. They are formed by the action of algae that trap sediments and form layers that eventually harden. These organisms thrived in the warm ancient seas of the Ottawa area about 450 million years ago. They still can be found in Australia in hyper-saline water.
2. Other types of fossils (eg. Orthocones) can be seen in the rocks surrounding the parking lot.

**KING MOUNTAIN, GATINEAU PARK, QUEBEC**

NB: When you leave the parking lot via the path to the left of the small lake, you will turn right at the junction following the trail beside the lake. As you begin to climb, you will be on the north side of King Mountain

1. Start looking at the rocks as you are walking.  
King Mountain is made of \_\_\_\_\_ and \_\_\_\_\_ type of rocks.  
Two examples of minerals you may see here are \_\_\_\_\_ and \_\_\_\_\_.
2. Look for intrusions (or dykes) in the rocks along the pathways. They are the bands of different colour cutting through a rock.  
What are the usual two colours of these intrusions? \_\_\_\_\_ and \_\_\_\_\_.  
How is an intrusion formed?
3. As you continue to hike the north side of King Mountain, (going up the stairs near small lake) what kinds of trees can you identify? (Refer to guidepost info 1 and 2)

4. Briefly describe the condition of the ground while on the north side of King Mountain (side we climb)

Why is it like that?

5. After you reach the lookout, notice the trees and shrubs on the south slope. How are the trees around it different from those on the north slope which you have just walked up?

Explain why this occurs. (Refer to guidepost info 3 and 4)

6. Contrast the land uses of land in the Ottawa Valley (the land to the south that you gaze at from the lookout) with the land uses in Gatineau Park.

- a. Gatineau Hills: (1 use) \_\_\_\_\_
- b. Ottawa Valley: (3 uses) \_\_\_\_\_

7. There is a rock cairn built atop King Mountain. What is its historical significance in relationship to surveying?

### **CHAMPLAIN LOOKOUT AND TRAIL, GATINEAU PARK, QUEBEC**

NB: if your group walks the trail first, start at #10. Complete #8 & #9 at the plaques.

- 8. a. Name the river that you see from the lookout \_\_\_\_\_
- b. Which province is on the south side of the river? \_\_\_\_\_ north side? \_\_\_\_\_

9. Go to the display of drawings and explanations then answer the following questions:

- a. How long ago did ice cover this area? \_\_\_\_\_
- b. What name is given to a sheet of moving ice? \_\_\_\_\_
- c. How did the ice change the landscape?
  
- d. After the ice melted, what was the name of the sea that occupied the land to the south of the Gatineau Hills? \_\_\_\_\_
- e. Name the geological feature which was the shoreline of this sea. \_\_\_\_\_
- f. Explain the reason for the difference in elevation between the Champlain Lookout and the lower land to the south.

g. Draw a labelled sketch of what you see, showing: 1. the Gatineau Hills, 2. the feature named in e, 3. the plain to the south, 4. the river (give its name), 5. Label the provinces of Ontario and Quebec. Use the space below.

10. While on the trail, guidepost #2 is in a ravine. What is a ravine?

How is a ravine formed? (You may wish to refer to attached information which corresponds to the trail guideposts.)

11. At guidepost # 8, you will find an erratic. What is an erratic?

How did this “erratic” get there? Use a series of sketches to explain your answer. Refer to the Champlain Trail sheet, #8 for a good diagram to copy.

## **HOG'S BACK (Prince of Wales Falls) 1:**

We study this area because it is an excellent example of sedimentary rock formation. Notice the layering of the sand and mud deposits that are the basis for the rock. While standing on the bridge with your back to the traffic, you can see examples of mild folding on the east side (right side) of the falls. You should also note that the east side is higher than the west side.

1. The following is a list of geological activity which occurred in this region which led to the formations that you see here today. They are NOT LISTED IN ORDER! Read the plaques on the west side of the falls to find the correct sequence. Number them correctly, with #1 being the oldest geological event, and #7 being the most recent.

\_\_\_\_\_ 9000 years ago, the Rideau River was much wider. Further adjustments in the earth's crust resulted in structural changes within the rocks and to the shape of the river channel. Erosion over thousands of years has also modified the area.

\_\_\_\_\_ This mud and sand underwent compaction, compression, formed sedimentary rock, then experienced upheaval and later, erosion (wearing away).

\_\_\_\_\_ 200 years ago, spectacular falls were here, within 3 sets of treacherous rapids. One of the ridges, no longer visible, rose above the foaming water, easily visible to early settlers and loggers in the area.

\_\_\_\_\_ With movement in the earth's crust, the sea withdrew, disappeared, and left a rugged landscape, with outcrops of limestone, sandstone, and shale. A fault occurred, causing one side to lift up, the other to drop down.

\_\_\_\_\_ Glacier ice melted 11,000 years ago, and the Champlain Sea flooded the Ottawa Valley.

\_\_\_\_\_ 450,000,000 years ago, muds and sands were deposited in an ancient marine basin (under water)

2. Why is this area called Hog's Back? Who coined the phrase? (Hint: answer in on plaque on west side, or figure it out from a statement above from the most recent times.)

3. How old is the rock here? (Find the reddish plaque on west side) \_\_\_\_\_

4. Look at the accompanying diagrams on the next page. What type of surface rock is found:  
-on the east side of the falls? \_\_\_\_\_ -on the west side of the falls? \_\_\_\_\_

5. Explain what caused the ripple marks on the west side of the falls.

6. By looking at the differing heights of each side of the falls, and the rock type of each side, (sandstone and limestone), & your diagrams, which type is more resistant to erosion?

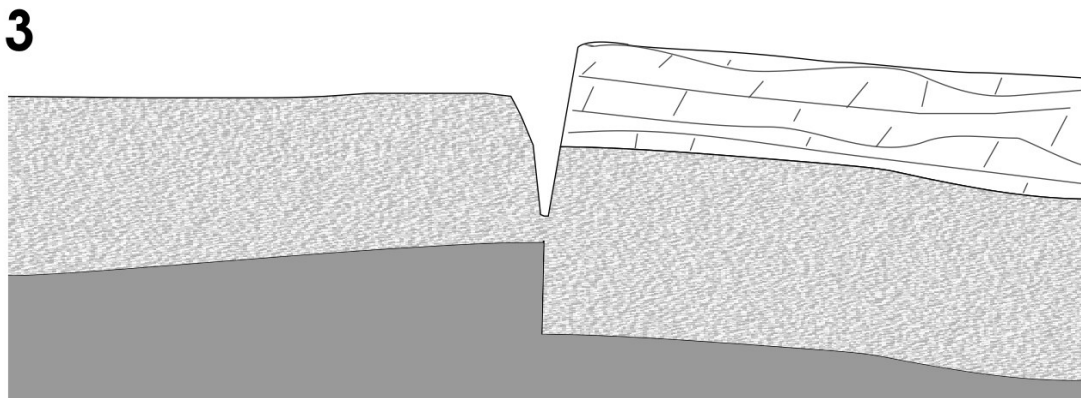
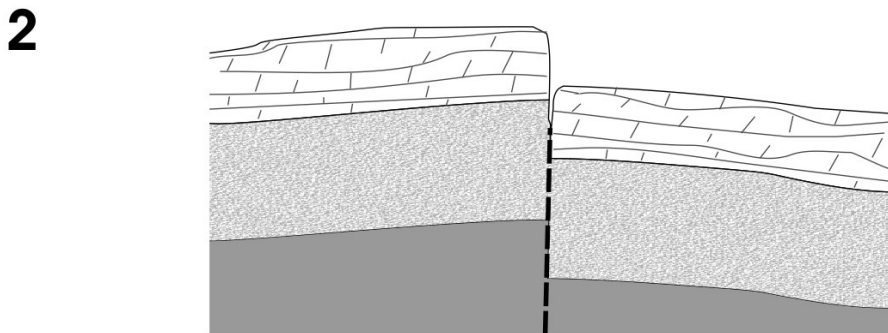
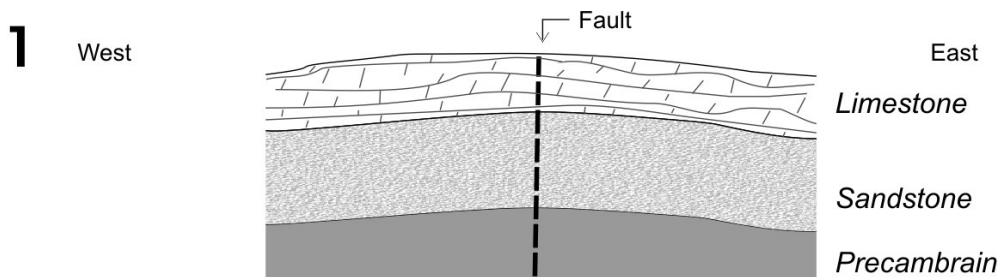
What visible evidence is there to support your answer?

## HOG'S BACK 2

7. Drawn below is a cross-section profile (side view) from the west bank (left) to the east bank (right) as if standing on the bridge facing south (traffic at your back).

Put labels of the following ON DIAGRAM 3 ONLY.

- Write the name of each layer of the rock types found on both sides.
- Put arrows to show areas that were: 1. uplifted, 2. downfaulted
- Label "ripple marks" where one can see the ripple marks of the ancient sea.
- Put a circle around the area where you can see evidence of folding.
- Indicate with an arrow and labelling, where the Rideau River is flowing.



## HOG'S BACK 3

8. On the map, find the symbol drawn on the large island near the bridge. The symbol represents strike and dip. The longer line, strike, is the direction or bearing along an inclined layer (bed) as it intersects the horizontal plane (here conveniently provided by the pools of water). Dip is the angle that the bed is inclined from the horizontal. The direction of dip is indicated by a short tick on one side of the long strike line symbol.
- Look at the rest of the exposed bedrock and add strike and dip symbols of your own. The rocks are folded, so you should see a systematic pattern emerge.
  - Circle where the exposed part of a fault surface displays parallel linear marks. These marks parallel the direction along which the blocks moved relative to each other when the fault was active. Was the movement mainly horizontal or vertical?
  - Walk along the river pathway to view other signs of erosion, -clusters of boulders that have been concentrated by removal of the finer-grained matrix of glacial till. Indicate them on the map.

Source: J.A.Donaldson

