

Camp Attended: _____

GEOLOGY

Merit Badge Requirements



- 1) Define geology. Discuss how geologists learn about rock formations. In geology, explain why the study of the present is important to understanding the past.
- 2) Pick three resources that can be extracted or mined from Earth for commercial use. Discuss with your counselor how each product is discovered and processed.
- 3) Review a geologic map of your area with your counselor and discuss the different rock types and estimated ages of rocks represented. Determine whether the rocks are horizontal, folded, or faulted, and explain how you arrived at your conclusion.
- 4) Do ONE of the following:
 - A) With your parent's and counselor's approval, visit with a geologist, land-use planner, or civil engineer. Discuss this professional's work and the tools required in this line of work. Learn about a project that this person is now working on, and ask to see reports and maps created for this project. Discuss with your counselor what you have learned.
 - B) Learn about the career opportunities available in geology. Pick one that interests you and explain how to prepare for such a career. Discuss what courses might be useful for such a career. You may use resources found on the Internet (with your parent's permission), at the library, in books and articles from periodicals, from television programs, and at school.
- 5) Complete ONE of the options listed below – A, B, C, or D.
 - A) **Surface and Sedimentary Processes Option**
 - 1) Conduct an experiment approved by your counselor that demonstrates how sediments settle from suspension in water. Explain to your counselor what the exercise shows and why it is important.
 - 2) Using topographical maps provided by your counselor, plot the stream gradients (different elevations, divided by distance) for four different stream types (straight, meandering, dendritic, trellis). Explain which ones flow fastest and why, and which ones will carry larger grains of sediment and why.
 - 3) On a stream diagram, show areas where you will find the following features: cut bank, fill bank, point bar, medial channel bars, lake delta. Describe the relative sediment grain size found in each feature.
 - 4) Conduct an experiment approved by your counselor that shows how some sedimentary material carried by water may be too small for you to see without a magnifier.
 - 5) Visit a nearby stream. Find clues that show the direction of water flow, even if the water is missing. Record your observations in a notebook, and sketch those clues you observe. Discuss your observations with your counselor.
 - B) **Energy Resources Option**
 - 1) List the top five Earth resources used to generate electricity in the United States.
 - 2) Discuss source rock, trap, and reservoir rock- the three components necessary for the occurrence of oil and gas underground.
 - 3) Explain how each of the following items is used in subsurface exploration to locate oil or gas: reflection seismic, electric well logs, stratigraphic correlation, offshore platform, geologic map, subsurface structure map, subsurface isopach map, and core samples and cutting samples.
 - 4) Using at least 20 data points provided by your counselor, create a subsurface structure map and use it to explain how subsurface geology maps are used to find oil, gas, or coal resources.
 - 5) Do ONE of the following activities:
 - A) Make a tabletop display showing how oil and gas or coal is found, extracted, and processed. You may use maps, books articles from periodicals, and research found on the Internet (with your parent's permission). Share the display with your counselor or a small group (such as your class at school) in a five-minute presentation.
 - B) With your parent's and counselor's permission and assistance, arrange for a visit to an operating drilling rig. While there, talk with a geologist and ask to see what the geologist does onsite. Ask to see cutting samples taken at the site.
 - C) **Mineral Resources Option**
 - 1) Define rock. Discuss the three classes of rocks including their origin and characteristics.
 - 2) Define mineral. Discuss the origin of minerals and their chemical composition and identification properties, including hardness, specific gravity, color, streak, cleavage, luster, and crystal form.
 - 3) Do ONE of the following:
 - A) Collect 10 different rocks or minerals. Record in a notebook where you obtained (found, bought, traded) each one. Label each specimen, identify its class and origin, determine its chemical composition, and list its physical properties. Share your collection with your counselor.
 - B) With your counselor's assistance, identify 15 different rocks and minerals. List the name of each specimen, tell whether it is a rock or mineral, and give the name of its class (if it is a rock) or list its identifying physical properties (if it is a mineral).
 - 4) List three of the most common road-building materials used in your area. Explain how each material is produced and how each is used in road building.
 - 5) Do ONE of the following activities:
 - A) With your parent's and counselor's approval, visit an active mining site, quarry, or sand and gravel pit. Tell your counselor what you learned about the resources extracted from this location and how these resources are used by society.
 - B) With your counselor, choose two examples of rocks and two examples of minerals. Discuss the mining of these materials and describe how each is used by society.
 - C) With your parent's and counselor's approval, visit the office of a civil engineer and learn how geology is used in construction. Discuss what you learned with your counselor.

D) Earth History Option

- 1) Create a chart showing suggested geological eras and periods. Determine which period the rocks in your region might have been formed.
- 2) Explain to your counselor the processes of burial and fossilization, and discuss the concept of extinction. Identify three plants or animals on the threatened or endangered list of the U.S. Fish and Wildlife Service.
- 3) Explain to your counselor how fossils provide information about ancient life, environment, climate, and geography. Discuss the following terms and explain how animals from each habitat obtain food: benthonic, pelagic, littoral, lacustrine, open marine, brackish, fluvial, eolian, protected reef.
- 4) Collect 10 different fossil plants or animals. Record in a notebook where you obtained (found, bought, traded) each one. Classify each specimen to the best of your ability, and explain how each one might have survived and obtained food. Tell what else you can learn from these fossils.
- 5) Do ONE of the following:
 - A) Visit a science museum or the geology department of a local university that has fossils on display. With your parent's and counselor's approval, before you go, make an appointment with a curator or guide who can show you how the fossils are preserved and prepared for display.
 - B) Visit a structure in your area that was built using fossiliferous rocks. Determine what kind of rock was used and tell your counselor the kinds of fossil evidence you found there.

Requirement 1

Define geology. Explain why the study of the present is important to understanding the past. Discuss how geologists learn about rock formations. _____

Requirement 2

Pick three resources that can be extracted or mined from Earth for commercial use. Discuss with your counselor how each product is discovered and processed.

Resource #1 _____

How was this product discovered and processed? _____

Resource #2 _____

How was this product discovered and processed? _____

Resource #3 _____

How was this product discovered and processed? _____

Requirement 3

Review a geologic map of your area with your counselor and discuss the different rock types and estimated ages of rocks represented. Determine whether the rocks are horizontal, folded, or faulted, and explain how you arrived at your conclusion. _____

Requirement 4

Do **ONE** of the following:

4A) With your parent's and counselor's approval, visit with a geologist, land-use planner, or civil engineer.

Profession: _____

Discuss this professional's work and the tools required in this line of work with your counselor. _____

What project was this person working on? Discuss this project, reports and maps with your counselor. _____

4B) Learn about the career opportunities available in geology. Pick one that interests you and explain how to prepare for such a career.

Career: _____

How would you prepare for such a career? _____

Discuss what course might be useful for such a career. _____

Requirement 5

Complete **ONE** of the options listed below:

5 A) Surface and Sedimentary Processes Option

1) Conduct an experiment approved by your counselor that demonstrates how sediments settle from suspension in water. Explain to your counselor and below what the exercise shows and why it is important.

_____ Have your leader or counselor initial here when completed.

2) Using topographical maps provided by your counselor, plot the stream gradients (different elevations divided by distance) for four different stream types (straight, meandering, dendritic, trellis).

Explain which ones flow fastest and why, and which ones will carry larger grains of sediment and why.

Straight- _____

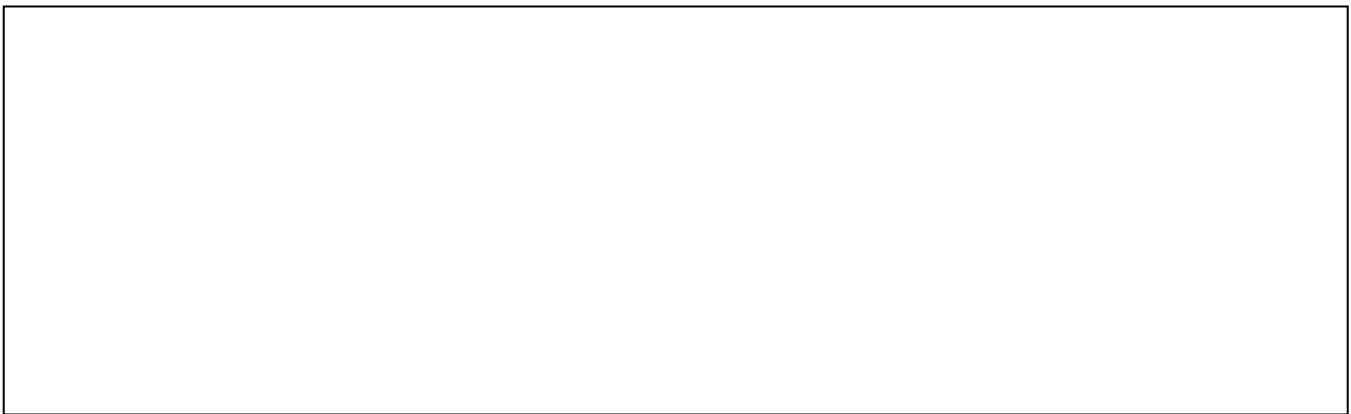
Meandering- _____

Dendritic- _____

Trellis- _____

3) On a stream diagram, show areas where you will find the following features: cut bank, fill bank, point bar, medial channel bars, lake delta.

Stream Diagram:



Describe the relative sediment grain size found in each:

Cut Bank: _____

5 B) Energy Resources Option:

1) List the top five Earth resources used to generate electricity in the United States.

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____

2) Discuss source rock, trap, and reservoir rock – the three components necessary for the occurrence of oil and gas underground.

Source Rock: _____

Trap: _____

Reservoir Rock: _____

3) Explain how each of the following items is used in subsurface exploration to locate oil or gas.

Reflection Seismic

Electric Well Logs

Stratigraphic Correlation

Offshore Platform

Geologic Map

Subsurface Structure Map

Subsurface Isopach Map

5) Do **ONE** of the following activities:

A) Make a tabletop display showing how oil and gas or coal is found, extracted, and processed. You may use maps, books, articles from periodicals, and research found on the Internet (with your parent's permission). Share the display with your counselor or a small group (such as your class at school) in a five minute presentation.

Items used for your tabletop display:

Discuss your display with your counselor or small group (5 minute presentation):

B) With you parent's and counselor's permission and assistance, arrange for a visit to an operating drilling rig.

Where did you visit to see an operating drilling rig?

Who was the geologist that you spoke to? _____

What does he/she do onsite?

What cutting samples did you see that have been taken from the site?

C) Mineral Resources Option

C 1) Define rock:

Discuss the three classes of rocks including their origin and characteristics.

Class 1:

Class 2:

Class 3:

C 2) Define mineral: _____

Discuss the origin of minerals and their chemical composition and identification properties, including

HARDNESS: _____

SPECIFIC GRAVITY: _____

COLOR: _____

STREAK: _____

CLEAVAGE: _____

LUSTER: _____

CRYSTAL FORM: _____

C 3) Do ONE of the following:

3A) Collect 10 different rocks or minerals. Label each specimen below.
Share your collection with your counselor.

#1: _____ (rock or mineral)
Where did you obtain it? _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#2: _____ (rock or mineral)
Where did you obtain it? _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#3: _____ (rock or mineral)
Where did you obtain it?: _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#4: _____ (rock or mineral)
Where did you obtain it?: _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#5: _____ (rock or mineral)
Where did you obtain it?: _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#6: _____ (rock or mineral)
Where did you obtain it?: _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#7: _____ (rock or mineral)
Where did you obtain it?: _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#8: _____ (rock or mineral)
Where did you obtain it?: _____
Identify its:
Class: _____
Origin: _____
Determine its chemical composition: _____

List its physical properties: _____

#9: _____ (rock or mineral)
Where did you obtain it?: _____
Identify its:
Class: _____
Origin: _____

Determine its chemical composition: _____

List its physical properties: _____

#10: _____ (rock or mineral)

Where did you obtain it?: _____

Identify its:

Class: _____

Origin: _____

Determine its chemical composition: _____

List its physical properties: _____

3B) With your counselor's assistance, identify 15 rocks and minerals.

1# _____

Class: _____

List its identifying physical properties: _____

2# _____

Class: _____

List its identifying physical properties: _____

3# _____

Class: _____

List its identifying physical properties: _____

4# _____

Class: _____

List its identifying physical properties: _____

5# _____

Class: _____

List its identifying physical properties: _____

6# _____

Class: _____

List its identifying physical properties: _____

7# _____

Class: _____

List its identifying physical properties: _____

8# _____

Class: _____

List its identifying physical properties: _____

9# _____

Class: _____

List its identifying physical properties: _____

10# _____

Class: _____

List its identifying physical properties: _____

11# _____

Class: _____

List its identifying physical properties: _____

B) With your counselor, choose two examples of rocks and two examples of minerals. Discuss the mining of these materials and describe how each is used by society.

Rock #1: _____

Rock #2: _____

Mineral #1: _____

Mineral #2: _____

C) With your parent's and counselor's approval, visit the office of a civil engineer and learn how geology is used in construction. Discuss what you learned with your counselor.

Where and who did you visit: _____

How is geology used in construction:

5D) Earth History Option

1) Create a chart showing suggested geological eras and periods.
Determine which period the rocks in your region might have been formed:

2) Explain to your counselor the processes of burial and discuss the concept of extinction.

Explain to your counselor the processes of fossilization and discuss the concept of extinction. _____

List 3 plants or animals that are on the threatened or endangered list of the U.S. Fish and Wildlife Service.

1# _____
2# _____
3# _____

3) Explain to your counselor how fossils provide information about:

Ancient Life:

Environment:

Climate:

Geography:

Discuss the following terms and explain how animals from each habitat obtain food:

Benthonic:

Pelagic:

Littoral:

Lacustrine:

Open Marine:

Brackish:

Fluvial:

Eolian:

Protected Reef:

4) Collect 10 different fossil plants or animals.

1: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

2: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

3: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

4: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

5: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

6: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

7: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

8: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

9: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

10: _____ (plant or animal)

Where did you obtain it: _____

Classify specimen and explain it might have survived and obtained food.

What else did you learn about this fossil:

5) Do ONE of the following:

A) What science museum or the geology department of a local university that has fossils on display did you visit? _____

How are the fossils preserved and prepared for display: _____

B) What structure in your area that was built using fossiliferous rocks that you visited:

What kind of rock was used:
