

Geology

Merit Badge Workbook



Merit badges are earned by doing: reading the pamphlet, practicing the skills, and showing your counselor what you have learned.
This workbook gives you a place to organize your notes and track your progress along the way.
Merit badge counselors may not require the use of this or any similar workbook.
You still must satisfy your counselor that you can demonstrate each skill and have learned the information.
Use the space under each requirement to note what you have done and what you want to talk about, not to write out full answers.
When a requirement says discuss, show, tell, explain, or demonstrate, that is what you must do.
No one may add to or subtract from the official requirements found on scouting.org (Guide to Advancement 7.0.4.8).
Scouting America last updated this badge's requirements page on December 15, 2025.
Requirements change from time to time. Double-check scouting.org before you start.

Scout's name: _____ Unit: _____ Date started: _____

Counselor's name: _____ Phone no.: _____ Email: _____

Links marked "Scouting America resources" are the ones Scouting America shares on its official badge page.
This workbook is unofficial and not endorsed by Scouting America.

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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.

Scouting America resources: Defining Geology (video) · Introduction to Geology (video)

Geology, in my own words

How geologists learn about rock formations

Why studying the present helps us understand the past

Requirement 1 completed on _____ counselor initials _____

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.

Scouting America resources: Patterns of Mineral Extraction (video)

Three resources extracted or mined from Earth

Resource	How it is discovered	How it is processed

Requirement 2 completed on _____ counselor initials _____

3. Review a geologic map of your area or an area approved by your counselor, and discuss the different rock types and estimated ages of rocks represented. Determine whether the rocks are sedimentary, metamorphic, or igneous. Explain if the geologic map shows horizontal, folded, faulted, or intrusive rocks, and explain how you arrived at your conclusion.

Scouting America resources: State Geological Surveys (website)

Geologic map I reviewed (area)

Rocks shown on the map

Rock type	Sedimentary, metamorphic, or igneous	Estimated age

☐ Horizontal
☐ Folded
☐ Faulted
☐ Intrusive

How I arrived at my conclusion

Requirement 3 completed on counselor initials

4. Do ONE of the following options:

☐ **Option A—Surface and Sedimentary Processes. Do ALL of the following:**

(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.

Scouting America resources: Stream Erosion and Stream Deposition (video) · Sediment Settlement Lab (video) Separate Soil! (video)

Date Experiment I did

What the experiment 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.

Scouting America resources: How to Calculate the Gradient of a Slope (video)

Stream gradients I plotted

Stream type	Elevation difference	Distance	Stream gradient
Straight			
Meandering			
Dendritic			
Trellis			

Which ones flow fastest, and why

Which ones 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, and lake delta. Describe the relative sediment grain size found in each feature.

Scouting America resources: Point Bars and Cut Banks (video)

My stream diagram (draw here or attach a page)

Feature	Relative sediment grain size
Cut bank	
Fill bank	
Point bar	
Medial channel bars	
Lake delta	

(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.

Scouting America resources: Sediment in Streams (video)

Date | What I used to look closer

What the experiment showed

(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.

Scouting America resources: How to Read Water (video)

Date _____ Stream I visited _____

Clues that show the direction of water flow

Sketch of the clues (draw here or attach a page)

☐ **Option B—Energy Resources. Do ALL of the following:**

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

Scouting America resources: Electric Power Monthly (website)

	Earth resource used to generate electricity
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.

Scouting America resources: Formation of Reservoir Rock (video)

Component	**My notes**
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, and core samples and cutting samples.

Scouting America resources: Using 3D Seismic Exploration to Find and Drill for Oil and Natural Gas Sources (video)

Item	How it is used to locate oil or gas
Reflection seismic	
Electric well logs	
Stratigraphic correlation	
Offshore platform	
Geologic map	
Subsurface structure map	
Subsurface isopach map	
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.

My subsurface structure map (draw here or attach a page)

How subsurface geology maps are used to find oil, gas, or coal

(5) Do ONE of the following:

- ☐ **(a)** Make a display or presentation 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 or guardian's permission). Share the display with your counselor or a small group (such as your class at school) in a five-minute presentation.

  Oil and gas, or coal _____ Shared with _____ Date _____

  - ☐ How it is found
  - ☐ How it is extracted
  - ☐ How it is processed

☐ **(b)** With your parent or guardian'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.

Date | Drilling rig I visited

Geologist I talked with

What the geologist does onsite, and the cutting samples I saw

☐ **Option C—Mineral Resources. Do ALL of the following:**

(1) Define rock. Discuss the three classes of rocks including their origin and characteristics.

Scouting America resources: Rocks for Kids (video) · Types of Rocks (video)

Rock, in my own words

Class of rock	Origin	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.

Scouting America resources: Rocks and Minerals (video)
Identifying Rocks and Minerals - Using Physical Properties for Identification (video)

Mineral, in my own words

The origin of minerals and their chemical composition

Identification property	My notes
Hardness	
Specific gravity	
Color	
Streak	
Cleavage	
Luster	
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.

My collection of 10 rocks or minerals

Specimen label	Where I got it (found, bought, traded)	Class and origin	Chemical composition	Physical properties

☐ **(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).

15 rocks and minerals I identified

	Specimen name	Rock or mineral	Class (rock) or identifying physical properties (mineral)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

15 rocks and minerals I identified (continued)

	Specimen name	Rock or mineral	Class (rock) or identifying physical properties (mineral)
13			
14			
15			

(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.

Scouting America resources: Top Rock Types Used in Road Construction (website)

Three common road-building materials in my area

Material	How it is produced	How it is used in road building

(5) Do ONE of the following:

☐ **(a)** With your parent or guardian'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.

Date _____ Site I visited _____

What I learned about the resources extracted here and how society uses them

☐ **(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.

Example	Name	How it is mined	How society uses it
Rock 1			
Rock 2			
Mineral 1			
Mineral 2			

☐ **(c)** With your parent or guardian'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.

Date _____ Civil engineer's office I visited _____

How geology is used in construction

☐ **Option D—Earth History. Do ALL of the following:**

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

Scouting America resources: The Geological Timescale (video)

My chart of geological eras and periods (draw here or attach a page)

Period when the rocks in my region might have formed

(2) Explain the theory of plate tectonics. Make a chart explaining, or discuss with your counselor, how the processes of plate tectonics work. Discuss how plate tectonics determines the distribution of most of the Earth's volcanoes, earthquakes, and mountain belts.

Scouting America resources: How Plate Tectonics Work (video)

The theory of plate tectonics

How the processes of plate tectonics work (chart or notes)

Feature	How plate tectonics determines where they occur
Volcanoes	
Earthquakes	
Mountain belts	

(3) Explain to your counselor the processes of burial and fossilization, and discuss the concept of extinction.

Scouting America resources: Fossilization Process Simply Explained (video) · Fossils 101 (video)
Fossils and Paleontology (website)

Topic	My notes
Burial	
Fossilization	
Extinction	

(4) 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, and protected reef.

Scouting America resources: Fossils and Rock Layers for Kids! (video) · Divisions of the Marine Environment (video) Benthos: Intertidal Zone (video) · Pelagic Zone (video) · Pelagic Zone Facts (website) · What Is the Littoral Zone (video) Lacustrine Zone (video) · Oceans 101 (video) · Fluvial Processes (video) · Weathering Environments Part 1: Fluvial Processes (video) Weathering Environments Part 2: Aeolian Processes (video) · Coral Reef 101 (video)

What fossils tell us about	How
Ancient life	
Environment	
Climate	
Geography	

Term	What it means	How animals from this habitat obtain food
Benthonic		
Pelagic		
Littoral		
Lacustrine		
Open marine		
Brackish		
Fluvial		
Eolian		
Protected reef		

(5) Collect 10 different fossil plants or animals OR (with your counselor's assistance) identify 15 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.

- ☐ I collected 10 fossils
- ☐ I identified 15 fossils with my counselor

My fossil record

Fossil	Where I got it (found, bought, traded)	Classification	How it might have survived and obtained food

My fossil record (continued)

Fossil	Where I got it (found, bought, traded)	Classification	How it might have survived and obtained food

What else I can learn from these fossils

(6) 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 or guardian'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.

Scouting America resources: Geology Museums to Visit in the United States (website)

Date | Place I visited | Curator or guide

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.

Date | Structure I visited | Kind of rock used

Fossil evidence I found there

☐ **(c)** Visit a rock outcrop that contains fossils. Determine what kind of rock contains the fossils, and tell your counselor the kinds of fossil evidence you found at the outcrop.

Date | Outcrop I visited | Kind of rock with the fossils

Fossil evidence I found at the outcrop

☐ **(d)** Prepare a display or presentation on your state fossil. Include an image of the fossil, the age of the fossil, and its classification. You may use maps, books, articles from periodicals, and research found on the internet (with your parent or guardian's permission). Share the display with your counselor or a small group (such as your class at school). If your state does not have a state fossil, you may select a state fossil from a neighboring state.

My state fossil | Shared with

Topic	What I found
Age of the fossil	
Its classification	

Image of the fossil (draw here or attach a page)

Requirement 4 completed on | counselor initials

5. Do the following:

(a) Discuss with your counselor the importance of the Leave No Trace Seven Principles and the Outdoor Code as they relate to the study of geology.

Scouting America resources: Leave No Trace (video)

Guideline	Why it matters when studying geology
Leave No Trace Seven Principles	
Outdoor Code	

(b) Explain how you practiced the Leave No Trace Seven Principles and the Outdoor Code while traveling in natural areas and while collecting rock and fossil specimens for this merit badge.

How I practiced them while traveling in natural areas

How I practiced them while collecting rock and fossil specimens

Requirement 5 completed on _____ counselor initials _____

6. Do ONE of the following:

☐ **(a)** Explore careers related to this merit badge. Research one career to learn about the training and education needed, costs, job prospects, salary, job duties, and career advancement. Your research methods may include—with your parent or guardian's permission—an internet or library search, an interview with a professional in the field, or a visit to a location where people in this career work. Discuss with your counselor both your findings and what about this profession might make it an interesting career.

Scouting America resources: 20+ Geoscience Careers & How Much Geoscientists Make $ (Why You Should Study Geology!) (video) Geology Jobs: What You Can Do With a Degree in Geology (video)

Careers related to geology

Career	What people in this career do

The career I researched _____

What I found

Topic	My notes
Training and education	
Costs	
Job prospects	
Salary	
Job duties	
Career advancement	

What might make it an interesting career

☐ **(b)** Explore how you could use knowledge and skills from this merit badge to pursue a hobby or healthy lifestyle. Research any training needed, expenses, and organizations that promote or support it. Discuss with your counselor what short-term and long-term goals you might have if you pursued this.

Scouting America resources: Why I'm So Obsessed With Geology (video)
What Is Geology and How Can Rock Collecting Become a Fascinating Hobby? (video)
Rockhounding 101: The Best Way to Find Minerals (video) · Michigan Geology Tourism Series (video)

Hobby or healthy lifestyle

What I found

Topic	My notes
Training needed	
Expenses	
Organizations that promote or support it	
Short-term goals	
Long-term goals	

Requirement 6 completed on counselor initials

Counselor sign-off

Your counselor signs your blue card or approves the badge in Scoutbook, and your unit records it. This line is for your own records.

Counselor's signature Date completed

Official Scouting America resources

Scouting America resources: Geology merit badge page (requirements and resources) · Geology merit badge pamphlet (free PDF)
All merit badges

Made by Cole at ScoutSmarts.com, an Eagle Scout who loves helping Scouts.
Spot an error or a requirement change? Tell me at scoutsmarts.com/contact.
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