



Geology

Scouts BSA · STEM

Name

Started

Completed

Geology is the study of rocks, minerals, and the forces that shape the Earth. You'll learn how geologists read the land, explore resources we use every day, and dig into a topic that interests you. Once you start, you'll never look at a rock the same way.

Requirements

Every official requirement, in plain language. Check the official wording when you sign off (scouting.org/merit-badges/geology/). Tips and examples are ideas, not extra requirements.

- ☐ **1** Define geology. Discuss how geologists study rock formations, and explain why understanding the present helps geologists understand the past

Tip: Start a small rock collection and look at each one with a magnifying glass. Think about how a geologist would describe it.

Example: Explain how a geologist studies a rock: look at it with a hand lens, test hardness by scratching it, check color and luster, notice the grain size, and think about whether it formed from lava, from layers of sediment, or under heat and pressure.

- ☐ **2** Choose 3 resources taken from the Earth to be sold or used in industry. Discuss with your counselor how each one is found and processed

Tip: Look around your home for things that came from the Earth, like metal, gravel, or the fuel that heats your house.

Example: Pick three resources and follow each to your house: gravel from a quarry for the driveway, copper from a mine for the wires in your walls, and natural gas or coal for heat or electricity. Discuss how each is found and removed.

- ☐ **3** Study a geologic map of your area (or one your counselor approves). Discuss its rock types and estimated ages, decide if they're igneous, sedimentary, or metamorphic, and explain whether the map shows folded, faulted, horizontal, or intrusive rocks and how you decided

Tip: Ask your counselor or a library for a geologic map of your area, and find the spot where you live.

Example: On a geologic map, find the color for your neighborhood and read the legend. You might learn you live on sandstone that's 300 million years old, or on clay left behind by a glacier. Point out one other rock type nearby.

4 Geology focus area: Choose 1 of 4

Tips for this section: Pick the option that matches your interests and look for a nearby museum, road cut, or rock club to help.

Example for this section: Whatever option you choose, think field trip: a road cut to sketch rock layers, a riverbank to watch sediment move, or a museum to see fossils and minerals. Take notes and photos to share with your counselor.

4a Option A: surface and sedimentary processes

- ☐ **4a1** Do a counselor-approved experiment showing how sediment settles out of water. Explain to your counselor what it shows and why that matters

- ☐ **4a2** On topographic maps from your counselor, plot stream gradients (elevation change divided by distance) for 4 stream types: straight, meandering, dendritic, and trellis. Explain which flow fastest and which carry bigger sediment grains, and why

- ☐ **4a3** On a stream diagram, mark where you'd find a point bar, a cut bank, a fill bank, medial channel bars, and a lake delta, and describe the relative grain size of sediment in each

- ☐ **4a4** Do a counselor-approved experiment showing that some sediment carried by water is too tiny to see without a magnifier

- ☐ **4a5** Visit a nearby stream and look for clues to which way the water flows, even if it's dry. Write notes and sketch the clues in a notebook, then discuss them with your counselor

4b Option B: energy resources

- ☐ **4b1** List the 5 main Earth resources used to make electricity in the United States

- ☐ **4b2** Discuss the 3 things needed for oil and gas to collect underground: source rock, reservoir rock, and a trap

- ☐ **4b3** Explain how each of these helps find oil or gas underground: geologic maps, subsurface structure and isopach maps, reflection seismic, stratigraphic correlation, electric well logs, offshore platforms, and core and cutting samples

- ☐ **4b4** Use at least 20 data points from your counselor to draw a subsurface structure map. Use your map to explain how such maps help locate oil, gas, or coal

4b5 Oil, gas, or coal project: Choose 1 of 2

- ☐ **4b5a** Make a display or presentation on how oil and gas or coal is located, extracted, and processed, using maps, books, magazine articles, and online research (with a parent's or guardian's permission). Present it in 5 minutes to your counselor or to a small group, like your class at school

- ☐ **4b5b** With permission and help from a parent or guardian and your counselor, arrange to visit a working drilling rig. Talk with the geologist there about what they do on site, and ask to see the cutting samples taken there

4c Option C: mineral resources

- ☐ **4c1** Define rock. Discuss the 3 classes of rock, how each forms, and what each is like

- ☐ **4c2** Define mineral. Discuss how minerals form, their chemical makeup, and the properties used to identify them, such as luster, streak, color, cleavage, hardness, crystal form, and specific gravity

4c3 Rock and mineral collection: Choose 1 of 2

- ☐ **4c3a** Collect 10 different rocks or minerals. Write in a notebook where you got each one (found, bought, or traded). Label each, identify its class and origin, find its chemical makeup, and list its physical properties. Share the collection with your counselor

- ☐ **4c3b** With your counselor's help, identify 15 different rocks and minerals. List each one's name, say whether it's a rock or a mineral, and give its class (for a rock) or its identifying physical properties (for a mineral)

- ☐ **4c4** List 3 of the most common road-building materials in your area, and explain how each is produced and used to build roads

4c5 Mining and construction: Choose 1 of 3

- ☐ **4c5a** With approval from a parent or guardian and your counselor, visit an active mine, quarry, or sand and gravel pit. Afterward, tell your counselor what resources come from there and how society uses them

- ☐ **4c5b** With your counselor, choose 2 rocks and 2 minerals. Discuss how each is mined and describe how society uses it

- ☐ **4c5c** With approval from a parent or guardian and your counselor, visit a civil engineer's office to see how geology shapes construction projects. Talk over what you learned with your counselor

4d Option D: Earth history

- ☐ **4d1** Make a chart of the proposed geologic eras and periods, and figure out in which period the rocks in your region may have formed

- ☐ **4d2** Explain plate tectonics. Make a chart or talk with your counselor about how it works, and discuss how it controls where most of Earth's volcanoes, earthquakes, and mountain ranges are found

- ☐ **4d3** Explain to your counselor how living things get buried and become fossils, and discuss what extinction means

- ☐ **4d4** Explain how fossils reveal ancient life, environments, climates, and geography. Discuss these habitats and how animals in each get food: pelagic, benthonic, littoral, lacustrine, fluvial, eolian, brackish, open marine, and protected reef

- ☐ **4d5** Collect 10 fossils of different plants or animals, or identify 15 with your counselor's help. Note in a notebook how you got each, classify each as well as you can, explain how each may have lived and fed, and tell what else the fossils teach you

4d6 Fossils in the field: Choose 1 of 4

- ☐ **4d6a** Visit a science museum or university geology department with fossils on display. Before you go, with approval from a parent or guardian and your counselor, book a time with a curator or guide to show you how fossils are preserved and prepared for display

- ☐ **4d6b** Visit a building in your area made from fossil-bearing rock. Figure out the type of rock, and tell your counselor what fossil evidence you found

- ☐ **4d6c** Visit a rock outcrop that has fossils. Figure out what kind of rock holds them, and tell your counselor what fossil evidence you found

- ☐ **4d6d** Prepare a presentation or display about your state fossil (or a neighboring state's, if yours has none) with a picture, its age, and its classification, using maps, books, magazine articles, and online research (with permission). Share it with your counselor or a small group, like your class

5 Leave No Trace in geology

Tips for this section: Collect only where it's allowed, and leave fossils and formations in parks for others to enjoy.

Example for this section: Leave No Trace in geology means collecting only where it's allowed, taking just a small sample instead of a whole slab, never chipping at fossils or formations in parks, and filling any holes you dig.

- ☐ **5a** Discuss with your counselor why the Outdoor Code and the Leave No Trace Seven Principles matter when studying geology

- ☐ **5b** Explain how you followed the Outdoor Code and Leave No Trace on trips into natural areas and when gathering rock and fossil specimens for this badge

6 Careers and hobbies: Choose 1 of 2

Tips for this section: Talk with a geologist, or try a hobby like rock hounding with a local rock and mineral club.

- ☐ **6a** Explore careers related to geology. Research one, including the training and education needed, costs, job outlook, pay, duties, and advancement (with permission, by internet or library search, an interview, or a workplace visit). Discuss your findings with your counselor and why the career might interest you

- ☐ **6b** Explore how geology skills could lead to a hobby or healthy lifestyle. Research the training, costs, and groups that support it, and discuss with your counselor the short- and long-term goals you might set