girl scouts of central texas

# Patch Program

## Rocks Rock!

Discover the wonderful world of geology, the science of Earth's physical structure including rocks, geodes, gemstones, and fossils, from the wonders of the world to the rocks in your backyard! How are precious gems created? What clues can you use to identify rocks in your backyard? Learn why rocks rock!

Be entered into our featured patch sweepstakes! Patch purchasers will be automatically entered into our sweepstakes, with the chance to win a rock tumbler. Read the **sweepstakes rules** for details.

### Grade level requirements:

- **Daisies (grades K-1).** Choose one activity from each category.
- **Brownies (grades 2-3).** Choose two activities from each category.
- **Juniors (grades 4-5).** Choose three activities from each category.
- **Cadettes (grades 6-8).** Choose three to four activities from each category.
- **Seniors (grades 9-10).** Choose three to four activities from each category.
- **Ambassadors (grades 11-12).** Choose three to four activities from each category.

When you're done, **submit photos** and a story to inspire other Girl Scouts to earn this patch, too. **Purchase your patch** by Sunday, August 31.

# Discover

Discover the wonders of geology from deep in the Earth's core to the rocks right on the surface! Uncover how geodes form and what a mineral really is.

- **What's Geology?:** Geology is the study of Earth including its structure, composition (what it's made of), physical processes, and history! The word comes from the Greek language. The prefix (beginning of a word) gē, that later became geo-, means "earth" and the suffix (ending) -ology means "the study of". You may have noticed the -ology suffix being used in other fields of science like biology and psychology.
    - Geology has several subdisciplines (specific topics of study within geology). Choose a subdiscipline and research what your new job would include:
        - Mineralogy – study of minerals
        - Petrology – study of rocks
        - Volcanology – study of volcanos
        - Paleontology- study of geologic history and fossils
        - Geomorphology- study of landforms and their formation
- **Discover Earth's Layers:** Earth isn't just solid rock; it has five layers composed of liquids and solids! The crust, upper mantle, lower mantle, outer core, and inner core.
    - Use a drawing or printout of the Earth's layers and then try to guess how deep into the Earth humans have reached! Then compare your answers with Insider Tech's animation.
- **The Rock Cycle:** There are three methods by which new rocks form: from magma which is melted rock (igneous), from millions of years of compression of bits of rock and organic material (sedimentary), and through a process where existing rocks are exposed to intense heat and pressure (metamorphic). Explore how each of these rock types are formed and how they can move between those states:
    - Rock out with the Rock Cycle Song by Hopscotch
    - Explore the rock cycle with chocolate! Geologist Becky Nesel breaks it down in this informative video.

Igneous rocks are formed from melted rock, also known as magma. They can form above ground from volcanoes erupting lava and below ground where magma cools inside the Earth's crust.

Sedimentary rocks are made up of pieces of other rocks (clastic) or organic material including shells, bones, and plants that are buried and compressed into a new rock.

Metamorphic rocks are created when existing rocks are exposed to intense heat or pressure transforming them into metamorphic rocks. All rocks can be changed into metamorphic rocks including other metamorphic rocks.

- **Mineral Matters:** Minerals are the building blocks of rocks and there are over 5,800 different types! Minerals are naturally occurring elements or element compounds that have a crystal structure and are formed by variety of geological processes.
    - Uncover mineral identification with Miacademy Learning mineral mixup or Mike Sammartano's video guide.
    - Dive into this free breakdown of Minerology from the Idaho Museum of Mining & Geology and learn more about mineral classification, naming, and properties.
    - **Discover some unique mineral formations from around the world and learn how they formed:**

Colossal Gypsum Crystals from Naica, Mexico

Colorful Hydrothermal Structures of Dallol Ethiopia

Shilin Stone Forest Yunnan, China Ad

- **Gemstone Creation:** Gemstones (including amethysts, diamonds, and emeralds) actually start as crystals and rocks. The original crystal and rock are cut, ground, and polished by people to gain their gemstone status. Some gemstones even come from animals and plants. Examples of this include pearls which are created by oysters and amber which is formed from fossilized tree resin.

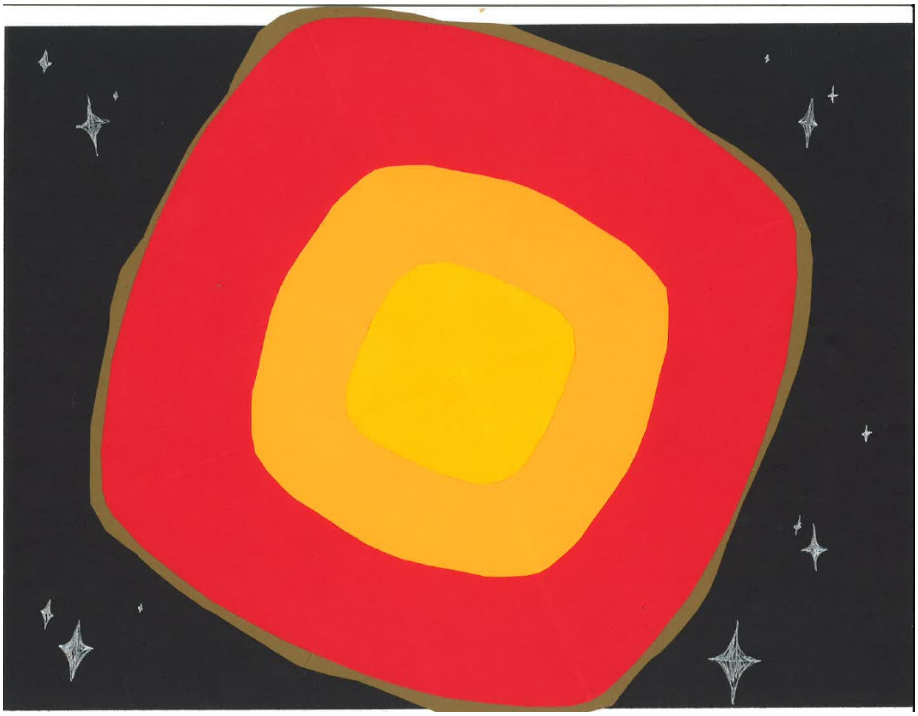
    - **Hear from an Expert:** Gabriela Farfan, a minerologist and the Smithsonian's curator for gems and minerals answers the internet's questions about rocks, minerals, gemstones, and more in this WIRED interview.
- **Synthetic vs Natural Gemstones:** While many may assume synthetic gemstones mean fake gemstones, synthetic gems are chemically and physically identical to natural gemstones! Since the late 1800s, synthetic gems have been created in laboratories and provide a cheaper and more ethical alternative to natural gemstones. Watch a video or documentary about synthetic gemstones to learn more!
    - Understand the impact and science of lab grown diamonds in this video from The Economist.
    - CSA's can explore the detailed science of lab grown gemstones and their place in memorial jewelry in PBS's Be Smart video.
- **Geological Geodes:** Geodes are hollow, rounded rock-like or clay objects lined internally with crystals. They range in size from as small as a walnut to as long as 26 feet. Geodes' hollow cavities can occur in various ways: from dissolving minerals, the decay of organic materials, shifts in the earth, or a rapid cooling of magma with air trapped inside. Mineral rich water finds its way into these pockets and as water evaporates minerals start to crystallize over thousands and even millions of years.
    - Learn more about how geodes form with Sci Show Kids
    - Discover the world's largest geode with Hank Green & SciShow
- **Rock-itecture:** Rocks are very popular in architecture and have stood the test of time! From the Incan civilizations to the Roman civilizations to the Renaissance movement to today's architecture, different minerals and rocks have gone in and out of style.
    - The Texas State Capitol is made from a pinkish granite from Granite Mountain in Marble Falls, Texas (over 188,518 cubic feet of it!). Typically, older buildings sourced materials closer to home than modern buildings due to the difficulty in transporting such heavy materials. Many older buildings have stories about sourcing materials from local mines, quarries, and hillsides. Find an old building in your community like a county courthouse or city hall and learn more about how it was built and where the stones came from!

- The “Seven Wonders of the World” is a well-known description of some not so well-known wonders. Only one of the original seven wonders has survived to the modern world (the Great Pyramid of Giza made of limestone and granite). In 2000, a new classification of the “Seven Wonders” was voted upon. The “New Seven Wonders” are all made of various stones. Learn about one of the “New Seven Wonders” and discover what materials it is built or even carved from.
  - Great Wall of China - China
  - Chichén Itzá – Mexico
  - Petra – Jordan
  - Machu Picchu – Peru
  - Christ the Redeemer - Brazil
  - The Colosseum – Italy
  - Taj Mahal - India
- **Women in Geology:** Uncover the history of some famous women in geology. Show off your new knowledge in a creative way like a poster, an interpretive dance, or a craft depicting their research/impact on geology.
  - Etheldred Benett
  - Marie Tharp
  - Inge Lehmann
  - Mary Anning
  - Ethel Shakespear
  - Gertrude Elles
  - Janet Watson
  - Florence Bascom

# Connect

Get hands on and show off your geology knowledge. Make a rock-ing craft, talk to an expert, and explore the beauty of geology in your community!

- **Crust-y Crafts:** Recreate the layers of the Earth with food or craft supplies!
    - Using marshmallows, pudding, and some crushed cookies, create your own Earth Layer pudding with the Arizona's Science Center's recipe
    - Use clay/salt dough, paper, or recycled materials to make a model of our Earth's layers to display!



- **Rock and Roll**: Research a specific rock and host a fake interview with the "rock" star of your choice!
- **Crystal Creator**: Create your own candy crystals with this SciShow Kids video tutorial
- **Geode Genius:** Geodes are like nature's crystal blind-boxes – you never know what you will find inside**.** Create your own geode from sugar and glue with DIY-er Mona's blog tutorial.
- **Fossil Formation:** Fossils are exclusively classified as sedimentary rocks due to their unique formation by compaction and cementation. The heat and

pressure that form igneous and metamorphic rocks would destroy fossils' structure.
    - Create your own fossil with salt dough using the forces of compaction and cementation. Florida Museum's tutorial will show you how!
- **Gemstones-R-U.S.:** Identify gemstones that are found in your area and what they are used for
    - **Geology Page's guide to Rare Gems & Minerals in Texas**
    - **Gemological Institute of America (GIA)'s Gem Tour of America**
- **Surveyor Girl Scout**: Explore what rocks and minerals are in your home and your community!
    - Identify 10 things in your home that are made up of mined materials
    - Take a walk (or drive) around town to see how many buildings are made up of stone or bricks. Get a closer look at public buildings, like a library or city hall, to see if you can identify what they are made of.
- **Get Digital:** Did you know that the virtual world of Minecraft contains many real-life rocks, minerals, and crystals? Learn about a real-world equivalent to Minecraft bricks and then make a build using it!
- **Become a Rock Detective**: Use a magnifying glass to study rocks up close. Make a geology journal to record the types of rocks and the location where you find them. Draw pictures of your findings and leave the rocks in nature.
    - Check out the Backyard Rock Identification Guide
        - Igneous has six primary textures: **vesicular** which is bubbly, **glassy** which is smooth and shiny, **phaneritic** which has small visible crystals at an arm's length, **aphanitic** which has no visible crystals at an arm's length, **porphyric** which has some large visible crystals alongside crystals not visible at an arm's length, and **pyroclastic** which has lots of crystals of varying sizes.
        - Sedimentary rocks have three primary textures, **clastic texture** which has visible rock fragments which can be large (breccia rocks) or small (like sandstone), biogenic which are made up of organic materials which can be very obvious fragments (like coquina) or a solid texture (like coal), and **chemical sedimentary** rocks which have no rock fragments. You can also differentiate biogenic rocks from their reaction to hydrochloric acid which geologists use diluted versions of.
        - Metamorphic rocks have two primary textures: **foliated** textures have a striped look while **non foliated** textures have a speckled appearance of a single color of mineral.
- **Meet an Expert:** Visit a jeweler, park ranger, or museum docent to ask about their jobs and geology subdiscipline!
- **Geology in Your Parks:** Texas State Parks have all kinds of cool rocks and landforms. Many parks feature dramatic canyons, towering mesas, and unique

rock formations. Each offers a glimpse into the state's rich geological history! Plan a trip (real or theoretical) to a state or national park: what will you see, how will you get there, and what will you eat?


Inks Lake State Park - Burnet


Enchanted Rock State Natural Area – Fredericksburg


South Llano River State Park - Junction


San Angelo State Park – San Angelo


Dinosaur Valley State Park – Glen Rose


Waco Mammoth National Monument – Waco


Palo Duro Canyon State Park – Canyon


Big Bend National Park – Brewster County


Devil's Sinkhole State Natural Area - Rocksprings

- **Explore a Collection:** Explore a curated collection of rocks and minerals at a museum, university, or a virtual tour of Rice Museum of Rocks & Minerals.
    - Texas Science & National History Museum – Austin
    - Brazos Valley Museum of Natural History – Bryan
    - Heard Natural Science Museum & Wildlife Sanctuary - McKinney
    - Perot Museum of Nature and Science – Dallas
    - Houston Museum of Natural Science – Houston

# Take Action

It's geo-tastic! Share your geology know-how with others and get outdoors.

- **Explore State Parks:** Join us for Girl Scouts Love State Parks and explore local geological landscapes in person! Events and activities will be offered across 17 state parks within Girl Scouts of Central Texas on September 12-14, 2025.
- **Leave No Trace:** Learn the seven principles of Leave No Trace Which principle teaches us to leave all of nature's treasures where we find them? Have you heard the statement, "take only photos, leave only footprints"? Leaving the rocks we find where they are helps preserve the ecosystem and the story of the landscape.
    - Learn the seven principles of Leave No Trace.
    - Get creative and share your knowledge with your friends and family with a poster, pop-up book, song, or craft!
- **Backyard Identification Guide:** Identify the rocks in your backyard
    - Check out the Backyard Rock Identification Guide for an overview. For descriptions see **Become a Rock Detective** in the Connect section.
    - Hardness: Minerals have varying level of hardness classified by the Mohs Hardness Scale. Use some common tools like a copper penny or your fingernail to identify the minerals inside the rocks you find!

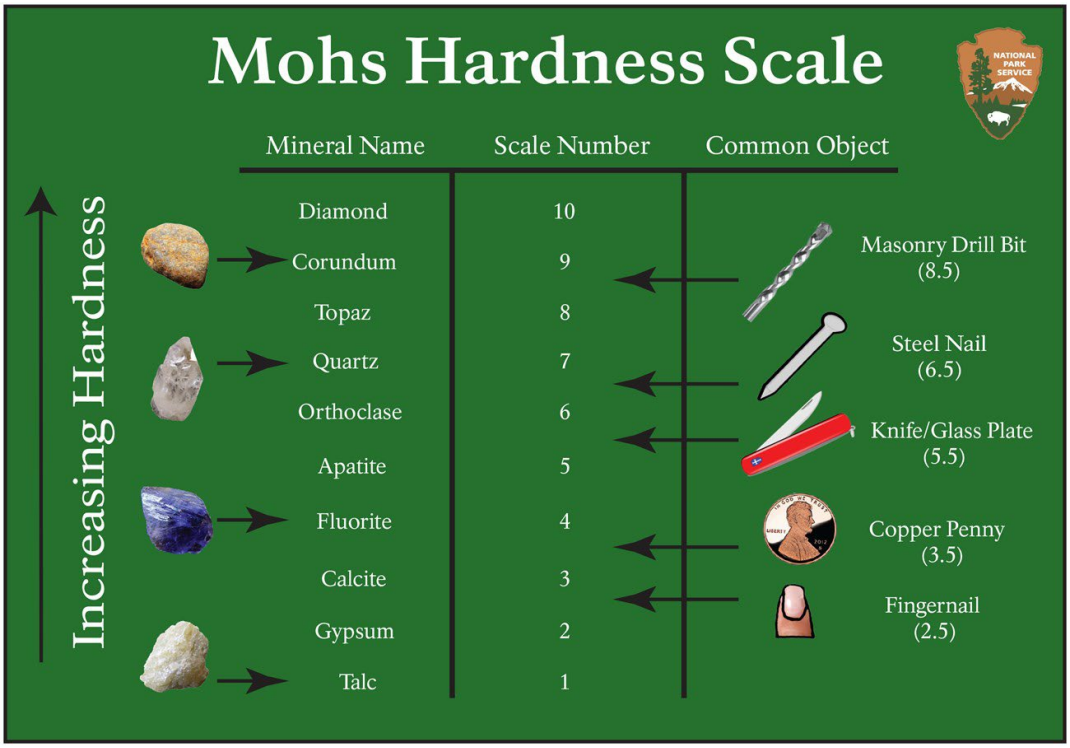



Image Credit: National Park Service

- For a comprehensive list of rocks and minerals, check out your local library or check out a digital copy of a geology book or rock and mineral field guide, some examples include:
  - National Geographic Kids Everything Rocks and Minerals
  - Rocks & Minerals: An Illustrated Field Guide by Evelyn Mervine and Vlad Stankovic
  - Rocks & Minerals by Dr. R.F. Symes and the Natural History Museum, London.
- Test your rock against Mining Matter's Rock Identification Guide or ScienceView's index of rocks
- For an extra challenge, try to identify your rock with Collector's Corner Rock Identification Key or Appalachian State University's Rock Classification Lab

- **Host a Rocks Rock! Party:** Celebrate how rocks rock & share your geological knowledge by hosting a rock party!
  - Share your rock knowledge with other Girl Scouts. Host a rock trivia game.
  - Rock out to some classic rock music like:
    - Eye of the Tiger(eye) by Survivor
    - We Will **Rock** You by Queen
    - I Love Rock(s) 'N Roll by Joan Jett
    - Don't Stop Believin' (in Geology) by Journey

        - Under Pressure (Like Metamorphic Rocks) by Queen
    - Find some **rock**ing food to serve (geode cakes, volcano cakes, rock cookies, layer dips, rock candy, crystal fruit platter)
- **Paint a Rock**: Painting rocks can be a great way to share kindness and show your Girl Scout spirit; however, make sure to Leave No Trace! Keep painted rocks to gardens, playgrounds, and sidewalks and not at our national parks, hiking trails, or shorefronts.
- **Rocks Around the World**: Create a travel brochure for a geological marvel: from the "New Seven Wonders of the World", the beauties at our Texas state and national parks, to unique mineral formations across the world, and the geological landscapes in your community!
- **Take A Rock Walk**: Get outdoors and look down! Examine the rocks you find and try and identify them. Record your findings in photographs, a nature journal, or as a drawing.
- **Pocket Full of Rocks**: Start your own rock & mineral collection (while observing Leave No Trace!).
    - Include a rock from each rock type
    - Label your collection with its name and where it was found/sourced
- **Women in Geology Today:** From planetary geology to paleontology, explore how female scientists are impacting the world of geology today. Discover a woman in geoscience and share her story in a creative way!
    - Tanya Atwater
    - Jessica Watkins
    - Dawn Wright
    - Marcia McNutt
    - Asmeret Asefaw Berhe
    - Emily Brodsky
    - Rita Parai
    - Donna Shillington

# Igneous Rocks

Igneous rocks are formed from melted rock, also known as magma. They can form above ground from volcanoes erupting lava and below ground where magma cools inside the Earth's crust.

Diorite

Basalt

Obsidian

Tuff

Pumice

Granite

Andesite

Gabbro

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# Sedimentary Rocks

Sedimentary rocks are made up of pieces of other rocks (clastic) or organic material including shells, bones, and plants that are buried and compressed into a new rock.

Siltstone

Coquina

Sandstone

Shale

Bauxite

Breccia

Chert

Coal

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# Backyard Rock Identification Guide

***Always wear safety glasses or googles when breaking rocks.***

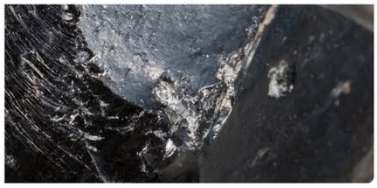
Clean your rock samples, either a quick rinse or a little scrub to uncover their true coloring, texture, and patterns!

## igneous

vesicular texture

phaneritic texture

porphyric texture



glassy texture

aphanitic texture

pyroclastic texture

## sedimentary

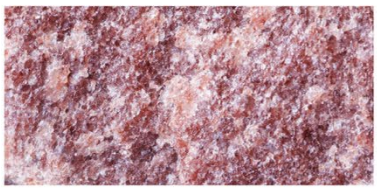
clastic textures

biogenic (organic)

chemical

## metamorphic

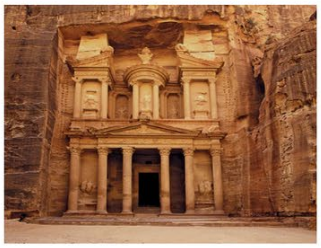
foliated texture



non foliated texture

# New Seven Wonders Materials Cheat Sheet

***Great Wall of China - China***
Packed soil (rammed earth), wood, brick, granite, and marble



***Petra – Jordan***
Sandstone and stucco

***Chichén Itzá – Mexico***
Limestone

***The Colosseum - Italy***
Concrete, travertine limestone, marble, stone, bricks, tuff, and wood.

***Christ the Redeemer - Brazil***
Reinforced concrete and soapstone

***Taj Mahal - India***
Brick-in-lime mortar, red sandstone, marble, and gems including turquoise, jade, and onyx

***Machu Picchu - Peru***
Andesite. adobe, and wood

Image Credits: Great Wall of China: Hung Chung Chih; Petra: Lovrencg/Fotolia; Chichén Itzá: diegograndi; The Colosseum: fabiomax/Fotolia; Taj Mahal: TMAX; Machu Picchu: Adalberto Rios Szalay; Christ the Redeemer: sfmthd/Fotolia

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