Garden of the Gods Park
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Program updates can be found at: https://gardenofgods.com/educational/edu-1/school-field-trips

Land Use Acknowledgement:

We gratefully acknowledge the native peoples on whose ancestral homeland we gather, as well as the diverse and vibrant Native communities of Colorado today.

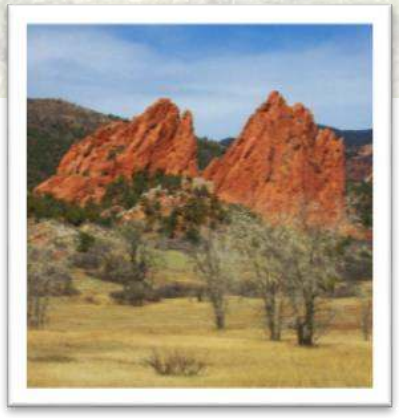
Home School Program

Welcome! We look forward to sharing the story of Garden of the Gods with your students.

We align with current Colorado Academic Standards for K-5 Social Studies: History, Life Science, and Earth and Space Science.

Goals:

- Students recognize the exceptional natural and geological wonder of the Garden of the Gods.
- Students gain a broad understanding of and appreciation for the science of geology.
- Students identify the three rock layers experienced in the Park, their ages and composition.
- Students recognize how different ecosystems coexist within the Park, making the Garden a crossroads of plant and animal life.
- Students identify how the Garden's ecology has supported human habitation for the last 4,000 years.
- Students appreciate the Garden's historical role in the Pike's Peak Region.



Reference Guide

An **ecosystem** is a single environment and all the living and non-living things in it. This means an ecosystem is more than just the plants and animals in an area. An ecosystem is also defined by the type of soil and rocks, the amount of precipitation, the elevation, and several other factors.

The Garden of the Gods is a crossroads of plants and animals from six different ecosystems. Many animals successfully live in multiple ecosystems. Below is a list of common species we discuss:

- Prairie Grasslands
  - Animals – Prairie Rattlesnake, Coyote, Striped Skunk, Mule Deer, Magpie, Red-Tailed Hawk, Honey Ants
  - Plants – Prickly-Pear Cactus, Yucca, Paintbrush
- Wetlands
  - Animals – Black Bear, Red Fox, Gray Fox, Magpie, Red-Winged Blackbird, Prairie Rattlesnake
  - Plants – Common Fireweed, Cottonwood Tree, Cattail
- Mountain Shrublands
  - Animals – Rocky Mountain Bighorn Sheep, Cottontail Rabbit, Bobcat, Wild Turkey, Eastern Fence Lizard, Honeybee
  - Plants – Wild Rose, Mountain Mahogany, Piñon Pine, Three-Leaf Sumac, One-Seed Juniper
- Piñon and Juniper Woodlands
  - Animals – Mountain Lion, Mule Deer, Least Chipmunk, Spotted Towhee, Scrub Jay, Honey Ant
  - Plants – Prairie Coneflower, Pasque Flower, One-Seed Juniper, Gambel Oak, Piñon Pine
- Cliff Islands
  - Animals – Least Chipmunk, Rock Pigeon, White-Throated Swift, Violet-Green Swallow, Prairie Falcon, Common Raven
  - Plants – Yucca, Three-Leaf Sumac, One-Seed Juniper, Ponderosa Pine
- Montane Forests
  - Animals – Little Brown Bat, Pack Rat, Red-Tailed Hawk, Mule Deer, Mountain Lion, Tiger Swallowtail Butterfly
  - Plants – Rocky Mountain Penstemon, Butterfly Weed, Ponderosa Pine, Chokecherry, Mountain Mahogany

Animals and plants in the Garden depend on each other to maintain a healthy environment. Some of our plants and animals would disappear from the Park if this balance did not exist. For example:

> The Tiger Swallowtail Butterfly (Colorado's largest) lays its eggs on the chokecherry shrub. The chokecherry is a *host plant* for the butterfly. The eggs hatch, the larvae feeds on the leaves, and then they spin their chrysalis on this same plant. The adult

butterfly pollenates the plant allowing it to reproduce. Loss of the chokecherry can result in a loss of the butterfly and vice versa.

Certain plants and animals in our Park serve as *keystone species.* That means that their presence is of primary importance to the Garden's biodiversity. For example:

The Gambel's Oak provides shelter and nesting sites for many of the Park's birds. It provides forage for mule deer, black bear, and many rodent species. Since they grow in wide stands, they provide excellent erosion control. The loss of this species in the Park would drastically alter our landscape and many animals would no longer live here.

Not only is the Park a crossroads of plants and animals, it has long been a gathering place for many different peoples. Archaeologists have evidence of human habitation in the Garden for the last 4,000 years. Many American Indian nations have history in the Front Range. The Ute (*Nuu-ciu*) maintain that they have always lived here amongst the rocks of the Garden and we honor their tradition. Sun Mountain (*tava*) is their name for Pikes Peak. *Nuu-ciu* made great use of the area's natural resources and climate, wintering here, sheltered by the rocks. They hunted deer, turkey and bison and utilized the yucca, three-leaf sumac, piñon pine, and other local plants for food and amenities.

European presence in the area began with the Spanish in the mid-1500s. French fur trappers frequented the area through the late 18th century. American exploration began in 1806 with Lt. Zebulon Pike's expedition, followed by Major Stephen Long in 1820 and Brevet Captain John C. Fremont in the 1840's. Settlement began in earnest with 1858's Pikes Peak or Bust gold rush.

The Garden of the Gods Park is composed of sedimentary rock layers. They are geologically remarkable due to their vertical and in some cases beyond vertical positions. This allows study of rock that in other areas has been buried by nearly a mile of sediment. Our program touches on the concept of rock formations.

1. Mesa Gravels (2 million- 10,000 years ago): Loose red gravels atop the eastern ridges of the park and the mesa east of 30th street. Remains of regional glaciation from the last ice age. The freezing and thawing of these glaciers deposited layers of gravel that are now sedimentary rocks in the making.
2. Pierre Shale (73-70 million years ago): Much of Colorado Springs, the park's Visitor and Nature Center, and the Camp Creek valley on the east side of the park rest atop the 5,000-foot thick Pierre Shale. Formed of sea sediments (mud and clay) from when Colorado was under a deep ocean.
3. Niobrara Formation (88-70 million years ago): The pale ridges bisected by Gateway Road on the park's east side are made of the Niobrara Formation. This white or buff layer is a mixture of shales and limestones. They are geological evidence of the shallow Cretaceous Seaway once covered Colorado.
4. The Benton Group (100-88 million years ago): The small valley between the rise of the Niobrara Formation and the towering red hogbacks of the Central Garden was

formed by the easily eroded Benton Group. Consisting mostly of black shales and limestones, this formation also contains thin lenses of volcanic ash clays. These layers were created as the Cretaceous Seaway began.

5. Dakota Group (112-100 million years ago): Dakota sandstone is visible to the north of the Benton Group valley. The grayish-tan ridge was formed in a coastal flood plain and beach sand environment during the Cretaceous time period. Due its distinct color and tendency to erode into fins or hogbacks, Dakota sandstone is visible all along Colorado's Front Range.
6. Morrison Formation (155-148 million years ago): Between White Rock and Juniper Loop Road are the purple to gray shales and pale gypsum of the Morrison Formation. A swampy lowland created this environment and the resulting sediments. This rock layer formed during the late Jurassic period.
7. Lykins Formation (260-250 million years ago): A pale, Triassic period formation visible east of the red South Gateway Rock from the sidewalk connecting the Gateway Trail to the Perkins Central Garden Trail. This thin, light-colored outcrop was formed in a tidal environment that produced a mixture of shale, dolomite, and limestone. Lykins contains fossilized algae and cyanobacteria called stromatolites. Geologists have found evidence of a mass extinction event in the Lykins Formation. Called The Great Dying (or the Permian-Triassic Extinction), this event wiped out over 90% of all life on earth and paved the way for the emergence of dinosaurs.
8. Lyons Formation (300-260 million years ago): The great hogbacks of the Central Garden (save for rocks of Sentinel Plaza and Three Graces Plaza) are made from the Lyons Formation. The creamy white to gray sandstones of the easternmost rocks (White Rock and Gray Rock) are made of the Upper Member of the Lyons Formation. The reddish-orange rocks are made of the Lower Member of this formation. These weather resistant sandstones formed in an arid, dune environment. The missing Middle Member is composed of easily eroded shale and is no longer visible in our park.
9. Fountain Formation (320-300 million years ago): The rocks of Sentinel Plaza, Three Graces Plaza, and the western park are made of the sandstones, shales, and conglomerates of the Fountain Formation. As the Ancestral Rockies eroded away, their sediments were deposited in alluvial fans that built up over 4,500-feet thick.

All the various sedimentary layers were gradually compacted and cemented into rock. Beginning about 70 million years ago these layers were broken and tilted upright. Erosion has exposed the ridges and carved out the valleys to what we see today.

Faulting is evident throughout the Central Garden. A fault is a crack in the earth's surface where movement occurs. Typical faulting occurs along the boundary of tectonic plates—the big, thin pieces of our planet's crust that drift and move on the viscous layer beneath them, bumping and grinding into each other. There is no plate boundary here in Colorado, but there is a crack in the North American tectonic plate itself.

Some faulting occurs in sudden, dramatic spurts, causing earthquakes. The faulting in the Garden occurs very slowly.

The biggest fault in the Garden is the Rampart Range Fault. It trends north and south, parallel to the Front Range. This fault is caused by mountain building and connects to another fault to the south by Cheyenne Mountain and to the north just south of Denver. Smaller faults radiate from the Rampart Range Fault throughout the park. It's these faults that cause the offset position of some of our rocks. For example, both Grey Rock and White Rock are part of the same rock layer, but due to faulting, are no longer aligned. White Rock rests much further east than Grey Rock.

Fossil evidence of dinosaurs and ancient marine animals has been found in the Park. The skull of a dinosaur named *Theiophytalia kerri*, a type of iguanodon, was found in the Garden of the Gods in 1878 by Colorado College Professor, James Kerr. The fossil dates to the early Cretaceous period and is the only evidence this species found anywhere in the world.

Supplementary Activity Ideas:

1. Have students do artwork, creative writing, or journaling based on something they learned about the Park.
2. Collect pictures of plants and animals of the area. Identify which ecosystem(s) they'd best thrive in.
3. Complete "Look What I Learned!" worksheet included in this packet

Look What I Learned
at Garden of the Gods

Name _____

Home School Program

1. Name three of the six ecosystems that form a crossroads in Garden of the Gods Park.

2. What is an ecosystem?

3. Name the three rock types. Which rock type identifies all the rock layers inside the Garden of the Gods?

4. List three causes of erosion within the park.

5. What are the three geologic processes that shape the Garden of the Gods?

6. Do plants growing high on the rocks increase erosion of the rocks or decrease the erosion? What about the plants along the ground, do they increase or decrease erosion? How?

7. Name some things *Nuu-ciu* used the yucca plant for.

8. Why does the black-billed magpie build a nest with a roof and two entrances?

9. Name some animals you might see if you visited the Park at night?

10. How did the Garden of the Gods get its name?

11. What are some reasons we do not feed wild animals in the Park?

12. On the back of this paper draw or write about your favorite experience at the Garden of the Gods today.

Look What I Learned! Answer Key
Garden of the Gods – Home School Program

1. Name three of the six ecosystems that form a crossroads in Garden of the Gods Park? **Prairie grasslands, wetlands, mountain shrublands, piñon and juniper woodlands, cliff islands, and montane forests**

2. What is an ecosystem? **All of the living things in a given area, interacting with each other, and with their environments (weather, earth, sun, soil, climate, atmosphere).**

3. Name the three rock types. Which rock type identifies all the rock layers inside the Garden of the Gods? **Igneous, Sedimentary, and Metamorphic rock. Our rock layers are sedimentary.**

4. List three causes of erosion within the park. **Human traffic, moving water, ice wedging, weathering**

5. What are the three geologic processes that shape the Garden of the Gods? **Uplift, Erosion, and Faulting**

6. Do plants growing high on the rocks increase erosion of the rocks or decrease the erosion? What about the plants along the ground, do they increase or decrease erosion? How? **Plants high on the rocks increase erosion by their roots working down into cracks and breaking up the rock. Plants along the ground prevent erosion as their roots hold down the topsoil.**

7. Name some things the Ute Indians used the yucca plant for. **Soap, shampoo, medicine, rope, paint brush, toothbrush, salad, sewing needles, weaving rugs/sandals, etc., roast pods and seeds for snack**

8. Why does the black-billed magpie build a nest with a roof and two entrances? **To protect the nest from the weather and to evade predators**

9. Name some animals you might see if you visited the park at night? **Little brown bat (in summer), raccoon, mountain lion, coyote, black bear, great horned owl**

10. How did the Garden of the Gods get its name? **In 1859, two surveyors came to lay out Colorado City. When they saw our sandstone formations, M. S. Beach, who related this incident, suggested that it would be a "capital place for a beer garden." His companion, Rufus Cable, a "young and poetic man", exclaimed, "Beer Garden! Why it is a fit place for the Gods to assemble. We will call it the Garden of the Gods."**

11. What are some reasons we do not feed wild animals in the Park? **It is dangerous to both the animals and people. Human food can make wild animals ill. Animals can get used to being fed by people and lose skills necessary to acquire food in the wild. Animals that associate people as a food source can become aggressive. Some animal diseases and parasites can be transferred between people and animals.**