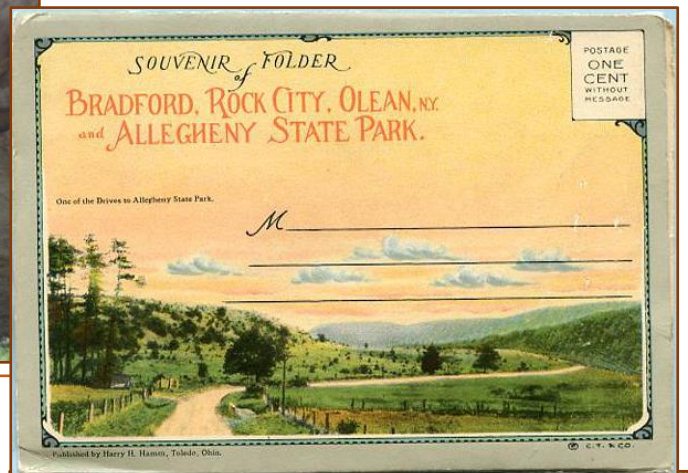


Rock City Park, Olean, NY.



Experience and discover one of the World's largest exposure of Quartz Conglomerate!



Educational Resource Guide



University of Pittsburgh
Bradford



TRAIL CENTRAL

Acknowledgements

Dale and Cindy Smith, Owners of Rock City Park
Linda Devlin, Executive Director, Allegheny National Forest Visitors Bureau
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An Educational Resource Guide – A Useful Tool for Educators. What is in this Guide?

This Educational Resource Guide is designed for middle and secondary students, teachers, as well as adults who will visit Rock City Park. It is intended to prepare and enhance your visit and what you will discover.

Information in this Educational Resource Guide gives you researched materials on the Geological and Human history of the park, things to look for and do during your journey through the rocks, and photos from the early days to today. There is a map of the area, an ["Etiquette Guide"](#) to keep everyone safe, and activities to enrich your visit.

This Guide includes several geological, math and literacy activities which meet [Pennsylvania Core](#) and [Next Generation Science Standards](#) to engage your students and you before arriving, while you are at the Park, and when you return home to share what was discovered with others. You will also find ["Hot Links"](#) to important information and the [Glossary](#).

Throughout the Guide, the following symbols are utilized to correspond with the Creative Connections and [Howard Gardner's Multiple Intelligences](#).



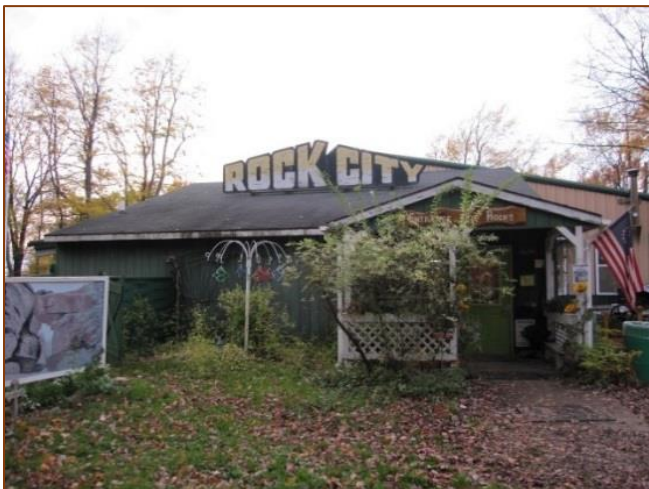
You will also find interesting bits of information scattered throughout the guide. Look for this icon --



All materials in this Guide may be copied and used freely. When using photographs, please include the source and credit of the photographs to Rock City Park, Olean, NY.

We trust you will enjoy reading, seeing, and using the materials to help make your visit memorable for everyone.

Thank you.



To Book Your Adventure, Contact:

Allegheny National Forest Visitors Bureau
PO Box 371, 80 E. Corydon Street
Bradford, PA 16701
800-472-9370 – FAX 814-368-9370
VisitANF.com

Or

Rock City Park
505 Route 16 South
Olean, NY 14760
866-404-ROCK
www.rockcitypark.com

**Rock City Park is open from May 1st to October 31st from 9AM – 6PM daily.
There is parking for busses, modern restrooms, a well-stocked gift shop,
and a museum with interesting artifacts.**

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Indian Stairs



Oil was discovered beneath the rocks. Rock City Park is part of the Pennsylvania Oil Fields which produced 75% of the world's oil in 1900. This well was about 2,000 feet deep.

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Pump Jack near Destination 1

Your Journey of Discovery Begins!

Home to the world's largest exposure of quartz conglomerate.

For a definition of Conglomerate, visit the [Glossary](#).



Signal Rock



While many rock formations are named, there are some un-named ones. Select one or several and name them.

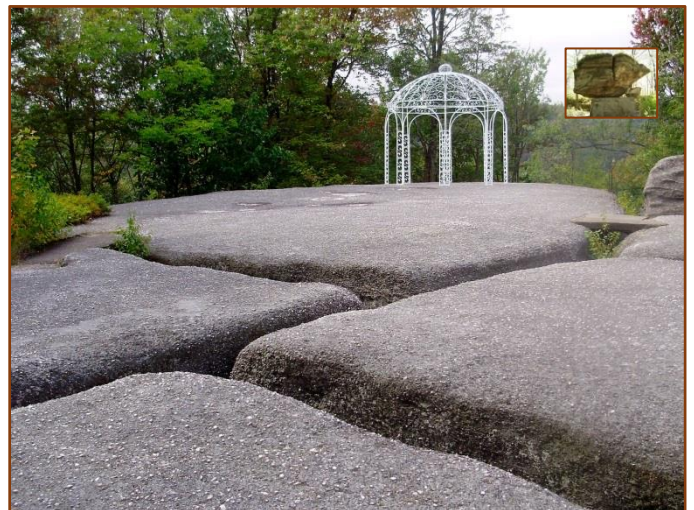
Use your imagination!



Rock City Park was a forerunner of Disney World! Advertisements in newspapers attracted hundreds of travelers from all over the country.



Beginning of the trail and journey



The cracks or crevices, called joints or fractures, may have been formed at the end of the last Ice Age.

Etiquette Guide to keep your journey and visit safe

Rock City Park is 23 acres with a natural trail of 860 meters or 0.53 miles featuring various steps and paths. You should wear comfortable clothing and good walking shoes. You should plan the journey to last about 90 minutes to two hours.



Stay on walking trails unless otherwise instructed. Do not allow anybody to stray from the group. (Use the buddy system).



Alert students with allergies to take allergy medication for precautionary measures. If they are under 18 make sure their medications are controlled by an adult.



Be aware of potential dangers like slippery paths and poisonous vegetation.



Be sure not to touch or eat any objects or vegetation unless instructed to do so.



Do not remove items from the park, including rocks, vegetation, or any other natural elements.



Dispose of trash at public trash receptacles.

What you should bring on the journey

There are lots of things to see and do at the park. These activities will add to your discoveries as you walk among the rocks.

- Pens or pencils with erasers
- A notebook or journal preferably with a hard cover to make writing easy
- A smartphone with camera or a camera
- A measuring tape at least 10 feet
- A protractor
- A basic compass
- Good walking shoes
- Your curiosity
- Your imagination



Dining Hall Pass

Historical Role Play Activity

The area that you are about to visit has meant many things to many different people over the years. A Seneca Indian would have viewed the area quite differently from a surveyor, or a young bride wanting to find a place for her wedding, or a group of young people looking for a special place to visit in the 1800's.

Have students research and adopt one of the perspectives below, and have them role play as that person during your visit. The different historical roles would see, hear, smell, and touch things differently. Have students take pictures to tell a story as a role they are playing.

Select to be someone who had connections to Rock City Park

- A Seneca Indian
- A surveyor during the American Revolution
- A Geologist
- A tourist in the late 1800s
- A group of young people looking for a special place to visit in the 1800s
- A bride looking for a special place for a wedding
- A person seeking Big Foot
- A prospector wanting to drill for oil
- A photographer who loves nature
- An artist who paints images of nature
- A writer who creates stories of history



Before your visit:

1. Discover the learning styles of your students that relate to [Howard Gardner's Multiple Intelligences](#).
2. Have students read the list above and identify which perspective they most identify with for the visit.
3. Have students research the history of the area.

During your visit: Have students . . .

1. Pretend to be their chosen role throughout the field trip. Have them explore the park with others while sharing that role.
2. Ask questions of themselves and others in their groups.
3. Keep a written or photo journal of their discoveries.

After your visit: Have students . . .

1. Engage in a **Think-Pair-Share** activity.
2. Think about their experience, and write a short descriptive paragraph.
3. Pair with another student or group to share and compare their experiences.

Historical Captions and Photo Journal Activity



This activity takes advantage of the beautiful scenery. Also, many students have access to smartphones.


Have students select from one of the people who had connections to Rock City Park listed above.

Notify students that they can take pictures on their smartphones to tell a story.

Have students upload their photos to a computer to either edit or print.

As teams or individually, have students tell their story through the photographs.

Example:

What is happening or could be happening in the photograph? What story does the photograph tell?	
Student name(s)	
<p style="text-align: center;"><i>What are some captions?</i></p> “Should we wave?” “What a great place for our family picnic!”	<p style="text-align: center;"><i>What would be the plot of your story?</i></p> Four sisters want to surprise their older sister for a birthday party at a very special place.

Have your students . . .

Write a skit or a storyboard to demonstrate how their role play character may have acted or reacted to the scenery and events at Rock City Park. You also have the students brainstorm what kind of props or costumes they can use back in the classroom as they tell the story of their journey.

Or, create a painted mural or a photo mural of the park to show their journey and share what they discovered.

Or, write and present a song or poem about Rock City Park and their discoveries.

Have your students create a **RAFT** activity by responding to the following prompts . . .

Role of the Writer: Who or what are you as the writer? A Seneca Indian? A surveyor? A person seeking Bigfoot?

Audience: To whom are you writing? A friend? Your partner? Readers of a newspaper?

Format: In what format are you writing? A letter? A poem? A speech?

Topic: What are you writing about? Why? What's the subject or the point?

Anticipation Guide







Before your visit: Write whether you agree or disagree with the following statements in the column marked “agree/disagree.” Also, use the blank spaces to write down some questions you might have before your visit.

During your visit: Pay attention during your visit to learn whether or not your predictions were right. Be sure to fill in “Where did you find the answer?” Explain how you know.

Anticipation Guide			
Statement	Before Your Visit Agree / Disagree	During your visit Did your answer change?	Where did you find the answer?
The rocks were created by glaciers.			
Rock City was part of the Pennsylvania Oil Fields which produced 75% of the world's oil in 1900.			
People in the 1800s carved their names and dates in the rocks.			
This conglomerate was deposited at the bottom of the ocean.			
There is evidence of earthquakes in the park.			
“Sentinel Rock” was used as a look-out for the Seneca Indians.			
You can tell directions by how soft plants grow on the rocks.			
The “Indian Steps” were believed to have been built using an early form of cement.			
These rocks used to be called "pudding stone" because they are made of white hardened tapioca pudding balls.			

Keeping Track of Sensory Discoveries

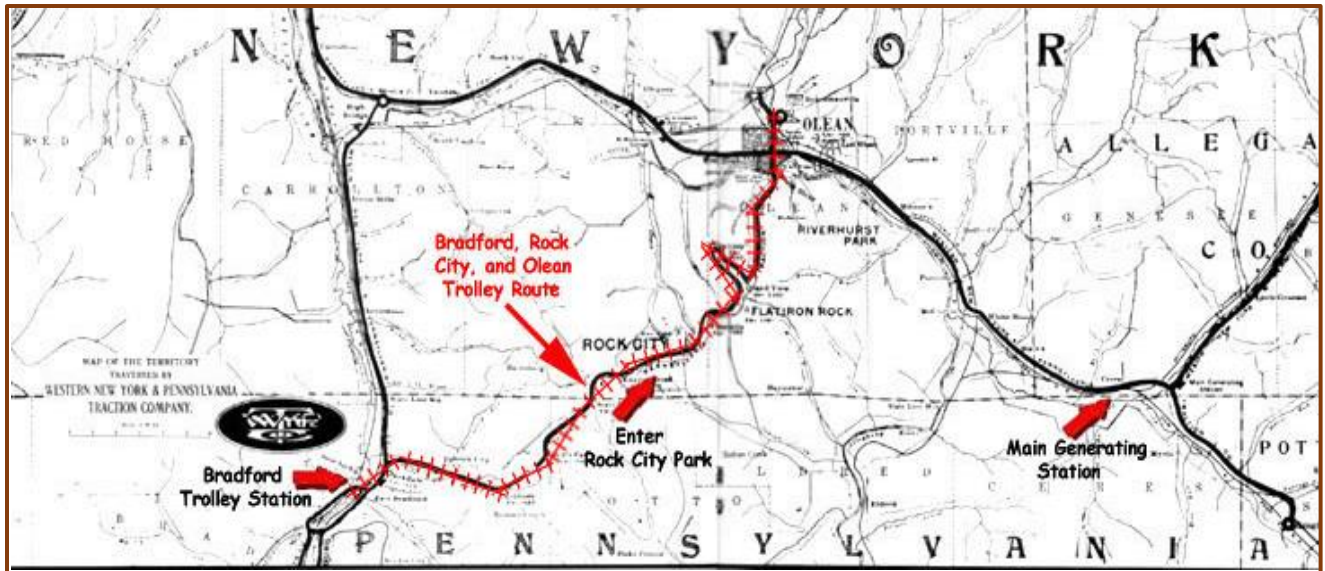
As you walk through the park, identify words, images, or phrases that contain sensory details associated with your walk. Each box has a hint of things to find, but there are many others. What else can you see, hear, smell, or touch? How would you describe them? Write each detail beneath the appropriate sensory term. As you travel in the park, write them in your journal. There will be more things to discover.

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="flex: 1;"> <h3 style="margin: 0;">Sensory Guide</h3> </div> <div style="text-align: right;">     </div> </div>		
Sight (What is it? What does it look like?)	Smell (What is it? What does it smell like?)	Touch (What is it? What does it feel like?)
Example: Location What geometric shape is the Indian's Camp?	Example: Location What do you smell near Sentinel Rock that has to do with an industry?	Example: Location What do you feel near Sentinel Rock that has to do with an industry?
Location	Location	Location
Location	Location	Location
Location	Location	Location
Location	Location	Location

Before you begin your journey through Rock City Park . . .



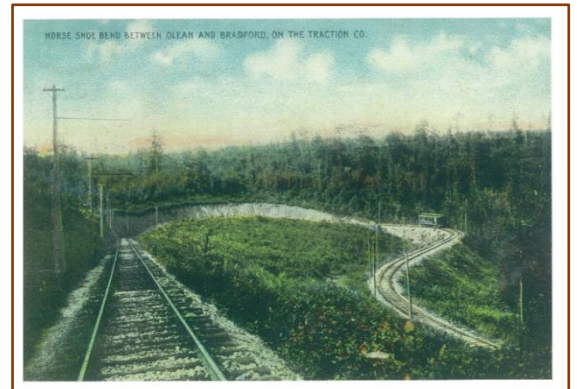
An attraction since 1890, Rock City Park was first operated by the Western New York and PA Traction Line, a local electric rail system which served thousands of travelers.



Rock City Park 1890 - 1920



- Lecture Hall
- Carousel
- Ice House
- Shooting Gallery
- Box Ball Alleys
- Refreshment Hall
- Penny Arcade
- Station Gate
- Photo House



Horseshoe Bend between Olean and Bradford on the Traction Company 1912

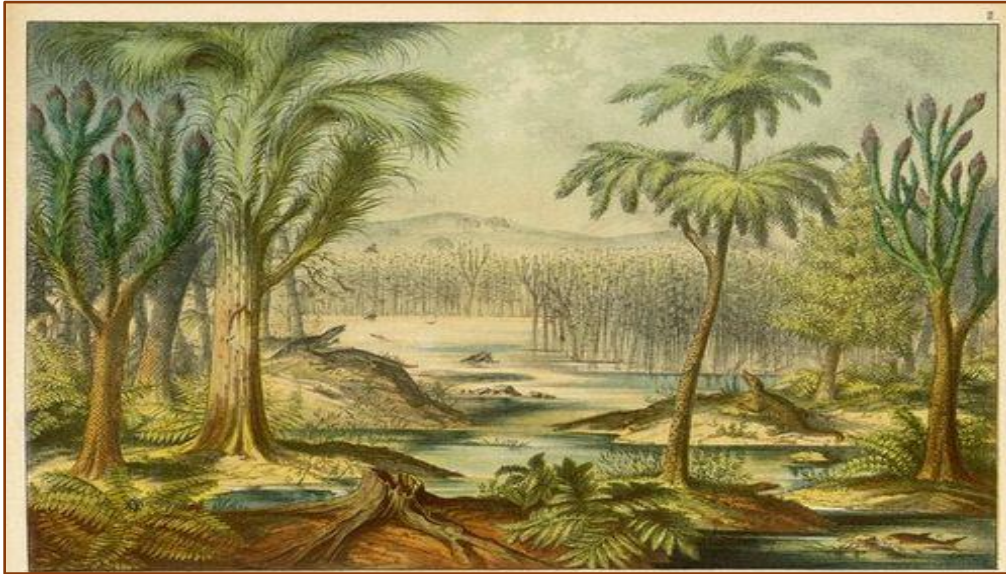
After it opened in 1890, Rock City Park guests also enjoyed its amusement park that included a carousel, box ball alleys, photo houses, rifle range, a dance pavilion and many other forms of entertainment.

The Amazing Geological History of Rock City Park

Rock City Park represents the largest exposure of the Olean [Conglomerate](#). The rock units were first named in 1894. Every rock formation has to have a type locality showing the first and best exposure. [Olean Conglomerate](#) was described based on the rocks exposed at Rock City Park. Olean Conglomerate has a fairly small areal extent spanning southern NY, northwestern PA, and northeastern Ohio. The massive group of rocks in the northern portion of the Bradford Oil District is on a ridge of the Great Divide of the Alleghany Mountains.

How old are the rocks at Rock City Park?

The age of the rocks is of the [Early Pennsylvania Period](#) which was 320-315 million years ago (mya). Rock City Park was the shore of a great, shallow, inland sea. These rocks were deposited in the Appalachian basin of that sea.



Carboniferous Landscape
Painted by Charles Knight

Weathering and erosion broke down the young Appalachian mountains in present day Canada, and transported those sediments to the south, in the Appalachian basin. The pebbles are rounded because of the river activity, not the waves. This was an important element in separating the Olean Conglomerate from Salamanca conglomerate. Olean has round pebbles, deposited by rivers, Salamanca has flat pebbles, deposited on a beach, and reworked by waves. The maximum recorded thickness of this conglomerate is at Rock City Park and is 80 ft.

What Is Conglomerate? How Does It Form? What Is It Used For?



For more information, visit [Geology.com](#)

The Olean Conglomerate is an Oligomict quartz conglomerate (made of a single mineral) that contains beds of both paraconglomerates (contains more matrix than gravel) and orthoconglomerates (contains more gravel than matrix). The white, cloudy quartz clasts vary from discoids to spheroids that range in size from

0.3 centimeters to 4 centimeters. Bedding consists primarily of large tabular [cross-beds](#) and steep dipping [foresets](#). In sandier beds, small channels can be observed.

Did glaciers create Rock City?

According to [Dr. Charles Ashburner](#) who conducted a survey of the region in 1877, the Glaciers stopped at Olean. So, no. Rock City Park was created by the collision of the African and North American continents which forced up the Appalachian Mountains. The Olean Conglomerate is interpreted as “transgressive lag deposits” where the rocks were deposited in a river system of high energy and turbulence. The “streets, and buildings” of Rock City Park were formed by flowing water filled with sediment, rain, air and freezing of water which forced the rocks apart and created fissures or cracks.

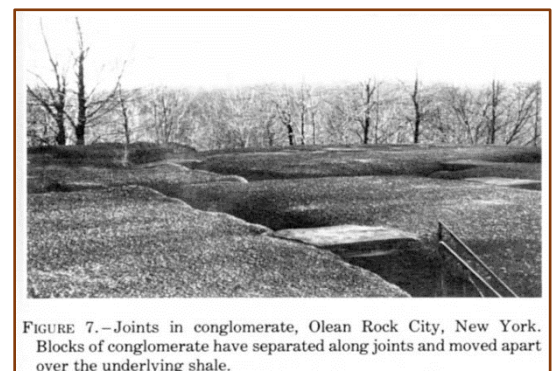


FIGURE 7.—Joints in conglomerate, Olean Rock City, New York. Blocks of conglomerate have separated along joints and moved apart over the underlying shale.

The Amazing Human History of Rock City Park

[Rock City Park](#) was founded as a commercial venture in 1890 by 5 local businessmen who became wealthy from the railroads and the great abundance of timber and oil in the region. Their electric railroad, The Western NY and PA Traction Company was the main way visitors got to the Park from Bradford and Olean.

Rock City Park became a major regional attraction from 1890 to 1920 with tourists coming from long distances. In 1905, a newspaper stated, "On a sunny day it would not be unusual to count the visitors to the park in the thousands."

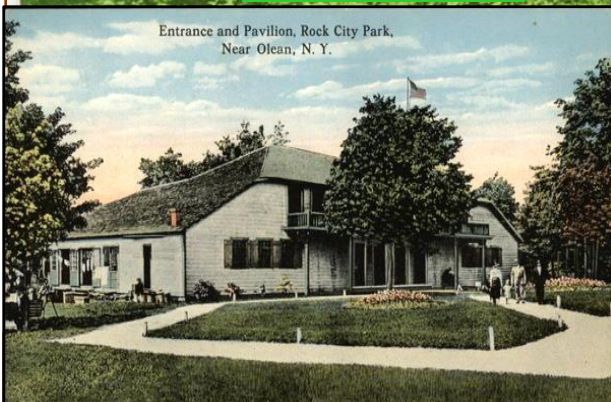


"THIS PUMP-JACK RAISES CRUDE OIL 2000 FEET" Rock City Park, N. Y. 77

By 1895, the park had become such an attraction that the owners built a huge glamorous hotel called the [Bon Air](#), plus a dance Pavilion, carousel, and train station. Celebrities who visited the park and signed the hotel guest register included the world bare-knuckle boxing champion John L. Sullivan, the opera singer Lillian Russel, and John Philip Sousa who wrote many American military and patriotic marches still used in marching bands today, including "The Stars and Stripes Forever." You can see their signatures in the hotel register in the museum!



Hotel Bon Air



Entrance and Pavilion, Rock City Park,
Near Olean, N. Y.

In 1913, the Olean Evening News reported that a new [Health Resort Sanatorium](#) occupied the former Bon Air Hotel that was previously abandoned. It had rates "low enough to be within the reach of everybody." The article stated "It would be impossible to find a location more admirably adapted for health and strength with scenic beauties unmatched in this section of the country." However, it closed in 1923.

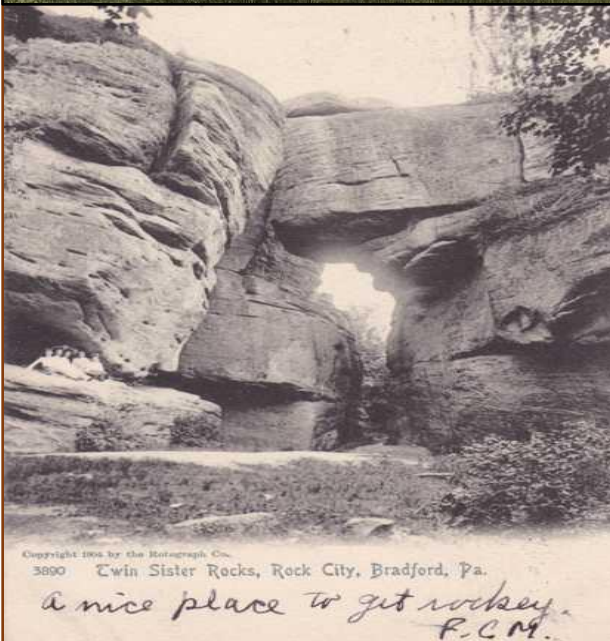
By the early 1920's the popularity of the park declined due to new inventions such as movies and the ability to travel more easily to a variety of places with the new automobile. Although no longer a commercial venture, local people still visited the park for picnics and to enjoy the amazing rock formations, as well as the scenery.

In 1927 the Bon Air Hotel was torn down. Materials from the hotel were used for homes in Olean. The McKean County Register reported that a new [Rock City Highway](#) was constructed and paved in 1931. "The new highway makes the scenic wonder again easily accessible from Olean and Bradford, it is believed that Rock City can be made popular as a scenic and amusement resort, all year 'round."

[The Pavilion](#) was destroyed by fire on May 4, 1939 after being abandoned and in decay for many years. The remains of the railroad are still visible in the woods at the edge of the park near the highway.

In the 1950s, the park was leased by a local engineer for Dresser. It was eventually sold to Dale and Cindy Smith in 2001 who currently own the park. You will meet them during your visit.

A walk through the park will surely take your mind off daily cares and reinvigorate your spirit!



Copyright 1894 by the Halograph Co.
3890 Twin Sister Rocks, Rock City, Bradford, Pa.

*a nice place to get rockey.
R.C.M.*

Rock City Park Scavenger Hunt



Name or draw three different kinds of flowers or plants in the picnic area.

The rocks in the black light room turn different colors. Name two rocks.

a. _____

b. _____

What feathery plant lives in the cracks and shady parts of the rocks?

What colors are the plants you see growing on the side of the rock?
What are the plants?

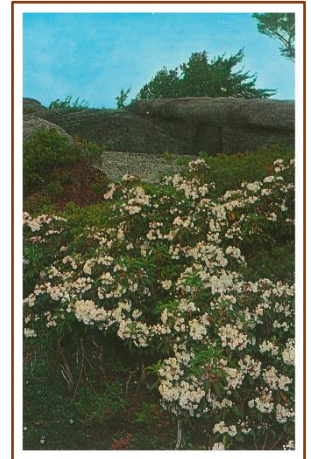
What did you notice about the temperature going through "Fat Man's Squeeze"?

Find the tree growing out of the rock with its roots exposed? How did this happen?

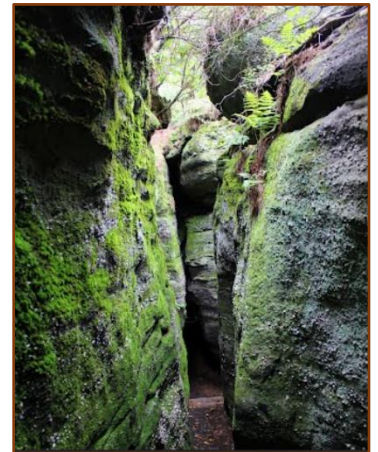
Find two other names carved in the rocks. What are the names and dates?

Find an example of weathering and describe what you found.

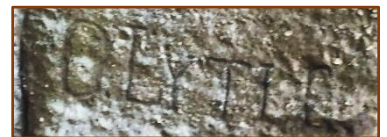
Find "The Old Man in the Rock." How did he get there?



Mountain Laurel



A pathway in Rock City Park



Name carvings on the rocks

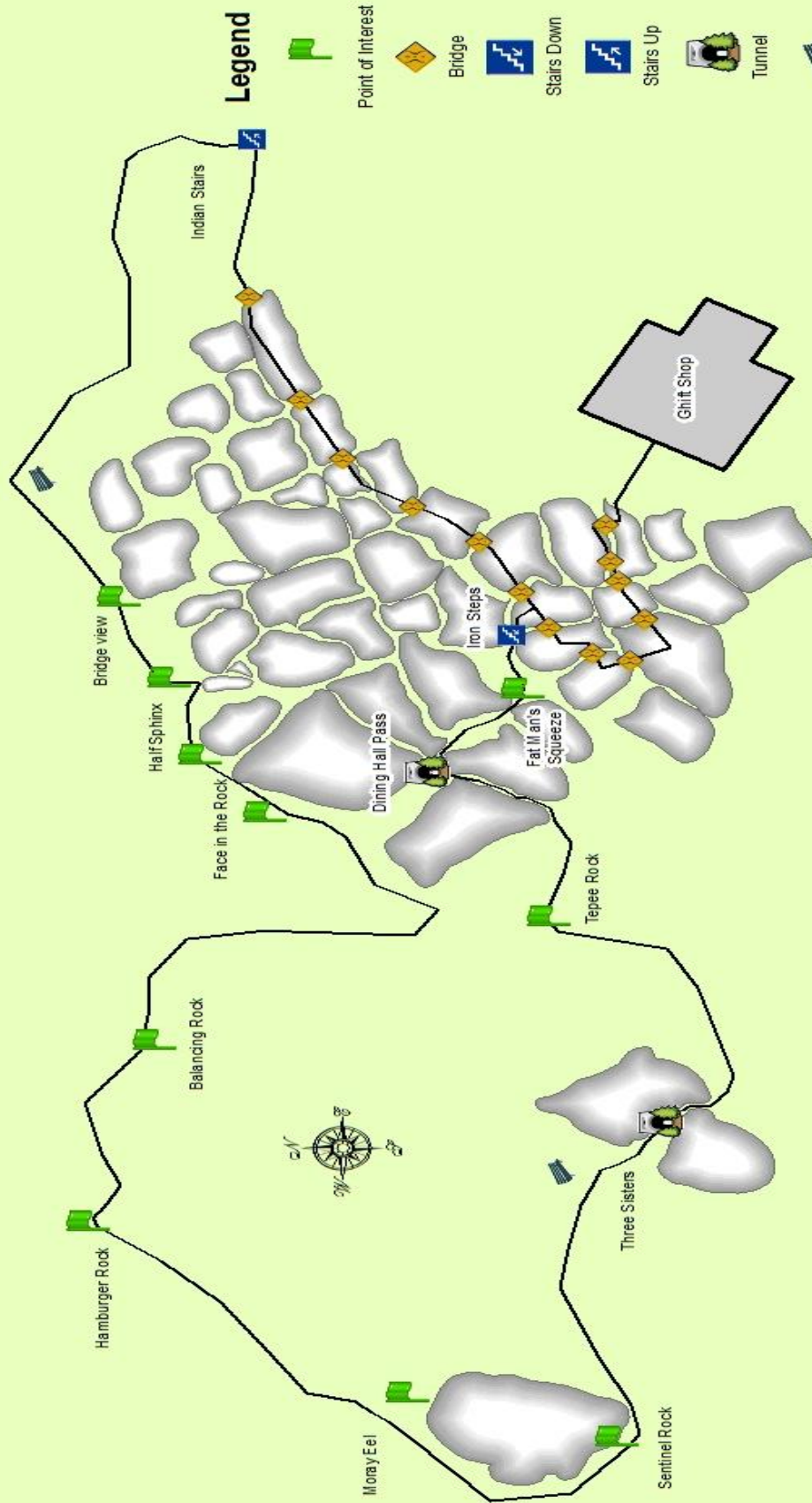
Map of Rock City Park

Rock City Park

"A City of Ancient Rivers"

A walk through the park will surely take your mind off daily cares and reinvigorate your spirit!

Data acquisition and map made by:
Ovidiu Frantescu and Justine Stephan-Cole



Stay on walking trails unless otherwise instructed.
Be aware of slippery paths and poisonous vegetation.
Do not touch any objects or vegetation unless instructed to do so.
Do not remove items from the park, including rocks, vegetation, or any other natural elements.
Dispose of trash at public trash receptacles.

Destinations!

Activities at each destination are labelled . . .



A Geology activity.



A Math activity.



A Writing activity.



A Look-for activity.

There are also [Gardner's Multiple Intelligences](#)



Before the trip in the classroom:

- Have students measure the density of a piece of sandstone or conglomerate – submerge the piece of sandstone in water to find its volume, then weigh to get mass.
- Inform students about [creep](#), [mechanical and chemical erosion](#), [weathering](#), [geologic time frame](#) so they can understand long periods of time.

During the trip:

Here are some geological things you will see in the park. Look for them on your journey.

Biological weathering – This is the breakdown of rock by the action of bacteria, plants and animals.

[Creep](#), [Erosion](#), [Weathering](#).

How do you tell one Sedimentary Rock from another?

For more information, visit <http://geology.com/rocks/sedimentary-rocks.shtml>

After the trip in the classroom:

Give the students a piece of hard sandstone or [conglomerate](#). Have them carve a 1/8 inch deep groove or carve their name so they can see how long it takes and how difficult it is. At the park, ask to compare their carving to the carvings of Jones, Washburn, and others when they find the carvings.

Destination 1 Part A. Gift Shop and Museum



To begin your journey through Rock City Park



Look at the Glowing Rocks, artifacts from the history of Rock City Park, the boulder, and the many rock samples on display.

There are many interesting things to see in the museum. Look for the "tire chair," items from the Bon Air Hotel, photographs, huge machinery, a giant rock to stand on, a giant tree trunk, and lots of gems and rocks. Also, look for the bottle tree.

You can also get a sneak peak of your journey by watching the short video.



Look for the Camouflaged Cadillac. This may be the only one of its kind in the world!

Destination 1 Part B. On top of the cliffs, behind the gift store



At Signal Rock, the Seneca Indians sent smoke messages. On a clear day you can see 35 miles!



Use your compass to identify the directions of the cracks. Write what you discovered in your journal. Why are the North–South cracks so wide while the East–West cracks are not?



Measure the orientation of the cracks that are the widest, and the orientation of the cracks that are the narrowest.



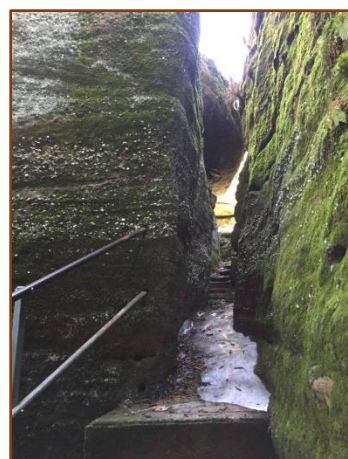
Measure the width of multiple cracks and calculate how long it took them to open up. – Relate all speeds to the speed of [creep](#) which is 1/16 inch per year.



Write a question you would ask a person drilling for oil at the oil rig or write a fable about creatures who may have lived among the cracks.



Destination 2 and 3. “Iron Steps” and “Fat Man’s Squeeze”



What did you notice about the temperature as you went down the stairs? Why?



What did you notice about the rocks and the colors as you went through “The Squeeze?” Discuss this with your partner.



Write a short poem, song or story about going through “The Squeeze.” Share it with your partner and friends.



How many feet did you descend before you felt a difference in temperature? Or calculate the total vertical distance traveled from the top or the first step.



Along the path to Destination 4, look for the immense sizes of the rocks and trees!



Destination 4. "Dining Hall Pass"



What sedimentary structures can you see here? What do these structures represent?



Look on the face pointing outwards, towards the "Map of NY." The second layer from the base up, these structures are not visible in other locations. Can you tell which way the water was flowing? How?



Look at the face of the rock which points toward Destination 5. The second layer from the base has lots of river channels crossing each other. Imagine what the river looked like.



This area has a lot of name carvings. How many can you find? Share your answer with your partner.



Using your compass, the carvings that are most easy to read are located on a rock face that points to North, South, East, or West? Why is this so? Write the discovery in your journal.

Destination 5. "State of New York Rock"



Looking at the "State of New York Rock," locate Albany, Buffalo, Olean, and another city.



It is about 293 miles from Buffalo to Albany. Locate Buffalo and Albany on the rock and estimate their distance in feet. Then, calculate the ratio between what you measured and the actual mileage. (This is the ratio setup to use for this problem – Feet:miles.)



Look for trees that seemed to have been bent for a reason. They are called "Trail Trees." Trees are sacred to the Seneca Indians. "Trail Trees" were secret and very important. How many "trail trees" can you find and where do they lead you?



Destination 6. "Indian Camp"



Painting by Rich McPeck



This is believed to have been a shelter for the Seneca Indians and used as protection.

[For information on the Seneca Indians, here is a link to the Seneca-Iroquois National Museum.](#)



Look for where they may have built their fire. Could the black markings on the ceiling of the camp be carbon left over from the fires? Can you find names of those who drilled for oil carved in the side wall of the camp?



Imagine you were here in the 1700s or 1800s. Write a short story, poem or song about something that could have occurred here. Share it with your friends.



Destination 7. "Teepee Rock"



Is this rock in its original location or was it moved? How can you tell? Is this rock overturned? How can you tell? Write the discovery in your journal.

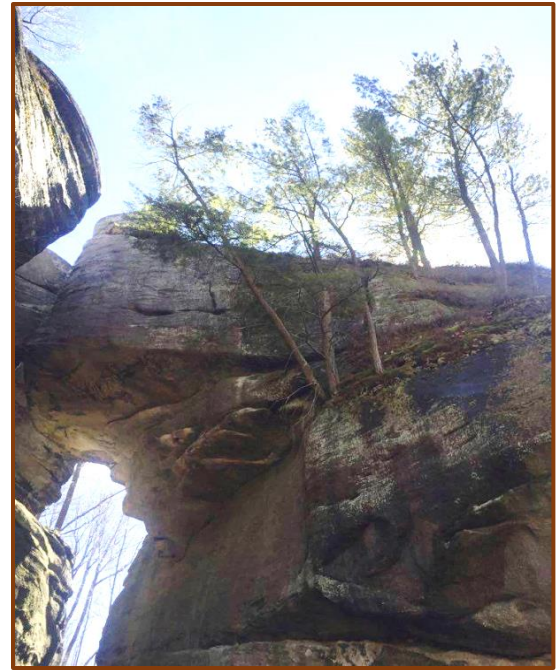
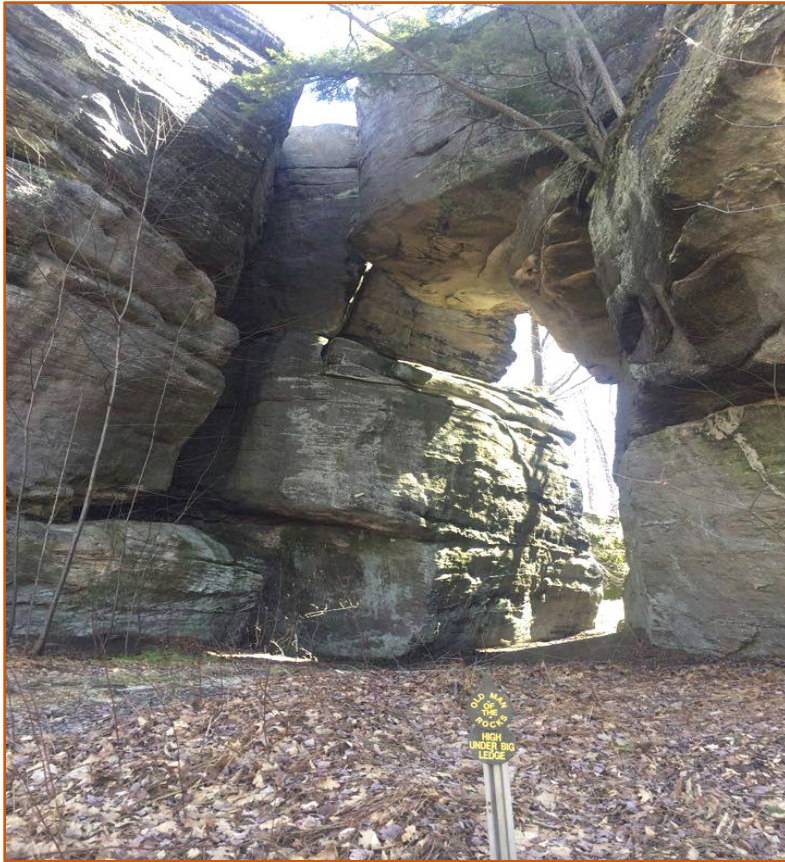


Look at the base of the rocks, on the right side of the "tunnel." Look for [vertical strata](#). What does this tell you? Write the discovery in your journal.



Identify the geometric shape of the rock. Identify which theorem you would apply to measure the length of the sides if you were to place a flag at the top point of Teepee Rock.

Destination 8. "Three Sisters"



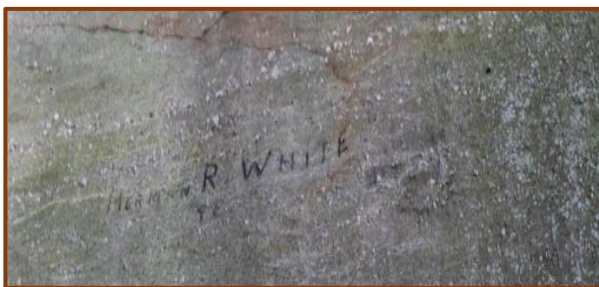
Approximate the height of the "tunnel" in feet.



Look for the three small pine trees perched on a cliff on the right side of the archway.



How can trees grow on bare rock far from nourishing soil? Where do they get their nourishment? Do you think these trees can grow as large as the ones on top of the cliff?



Spot the "Jones" inscription and other carvings on the rocks.

In what year did the Jones brothers carve their names? What kind of tools do you think they used? Write the discovery in your journal.



Is quartz, the main mineral in these rocks, a hard or a soft mineral? How long do you think it took those who carved their names to create the carvings? Compare your carving made in class before you started the journey to their carvings. How could they have carved their names so high up? Was it always this high?



As you continue your journey, look to your right above the scroll of J.J. Jones. You may see "The Old Man in the Rock." Standing to your left under the scroll and facing forward is "Monkey Face." What do you imagine they are saying? Write a poem or song they would perform. Share it with your partner and friends.



Destination 9. "Pulpit Rock"



The pulpit at St. Mary's of the Angels Catholic Church in Olean, NY.

A Pulpit is a raised platform or lectern in a church or chapel from which the preacher delivers a sermon.



What can you learn about the rock by looking at all the strata and formations on the rock? Write your discoveries in your journal.



Imagine you have something very important to say. Write a song or poem you would sing or present at Pulpit Rock. Share it with your friends.



Select a partner to stand against the rock. Then measure the partner's height in feet compared to the rock. Using the principle that it takes 1000 years to deposit 10 cm of rock, how long did it take for Pulpit Rock to become the same height as your partner?

Here is a great place to pause and reflect on what you have seen, look over what you have discovered, write some questions you may have, or predict what may be coming up. Throughout the park you'll see fern, moss, [Lichen](#) and many wild plants, some clinging to the rocks. Wild flowers such as [Jack-in-the-Pulpit](#), [Mountain Laurel](#), [Mountain Pink](#), and [Trillium](#) are abundant here. How many plants can you find? Write the discoveries in your journal.



Jack-in-the-Pulpit



Mountain Laurel
PA's state flower



Mountain Pink



Trillium

Here is more information on Rocks - https://www.sciencedaily.com/terms/sedimentary_rock.htm

Information on Erosion - <http://www.onegeology.org/extra/kids/earthprocesses/weathering.html>

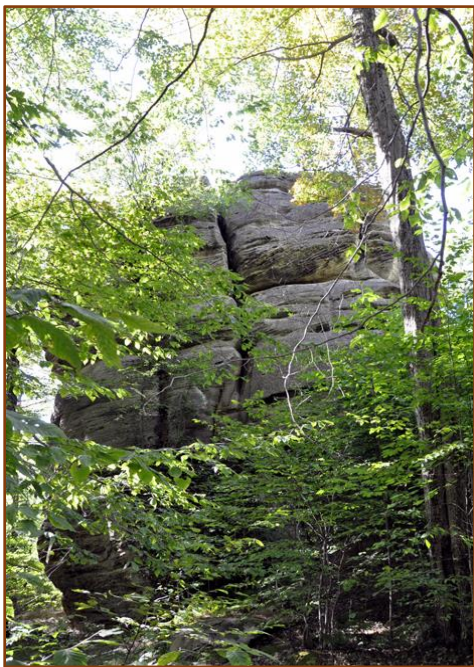
<http://www.eschooltoday.com/rocks/erosion-and-transportation-of-rock-sediments.html>

How Rocks Change. An interactive website - <https://www.learner.org/interactives/rockcycle/change3.html>

Soils, Sediment, Weathering and Sedimentary Rocks -

http://www.appstate.edu/~marshallst/GLY1101/lectures/7-Weathering+Sedimentary_Rocks.pdf

Destination 10. "Sentinel Rock"



This is the largest free standing rock in the park. This is a good location for the instructor to explain about the large [conglomerate](#) boulder, once separated from the main [outcrop](#), that slowly but surely slid downhill along the contact with the shale visible along the path.



There are multiple sets of [cross-bedding](#). Do they point in the same direction as the ones at the Dining Hall Pass? Why are they at different angles? Do they represent different water speeds?



Use your protractor, at what angles are these [cross-beds](#) dipping?



If Sentinel Rock could talk and thinking of rocks being mythological giants, what stories or warnings would the rock tell us?



How much time do you think it took for all this sediment to be deposited by the river? Refer back to the formula from the Pulpit Rock exercise. Write the discoveries in your journal.



This is the center section of the Oil Rig built in 1935 and used until 1962. Look for the oil barrel.



If you had to replace the wheel, what formula would you use to build one?

This is a model of a [Parkersburg Oil Rig](#).

You can discover more information about the history of oil in this region at the [Penn Brad Oil Museum](#). Be sure to visit the museum.



Write a letter that a person working on the oil drilling rig would write to his family. Share it with your partner or friends.



Length of drilling tools is 49 feet.
Auger stem is 36 feet long.
Derrick is 58 feet high.



Look for [Sensory Discovery](#) opportunities here. Also, look in other places throughout the park for things left by people who drilled for oil. Share how many you found with your partner and friends.

As you travel along the paths, look at the vegetation, trees, and rocks. You will also see more of the sides and back of Sentinel Rock. Notice the strange holes or "[pock marks](#)." How could they have been created? Why would this have been called Sentinel Rock? What would you call it?

Destination 11 and 12. "Moray Eel Rock" and "Hamburger Rock"



Look for the Moray Eel in the rock.



What would have created this kind of erosion?



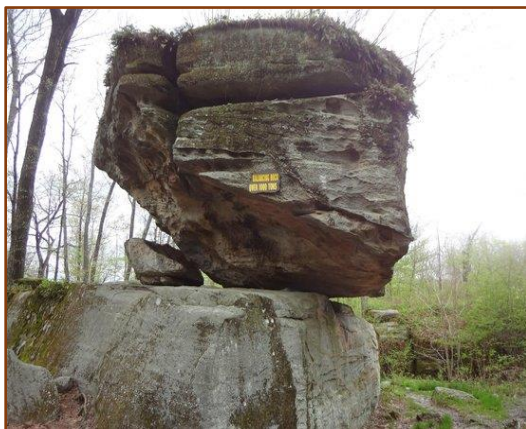
Does Hamburger Rock look like a hamburger with lettuce and pickles? What else could it look like? What can you discover about this rock by looking at the lines and the vegetation on it?



Using your knowledge from the class experiment "Measuring the density of sandstone" and the knowledge from the Pulpit Rock experiment, approximate the height, width, and depth of this "hamburger." Its weight is equivalent to how many McDonalds "Big Mac" (a Big Mac is 7.6 ounces)?



Destination 13. "Balancing Rock"



The back of Balancing Rock looks like an anvil.



This anvil is in front of Worth W. Smith Hardware in Olean, NY. Dale and Cindy Smith, owners of Rock City Park, are the second generation Owners/Operators of Worth W. Smith Hardware.



Has Balancing Rock always been in place or has it been moved by someone/something?



How could you measure the weight of this rock? It is too large to pick up and put on a scale!



Opposite of Balancing Rock is "Tree blown down in 2008." Why do you think the wind knocked down this one single tree, but not the ones around it? Write your thoughts and discoveries in your journal.

Destinations 14, 15 and 16. Fox Den, Bear Den, “Face in Rock”



Stone Coat is the name of a mythological rock giant of the Iroquois-speaking tribes. Stone Coats are described as being about twice as tall as humans with their bodies covered in rock-hard scales that repel all normal weapons. Stone Coats were never human, but were a tribe of primordial man-eating monsters created by [Flint](#).



Look for the eye and nose of Stone Coat. What direction is he facing? Why?



If this rock could talk, what would it tell or sing to us?

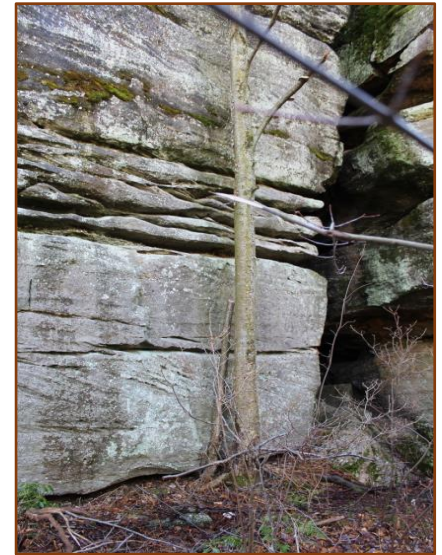
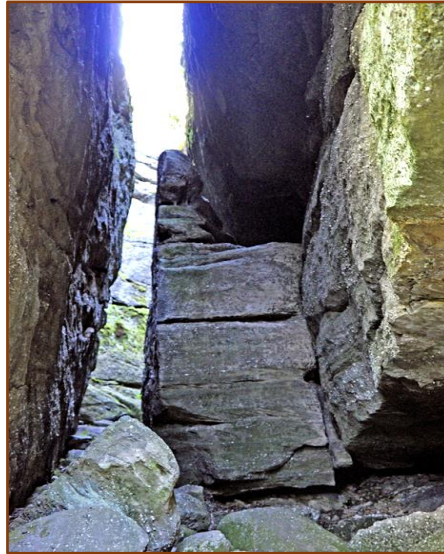


This formation is made up of [metric beds](#) of [conglomerate](#) in a relocated boulder dipping steep into the ground. Why are the beds so steep?



The surface exposed in the undercut near the rusty iron pieces shows a former river bed.

Destination 17. “Half Sphinx”



Metric beds of conglomerate are in the base. The lowest bed has [cross-beds](#) dipping toward what direction?



How do we know that a particular layer of sandstone is softer or harder than another layer? How do we know the layer is more porous? Write the discoveries in your journal.



Find the carvings of W. O. Washburn, PA and H. L. Mason 1888. Did they carve them at the same time? How do you know?



Look for lots of [“Honeycomb Erosion”](#) in the triangular overhang and next to the bench.

Honeycomb Erosion



How do you think these “pock marks” were formed? Do you see any other large cobbles or pebbles in the rocks? If not, this can't be because of fallen cobbles.



Do you see any tool markings left behind by diggers? If not, the markings can't be the result of someone carving into the rock. So, how was this done?



Are the “pock marks” on the surfaces primary or secondary structures? How do you know? Write the discoveries in your journal.



How was the Honeycomb Erosion created?



These are natural erosional features developed over thousands of years by rain water. When a drop of water stays suspended on the surface of an overhanging pebble, the water will produce some [chemical erosion](#) to the cement surrounding the quartz pebble. In time, millions of rain droplets will erode the cement surrounding the pebble causing it to fall, and leaving behind an indentation.

These indentations represent an increased surface upon which water and other elements can act and continue to erode which enlarges their indentation.



How many places in Rock City Park do you see examples of [Honeycomb Erosion](#)? Share your answer with your partner and friends.

Destination 18. "Indian Stairs"



The stairs are built from massive coarse sandstone and fine conglomerate.

It is believed the Seneca Indians built this staircase without using any cement or mortar before the White Men came to this region in the early 1700s.



What are these wavy structures at the base of the cliff? Are the ripples symmetrical or asymmetrical? Why?



What we see correlates with all the other evidence we have seen so far that points towards a river system.



Can you tell in which direction the water was flowing? How? What was the water speed during the time of low river activity? How can you tell? Write the discoveries in your journal.



Why is there a horizontal line separating the cross-beds? Why are the lines at different angles?



Measure the height of one stair, multiply the height by the number of stairs to calculate the distance you will climb. It takes 1000 years to deposit 10 cm of these rocks. How much in time have you traveled while climbing these stairs?



SENECA
NATION OF INDIANS



Be sure to visit the

<https://www.senecamuseum.org/Default.aspx>



SENECA
IROQUOIS
NATIONAL MUSEUM

Nya:weh sgeno
Welcome,

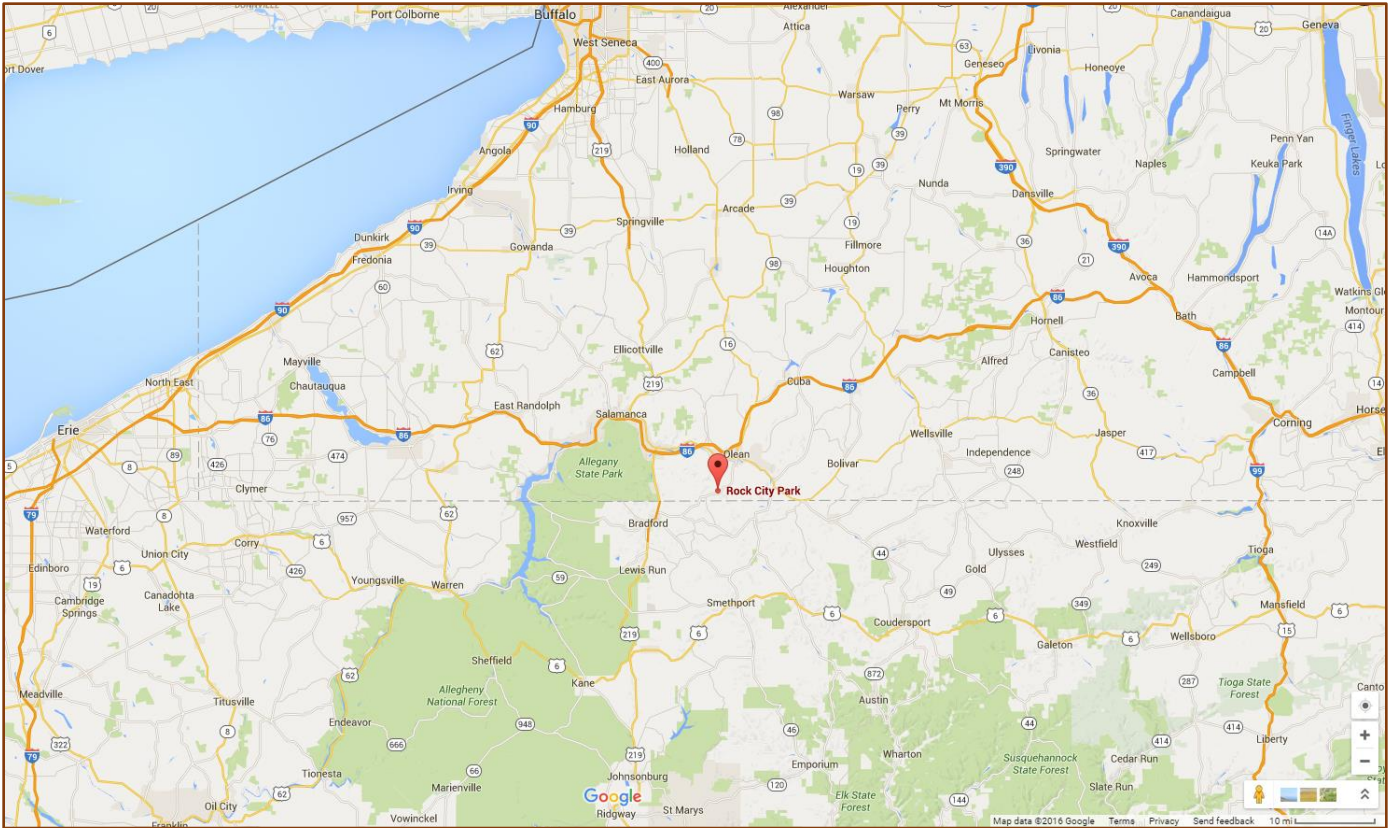
The Seneca Nation of Indians has a proud and rich history. We are the largest of six Native American nations comprising the Haudenosaunee or Iroquois Confederacy or Six Nations, a democratic government that pre-dates the United States Constitution.

We are known as the "Keeper of the Western Door," for the Seneca are the westernmost of the Six Nations. In the Seneca language we are also known as O-non-dowa-gah, (pronounced: Oh-n'own-dough-wahgah) or "Great Hill People."

Today, the Seneca Nation of Indians has a population of over 8,000 enrolled members. We are the fifth-largest employer in Western New York, creating thousands of new jobs and investing hundreds of millions of dollars to bolster the region's and New York State's economy.

Nya-weh,
Maurice A. John, Sr., President,
Seneca Nation of Indians
<https://sni.org/>

Road Map and Map Activity



Directions: You can replace the GPS. Help the driver plot your path home from Rock City Park. Draw, label, and locate items on the map to answer the questions. This can be done after your visit as an activity on the bus.

- Find the following items on the maps:
An Interstate Highway, State Route, small road.
- If you were going from Clarion to Salamanca, in what direction would you be traveling?
- If you were going from Buffalo to Olean, in what direction would you be traveling?
- Which National Forest is the closest to Rock City Park?
- Find your city on the map. Draw the directions from Rock City Park to your home or school.
- Use the scale at the bottom right corner of the map to calculate how many miles there are to your home.



Where did these paths lead and what did you discover? Share your answers with your partner and friends.



Teacher's Key to Questions and Activities

Destination 1 Part B. On top of the cliffs, behind the gift store pg. 16



"Measure the orientation of the cracks that are the widest, and the orientation of the cracks that are narrowest and using your compass identify the directions of the cracks."

The North-South cracks are the widest, the East-West cracks are the narrowest.



"Why are the North-South cracks so wide while the East-West cracks are not?"

– North-South cracks developed parallel with the valley, so all blocks will slide downhill enlarging the cracks; while the East-West cracks developed perpendicular to valley and the blocks are held in place by the sides of the valley near horizontal ground on the East-West trend.



"Measure the orientation of the cracks that are the widest, and the orientation of the cracks that are the narrowest." – Answers will vary.



"Measure the width of multiple cracks and calculate how long it took them to open up.

– Relate all speeds to the speed of [creep](#)." Speed of creep is 1/16 inch per year. Answers will vary.

Destination 2 and 3. "Iron Steps" and "Fat Man's Squeeze" pg. 16



"How many feet did you descend before you felt a difference in temperature? Or calculate the total distance dropped from the top or the first step." – Measure the length of one stair and multiply by the number of stairs for the solution. Answers will vary.

Destination 4. "Dining Hall Pass." pg. 17



"The carvings that are most difficult to read are located on a rock face that points to the N, S, E, or W?"

"Why is this so?" – Here is where the instructor should point out the differences in weathering between sun exposed faces (less moisture) and sun shaded faces (more moisture).



"What do these structures represent?" – These represent river channels.



"What [sedimentary structure](#) can you see here?" – The instructor should point out the scalloped shapes in the rock.

Destination 5. "State of New York Rock" pg. 17



"Can you tell which way the water was flowing in these channels?" – Yes, the water was flowing in or out of the rock face.



"What kind of river type has a wide river valley filled with gravel and multiple channels?"

– It is a Braided river system.



It is about 293 miles from Buffalo to Albany. Locate Buffalo and Albany on the rock, and estimate their distance in feet, then calculate the ratio between what you measured and the actual mileage.

– This is the ratio setup to use for this problem – Feet:miles. X feet:293 miles. Answers will vary

Destination 6. "Indian Camp" pg. 18



"Can you find the names carved in the walls of the camp?" – The names are on the side walls.

Destination 7. "Teepee Rock" pg. 18



"Is this rock in place or was it moved?" – It was moved.

"How can you tell?" – It is a fragment of a larger boulder tilted on its side. Look at the base of the rocks, on the right side of the "tunnel" and you will see [vertical strata](#). All [sediment](#) formations are deposited horizontally.

Destination 7. “Teepee Rock” pg. 18 (continued)



“Is this rock overturned?” – Yes, look in the same area at the base and you will see rotated cross-beds, they are overturned.



“Identify the geometric shape of the rock. Identify which theorem you would apply to measure the length of the sides if you were to place a flag at the top point of Teepee Rock.” – It is a triangle, Pythagorean Theorem $a^2 + b^2 = c^2$.

Destination 8. “Three Sisters” pg.19



The instructor should point out the three small pine trees growing perched up on a cliff, on the right side of the archway. “How can trees grow up there, on bare rock, far from the nourishing soil?” – Because there is a small ledge/crack where there is enough space for them to spread their roots.



“If they are so far from the soil, where do they get their nourishment?” – There is a small amount of dead leaves falling each year inside the same crack near the tree roots so they have a limited quantity of nutrients.



“Do you think these trees can grow as large as the ones on top of the cliff?” – No, they are and will always remain stunted because they do not have enough nutrients. -- “Kids eat you vegies or you will end up like these trees!”



“Following the measurements made at the beginning of the trip, up on the platforms, and using the same principle, how long do you think it took to develop such a wide crack between these rocks?” – The timing and distances should be reported to the speed of the [creep](#).



“Can you spot the “Jones” brothers inscription on these rocks?” – The carvings are in the passage way, on the right upper side about 20-30 feet above ground.



“In what year did the Jones brothers carve their names?” – The inscription reads 7-10-'97. “Is it 1997 or 1897?” – It is 1897 because no one did these carvings in 1997. We all became more environmentally aware and like to preserve these places as they are, created by nature.



The instructor should develop on the idea of conservation and environmental awareness.



“In 1897 did the Jones brothers have access to sophisticated carving machinery?” – No, most likely this was done by hand.



“Is quartz, the main mineral in these rocks, a hard or a soft mineral?” – It is hard, difficult to carve.



“Approximate the height of the “tunnel.” – Use the Pythagorean Theorem. One student of known height will be used as a “measuring stick.” Then, measure the distance from the observer to the measuring stick, to the rocks. Answers will vary.

Destination 9. “Pulpit Rock” pg. 20



“Select a partner to stand against the rock. Then measure the partner’s height in feet compared to the rock. Using the principle that it takes 1000 years to develop 10 cm of rock, how long did it take for Pulpit Rock to become the same height as your partner?” – Take the height of the partner and divide it by 10, then multiple it by 1000 for solution. Answers will vary.

Destination 10. “Sentinel Rock” pg. 21



“At what angles are these cross-beds dipping?” “Are they at different angles?” – Yes, they are.



“Do they represent different water speeds?” – Yes, they do.



“Do the cross-beds here point in the same direction as on Sentinel Rock?” – They should not point the same way because the Sentinel Rock has moved from its place and it can be rotated.

Destination 10. "Sentinel Rock" pg. 21 (continued)



This is a good place to point out some old oilfield equipment and encourage students to look for more.



This is a good place to point out the contact between [Olean Conglomerate](#) and its underlying formation (shale/siltstone) – The instructor might need to clear some dead leaves from the trail to make it more visible. This is also a good location for the instructor to explain the fact that large conglomerate boulders, once separated from the main outcrop, slowly but surely slide downhill along the contact with this shale.



"How tall do you think Sentinel Rock is?" – It is 40 to 50 feet (ft).



"How long do you think it took for all this sediment to be deposited by the river?" – At a normal sedimentation rate of gravel and coarse sands (10 cm/1000 years), so 3000 years/ft. = 150000 years.



This is where the instructor can point out the scientific notation for large values, 1 ky =1000 years.



"If you had to replace the wheel, what formula would you use to build a new wheel?"
– The formula is Circumference. $C=2\pi r$.

Destination 11 and 12. "Moray Eel Rock" and "Hamburger Rock" pg. 22



"Calculate the weight of the rock and a ratio problem."

– The students will use a partner to estimate the height/width of the rock (easy access to the rock) to find the volume. With the known volume they can use the density value (from class measurements) to find the mass of the rock. The mass of the rock will be divided by the mass of a Big Mac (7 ounces) to find the equivalent number of burgers. Answers will vary.

Destination 13. "Balancing Rock" pg. 22



"How could you measure the weight of this rock? It is too large to pick up and put on a scale!"

– The discussion should be geared towards measuring the density of a small sample than extrapolating to the larger block, done before coming into park. The rock is labeled as weighing 1000 tons.



"Has Balancing Rock always been in place or has it been moved by someone/something?"
– No, the rock was not moved.



"If the rock was moved, who did this?" – No one, but glaciers can be brought up into the discussion.



"Opposite of the Balancing Rock is 'Tree blown down in 2008.' Why did the wind knock down this one single tree, but not the ones around it?" – The tree was growing on a boulder, so its roots were not anchored deep into the ground.



"How could you measure the weight of this rock? It is too large to pick up and put on a scale!"

– The students should say that they can estimate the volume, and use the class calculations regarding The density of the rock to get an estimate of the mass. The Pythagorean theory should be used to measure the height. The width can be paced out along the base. With these measurements the students have the estimates of the volume than multiply by the density (measured in class) to get mass. The formula for the Volume of a rectangular prism is $V=whl$ (where w =width, h =height, l =length).

Destinations 14, 15 and 16. Fox Den, Bear Den, "Face in Rock" pg. 23



"Why are the beds dipping so steeply into the ground?" – Because the boulder has moved and rotated.



"Are the beds dipping today as they were dipping at the time of deposition?"
– No, because all the sediment beds are deposited horizontally.

Destination 17. “Half Sphynx” pg. 23



“How do we know that this particular layer of sandstone is softer?” – Look at your feet.
What kind of sediment is predominate at the base of the cliff? Is it sand or gravel? That’s the answer.



“Did Mr. Washburn and Mr. Mason carve their names at the same time?” – No, because the 1888 carving is more [weathered](#) so it was carved earlier.



Teacher can point out the differences between these carvings and the Jones’ brothers at “Three Sisters.” Show the small difference in the dates but large differences in erosion rates of each carving. Exposed carving of these names receives more weathering than the less exposed carving of the Jones brothers. Also the presence of moss and lichens increases the amount of moisture thus the rate of [chemical weathering](#).

Destination 18. “Indian Stairs” pg. 25



“What do you see?” – They are Sedimentary structures.



“What are the wavy structures?” – They are ripple marks.



“Are the symmetrical or asymmetrical?” – They are asymmetrical.



“Can you tell which direction the water was flowing?” – Yes, because the long, shallow side of the ripple is upstream while the short, steep face is downstream.



“Why are the lines at different angles?” – This represents different water speeds.
Slower water = shallow angle of cross-beds. Faster water = steep angle of cross-beds.



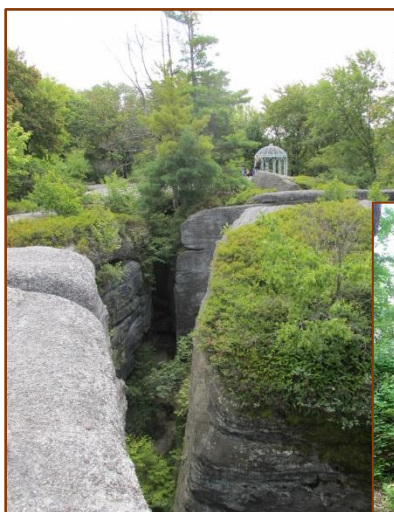
“What was the water speed during the time of low river activity?” – It was fast moving because the stingers are made up of pebbles, which is higher energy environment so it carried all finer fractions downstream.



“Are the ‘pock marks’ on the surfaces primary or secondary structures?” – They are secondary structures.



“Measure the height of one stair, multiply the height by the number of stairs to calculate the distance you will climb.” – Answers will vary.



Do you recognize these formations?



Glossary

Conglomerate - Conglomerate is made up of rounded pebbles cemented together. The pebbles have been rounded by the action of moving water. This could be from a river or stream or from waves on a long ago beach. **For more information, visit**

<http://www.rocksandminerals4u.com/conglomerate.html>



Creep - Soil creep is a very, very slow form of mass wasting. It's just a slow adjustment of soil and rocks that is so hard to notice unless you can see the effects of the movement.

For more information, visit

<http://earthsci.org/flooding/unit3/u3-03-03.html>

Cross-beds - Sedimentary rocks are normally deposited as horizontal layers. Even when folded or tilted by faulting the originally horizontal layering is obvious. Upon closer examination, however, you may see very fine layers (usually 1 to several mm thick) that are at an angle to the main bedding. These tilted layers contained within larger layers are termed **cross bedding**. If you dig trenches into modern sediments, you will find that cross-beds form a part of ripples and dunes.

For more information, visit

<http://www.pitt.edu/~cejones/GeolImages/5SedimentaryRocks/SedStructures/CrossBedding1.html>



Fosets - Foreset beds exist on the sloping surface of a river delta or dune. Beds above and below the foreset beds mark the horizontal direction. Foresets and [Cross-beds](#) are intimately related.

For more information, visit

<http://geology.about.com/od/geoprocesses/ig/sedstrucs/foresets.htm>



Density - Density is the mass of an object divided by its volume!

The formula of Density is Mass/Volume or, more usefully for our purposes, Density = Weight/Volume or $D = W/V$.

Erosion - This is the process that breaks things down. In nature, large objects are broken down into smaller things. Boulders become sand. Mountains are rained on and become hills. The pieces of the mountain become smaller pieces and go down the sides of hills. Weathering and erosion always happen in a downhill direction.

For more information, visit

http://www.geography4kids.com/files/land_erosion.html

<http://geology.com/dictionary/glossary-e.shtml>

Mechanical - This is similar to breaking a rock with a hammer.

Chemical - This is similar to pouring acid on a rock to dissolve it.

Geological Time Frame - <http://www.enchantedlearning.com/subjects/Geologictime.html>

Honeycomb Erosion weathering - You can find lots of good information here:

https://en.wikipedia.org/wiki/Honeycomb_weathering

Metric beds - Metric beds are sedimentary beds that are one or more than one meter thick.

Outcrop - Part of a rock formation or mineral vein that appears at the surface of the earth.

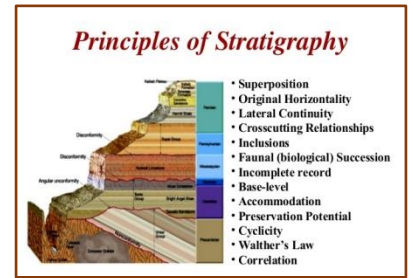
Sediment - Loose particles (such as mud and sand) that are carried into water by water, wind, etc.

Sedimentary bed - This is the smallest division of a [geologic formation](#) or [stratigraphic](#) rock series marked by well-defined divisional planes (bedding planes) separating it from layers above and below.

Sedimentary structures - Stratification are various markings preserved in sedimentary rocks, left there from the dispositional environment (river, delta, ocean, etc.) They can occur on the scale of hundreds of meters, and down to submillimeter scale. They are features of sedimentary rocks.

For more information, visit

http://www.indiana.edu/~geol105/images/gaia_chapter_5/sedimentary_structures.htm



Strata - Strata are layers of rock, or sometimes soil. In nature, strata come in many layers. Here is a picture of vertical strata. Vertical strata are layers of rock that have been rotated by tectonic activity.

For more information, visit

<http://study.com/academy/lesson/rock-strata-definition-lesson-quiz.html>



Trail Trees - <http://indiancountrytodaymedianetwork.com/2013/05/03/groups-quest-find-and-save-indian-trail-trees-149169>

Weathering - The process by which rocks are broken down into small grains and soil. Weathering can happen through rainfall, ice formation, or the action of living things, such as algae and plant roots. It is part of the **geological** cycle. There are mechanical, chemical and biological weathering processes.

For more information, visit

<http://geologycafe.com/class/chapter8.html>

Biological weathering – This is the weakening and subsequent disintegration of rock by plants, animals and microbes.

For more information, visit

<http://passel.unl.edu/pages/informationmodule.php?idinformationmodule=1124303183&topicorder=5&maxto=6>

Standards Addressed by the Activities

The Educational Resource Guide addresses PA Core Standards and National Next Generation Science Standards (NGSS).

Next Generation Science Standards



In a process managed by [Achieve](#), states will lead the development of K–12 science standards, rich in content and practice, arranged in a coherent manner across disciplines and grades to provide all students an internationally-benchmarked science education. The Next Generation Science Standards (NGSS) will be based on the Framework and will prepare students for college and careers. The NGSS will be developed collaboratively with states and other stakeholders in science, science education, higher education and industry. Additional review and guidance will be provided by advisory committees composed of nationally-recognized leaders in science and science education as well as business and industry. As part of the development process, the standards will undergo multiple reviews from many stakeholders including two public drafts, allowing all who have a stake in science education an opportunity to inform the development of the standards. This process will produce a set of high quality, college- and career-ready K–12 Next Generation Science Standards ready for state adoption.

For more information, visit

<http://www.nextgenscience.org/>

Source: <http://www.p12.nysed.gov/ciai/mst/sci/nyssls.html>

Historical Role Play Activity pg. 5

PA Standard - 9.1.8.E Communicate a unifying theme or point of view through the production of works in the arts.

PA Standard - 9.1.8.F Explain works of others within each art form through performance or exhibition.

PA Standard - 8.1.8.C Produce an organized product on an assigned historical topic that presents and reflects on a thesis statement and appropriate primary and secondary sources. (Reference RWSL Standard 1.8.8 Research)

Historical Captions and Photo Journal Activity pg. 6

PA CC.8.6.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

PA CC.8.6.6-8.G. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

PA Standard - 9.1.8.B Recognize, know, use and demonstrate a variety of appropriate arts elements and principles to produce, review and revise original works in the arts.

RAFT Activity pg. 6

PA CC.1.4.6-8.O Use narrative techniques such as dialogue, description, and pacing to develop experiences, events, and/or characters; use precise words and phrases, relevant descriptive details, and sensory language to convey experiences and events.

PA CC.1.4.6-8.P Organize an event sequence that unfolds naturally and logically, using a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another; provide a conclusion that follows from the narrated experiences and events.

Destination 1 Part B. On top of the cliffs, behind the gift store pg. 16

PA CC.1.4.6-8.D Organize ideas, concepts, and information using strategies such as definition, classification, comparison/contrast, and cause/effect; use appropriate transitions to clarify the relationships among ideas and concepts; provide a concluding statement or section; include formatting when useful to aiding comprehension.

PA CC.1.4.6-8.F Demonstrate a grade appropriate command of the conventions of Standard English grammar and spelling.

PA CC.1.4.6-8.M Write narratives to develop real or imagined experiences or events.

PA Math Standard CC.2.3.7A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.

Destination 2 and 3. “Iron Steps” and “Fat Man’s Squeeze” pg. 16

MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth’s 4.6-billion-year-old history.

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

PA CC.1.4.6-8.M Write narratives to develop real or imagined experiences or events.

PA Math Standard CC.2.4.7.B.3 Investigate chance processes and develop, use, and evaluate probability models.

Destination 4 “Dining Hall Pass” pg. 17

NGSS – 4ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how long the geological time scale is used to organize Earth’s 4.6 billion year old history.

Destination 5 “State of New York Rock” pg. 17

4ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how long the geological time scale is used to organize Earth’s 4.6 billion year old history.

PA Math Standard CC.2.1.6.D.1 Understand ratio concepts and use ratio reasoning to solve problems.

Destination 6 “Indian Camp” pg. 18

PA CC.1.4.6-8.M Write narratives to develop real or imagined experiences or events.

PA CC.1.4.6-8.N Engage and orient the reader by establishing a context and introducing a narrator and/or characters.

PA CC.1.4.6-8.O Use narrative techniques such as dialogue, description, and pacing, to develop experiences, events, and/or characters; use precise words and phrases, relevant descriptive details, and sensory language to convey experiences and events.

PA CC.1.4.6-8.P Organize an event sequence that unfolds naturally and logically, using a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another; provide a conclusion that follows from the narrated experiences and events.

PA CC.1.4.6-8.R Demonstrate a grade appropriate command of the conventions of Standard English grammar and spelling.

Destination 7 “Teepee Rock” pg. 18

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

PA Math Standard CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Destination 8 “Three Sisters” pg. 19

NGSS – 4ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

NGSS – 5- LS1-1 Support an argument that plants get the materials they need for growth chiefly from air and water.

PA Math Standard CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Destination 9 “Pulpit Rock” pg. 20

PA CC.1.4.6-8.M Write narratives to develop real or imagined experiences or events.

PA CC.1.4.6-8.N Engage and orient the reader by establishing a context and introducing a narrator and/or characters.

PA CC.1.4.6-8.O Use narrative techniques such as dialogue, description, and pacing, to develop experiences, events, and/or characters; use precise words and phrases, relevant descriptive details, and sensory language to convey experiences and events.

PA CC.1.4.6-8.P Organize an event sequence that unfolds naturally and logically, using a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another; provide a conclusion that follows from the narrated experiences and events.

PA CC.1.4.6-8.R Demonstrate a grade appropriate command of the conventions of Standard English grammar and spelling.

PA Math Standard CC.2.1.6.E.1 Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

Destination 10 “Sentinel Rock” pg. 21

4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

PA CC.1.4.6-8.M Write narratives to develop real or imagined experiences or events.

PA CC.1.4.6-8.N Engage and orient the reader by establishing a context and introducing a narrator and/or characters.

PA CC.1.4.6-8.O Use narrative techniques such as dialogue, description, and pacing, to develop experiences, events, and/or characters; use precise words and phrases, relevant descriptive details, and sensory language to convey experiences and events.

PA CC.1.4.6-8.P Organize an event sequence that unfolds naturally and logically, using a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another; provide a conclusion that follows from the narrated experiences and events.

Destination 10 “Sentinel Rock” pg. 21 (continued)

PA CC.1.4.6-8.R Demonstrate a grade appropriate command of the conventions of Standard English grammar and spelling.

PA Math Standard CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area.

PA Math Standard CC.2.1.7.A.1 Analyze proportional relationships and use them to model and solve real-world problems.

Destination 11 and 12 “Moray Eel Rock” and Hamburger Rock” pg. 22

PA Math Standard CC.2.1.6.D.1 Understand ratio concepts and use ratio reasoning to solve problems.

Destination 13 “Balancing Rock” pg. 22

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time

PA Math Standard CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.

Path to Destinations 14, 15 and 16 Fox Den, Bear Den, “Face in Rock” pg. 23

NGSS – 5ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

NGSS – 4ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

PA CC.1.4.6-8.M Write narratives to develop real or imagined experiences or events.

PA CC.1.4.6-8.N Engage and orient the reader by establishing a context and introducing a narrator and/or characters.

PA CC.1.4.6-8.O Use narrative techniques such as dialogue, description, and pacing, to develop experiences, events, and/or characters; use precise words and phrases, relevant descriptive details, and sensory language to convey experiences and events.

PA CC.1.4.6-8.P Organize an event sequence that unfolds naturally and logically, using a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another; provide a conclusion that follows from the narrated experiences and events.

PA CC.1.4.6-8.R Demonstrate a grade appropriate command of the conventions of Standard English grammar and spelling.

Destination 17 “Half Sphinx” pg. 23

NGSS – 4ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

NGSS - ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

Destination 18 “Indian Stairs” pg. 25

NGSS – 4ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

NGSS – ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

PA Math Standard CC.2.1.6.E.1 Solve real-world and mathematical problems involving division of fractions.

Map and Map Activity pg. 26

PA 7.1.6, 9.B Describe and explain geographic tools and their uses.



Entrance to Rock City Park



The Genuine Weather Rock



Thank you for visiting Rock City Park. We look forward to your comments and thoughts after your journey. We hope you will return soon and tell people about your visit.

Dale and Cindy Smith, Owners of Rock City Park