

# THE SMOKIES ROCKS!



*Ranger Led  
Program*

THEME: Geology  
GRADE LEVEL: Sixth, Seventh, or Eighth grade  
BEST TIME TO PLAN TRIP: Spring or Fall

## UNIT RATIONALE

The Appalachian Mountains are known to be among the oldest mountains in the world. Evidence of geologic events are found in rocks of the Great Smoky Mountains which attest to an incredibly long and active geologic history in this area. Students will have an opportunity to practice skills and techniques used by geologists to better understand the unique geologic features of Great Smoky Mountains National Park.

## STATE CURRICULUM STANDARDS - TENNESSEE

### SIXTH GRADE

#### SCIENCE

Embedded Inquiry

SPI 0607 Inq. 4

Embedded Tech./Engineering

SPI 0607 T./E. 3

Independence

SPI 0607 2.3

#### SOCIAL STUDIES

Geography

6.3 SPI.2

English/Language Arts

Communication

SPI 0601.2.4

SPI 0601.2.5

### SEVENTH GRADE

#### SCIENCE

Embedded Inquiry

SPI 0707 Inq.4

Embedded Tech./Engineering

SPI 0707 T./E. 3

The Earth

SPI 0707.7.2

SPI 0707.7.3

SPI 0707.7.4

SPI 0707.7.5

SPI 0707.7.6

SPI 0707.7.7

#### SOCIAL STUDIES

Geography

7.3 SPI.1

7.3 SPI.6

7.3 SPI.11

7.3 SPI.18

#### ENGLISH/LANGUAGE ARTS

Communication

SPI 0701.2.7

SPI 0701.2.8

### EIGHTH GRADE

#### SCIENCE

Embedded Inquiry

SPI 0807 Inq. 4

Embedded Tech./Engineering

SPI 0807 T.E. 3

Biodiversity and Change

SPI 0807.5.4

#### SOCIAL STUDIES

Geography

8.3 SPI.4

#### ENGLISH/LANGUAGE ARTS

Communication

SPI 0801.2.7

SPI 0801.2.8





## SIXTH GRADE

### SCIENCE

#### Embedded Inquiry

SPI 0607 Inq. 4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

#### Embedded Technology/Engineering

SPI 0607 T./E. 3 Distinguish between the intended benefits and the unintended consequences of a new technology.

#### Interdependence

SPI 0607.2.3 Identify the biotic elements of the major biomes.

### SOCIAL STUDIES

#### Geography

6.3 SPI.2 Identify basic geographic forms (i.e., rivers, lakes, bays, oceans, mountains, plateaus, deserts, plains, coastal plains).

### ENGLISH/LANGUAGE ARTS

#### Communication

SPI 0601.2.4 Select the most appropriate behaviors for participating productively in a team (e.g., contribute appropriate and useful information and ideas, understand the purpose for working as a team, understand the responsibilities of various roles within the team).

SPI 0601.2.5 Identify the functions and responsibilities of individual roles within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).

## SEVENTH GRADE

### SCIENCE

#### Embedded Inquiry

SPI 0707 Inq. 4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

#### Embedded Technology/Engineering

SPI 0707 T./E. 3 Distinguish between the intended benefits and the unintended consequences of a new technology.

#### Earth and Space Science (The Earth)

SPI 0707.7.2 Label a diagram that depicts the three different rock types.

SPI 0707.7.3 Identify the major processes that drive the rock cycle.

SPI 0707.7.4 Differentiate among the characteristics of the earth's three layers.

SPI 0707.7.5 Recognize that lithospheric plates on the scale of continents and oceans continually move at rates of centimeters per year.

SPI 0707.7.6 Describe the relationship between plate movements and earthquakes, mountain building, volcanoes, and sea floor spreading.

SPI 0707.7.7 Analyze and evaluate the impact of man's use of earth's land, water, and atmospheric resources.

### SOCIAL STUDIES

#### Geography

7.3 SPI.1 Identify and use the basic elements of maps and mapping.

7.3 SPI.6 Locate on a map specific lines of longitude and latitude (i.e., Prime Meridian,





International Date Line, Equator, North and South Poles, Tropics of Cancer and Capricorn, Arctic and Antarctic Circles).

7.3 SPI.11 Recognize specific physical processes that operate on the Earth's surface (i.e., erosion, volcanoes, earthquakes, wind and water currents, plate tectonics, and weathering).

7.3 SPI.18 Analyze the environmental consequences of humans changing their physical environment (i.e., air and water pollution, mining, deforestation, global warming).

## ENGLISH/LANGUAGE ARTS

### Communication

SPI 0701.2.7 Select the most appropriate behaviors for participating productively in a team (e.g., ask primarily relevant questions that move the team toward its goal and contribute to the topic of discussion, articulate the goals that have been provided for the team work and ask clarifying questions, come to agreement by seeking consensus or following the majority).

SPI 0701.2.8 Identify the functions and responsibilities of individual roles within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).

## EIGHTH GRADE

### SCIENCE

#### Embedded Inquiry

SPI 0807 Inq.4 Draw a conclusion that establishes a cause and effect relationship supported by evidence.

#### Embedded Technology/Engineering

SPI 0807 T./E. 3 Distinguish between the intended benefits and the unintended consequences of a new technology.

#### Biodiversity and Change

SPI 0807.5.4 Identify several reasons for the importance of maintaining the earth's biodiversity.

### SOCIAL STUDIES

#### Geography

8.3 SPI.4 Use various geographic data from maps and globes to determine longitude, latitude, distance, direction.

## ENGLISH/LANGUAGE ARTS

### Communication

SPI 0801.2.7 Select the most appropriate strategies for participating productively in a team (e.g., gain the floor in orderly ways, meet or set deadlines for completing each task, come to agreement by seeking consensus or following the majority).

SPI 0801.2.8 Identify the functions and responsibilities of individuals within an organized group (i.e., reporter, recorder, information gatherer, leader, timekeeper).



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# PLANNING A SUCCESSFUL TRIP THE SMOKIES ROCKS!



## SCHEDULE FOR A DAY OF ACTIVITIES IN GREAT SMOKY MOUNTAINS NATIONAL PARK

- Arrive at Look Rock Picnic Area for restrooms and to meet rangers
- Drive to Look Rock Tower Parking Area
- On-site activities with lunch in between activities
- Reload bus and return to school

## Planning a Successful Trip

- The location for this trip is at Look Rock located on the Foothills Parkway in Blount County, TN. Park rangers will meet you at the Look Rock Picnic Area.
- There is no cost to use this site.
- Arrange to have a teacher or chaperone available for every 10 students.
- Safety is of the utmost importance, especially in a National Park. Be sure to read the safety information provided on the following page. You may wish to take the page with you on your trip or send it to your chaperones prior to the on-site experience.



# SAFETY CONSIDERATIONS AND OTHER IMPORTANT INFORMATION



- Great Smoky Mountains National Park is a federally protected public use area. Please help the rangers keep all of the plants and animals protected in the park by not picking the plants or taking anything from the park.
- Please remind your students to wear appropriate footwear and clothing for this extended outdoor experience. Flip flops, slip-on shoes, or sandals are not appropriate for the program.
- Temperatures in some parts of the park can be 10-15 degrees colder than at your school. Long pants and layers are suggested for the program. Pants are the best precaution against cool temperatures, bee stings, ticks, and poison ivy.
- Within the park, cell phones are not always reliable. Rangers will follow the on-site agenda. If an unexpected problem occurs, rangers do carry park radios to make contact with the park dispatch office. For non-emergencies, call the Park Ranger dispatch at 865-436-1230 or contact a park employee.

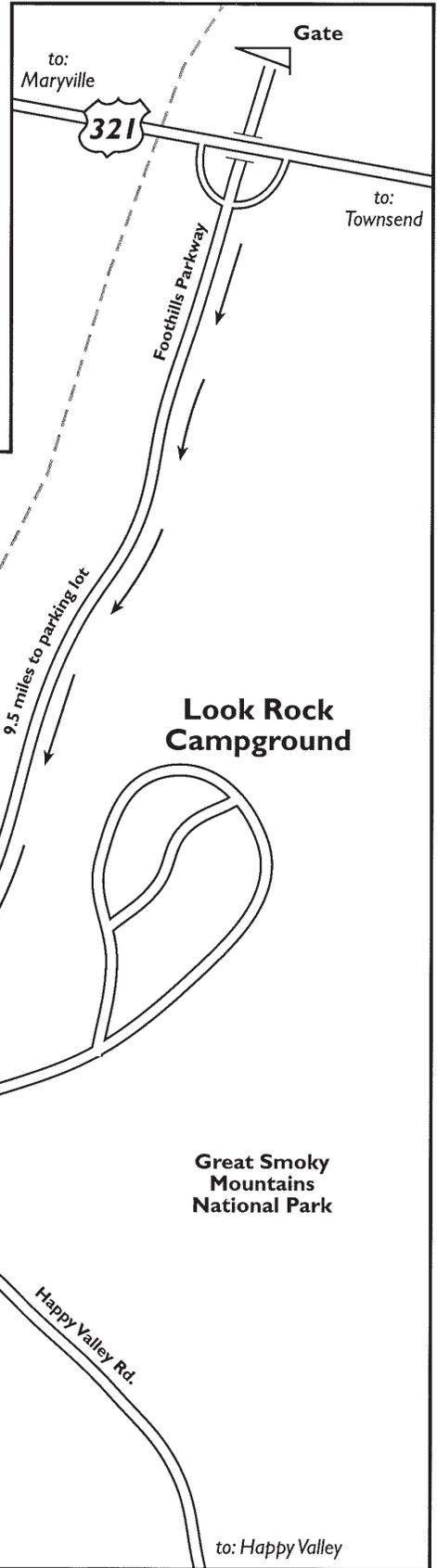
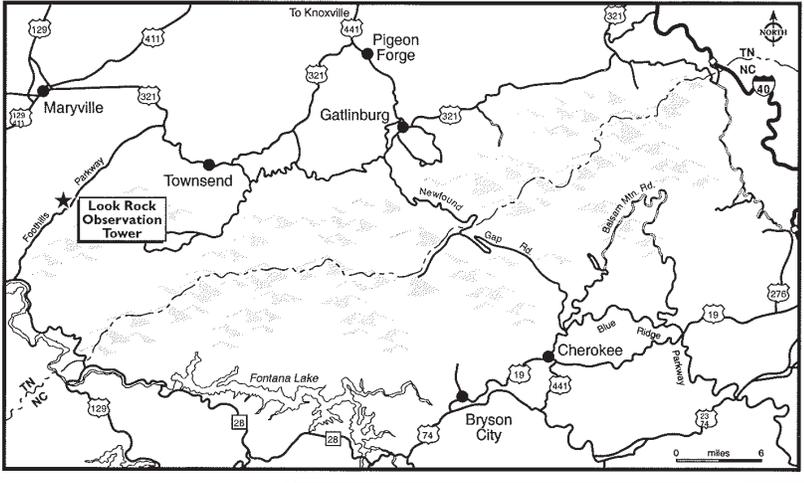
## Animals and Plants of Concern in the park

- All animals in the park are wild and their behaviors are unpredictable. Treat all animals with caution.
- Venomous snakes - Two species of venomous snakes live in the Smokies, the copperhead and timber rattlesnake. Students should be cautious where they place their hands and feet.
- Insects - Yellow jacket wasps are the insects of greatest concern. They build nests in the ground along trails and streams and are aggressive when disturbed. Stings cause local swelling and can lead to severe allergic reactions in sensitive individuals. Such persons should carry epinephrine kits.
- Poison Ivy - Poison ivy is a three-leaved plant which can grow on the ground as well as on “hairy” vines up trees. To avoid chances of an allergic reaction wear long pants, stay on trails, and avoid direct contact with vegetation. If contact occurs or is a concern, wash affected parts in cold soapy water immediately.
- It is extremely helpful to rangers leading the program for students to wear clearly labeled name tags with first names only.
- Pets are not allowed on most park trails. Please do not bring them on the field trip.
- For more information about the park (Things to Know Before You Come) please visit the park’s website: <http://www.nps.gov/grsm/planyourvisit/things2know.htm>





# MAP TO LOOK ROCK



## Look Rock Classroom

From Townsend or Maryville take US Route 321 to the Foothills Parkway. Travel 9.5 miles to the Look Rock Tower parking lot. Meet the Park Ranger there.

**Look Rock Observation Tower**

**Look Rock Picnic Area**

**Look Rock Campground**

**Great Smoky Mountains National Park**



# PRE-SITE/POST-SITE TEST

Name \_\_\_\_\_



1. Lithospheric plates beneath the Atlantic Ocean are moving at:
  - A. millimeters per year
  - B. centimeters per year
  - C. meters per year
  - D. kilometers per year
2. Which processes can change a metamorphic rock into an igneous rock?
  - A. weathering and erosion
  - B. melting and cooling
  - C. deposition and cementation
  - D. heat and pressure
3. Which geologic feature was most likely formed when two lithospheric plates collided?
  - A. Fontana Lake
  - B. Grand Canyon
  - C. Mississippi River delta
  - D. Appalachian Mountains
4. Which is the best description of where earthquakes are likely to occur?
  - A. in the middle of a continent
  - B. along a coastline
  - C. along two plate boundaries
  - D. in the middle of an ocean
5. Which is a biotic factor of a deciduous forest?
  - A. elk
  - B. rainfall
  - C. rocks
  - D. mountains
6. Increased air pollution has led to a decrease in biodiversity in many areas due to tree loss. One potential consequence of deforestation is
  - A. an increase in the amount of atmospheric oxygen
  - B. the addition of plants with potential medicinal uses
  - C. an increase in soil erosion
  - D. improved habitat for wildlife
7. Which of these best describes the composition of the inner core of Earth?
  - A. liquid iron and nickel
  - B. carbon dioxide and ice
  - C. quartz and oxygen
  - D. solid iron and nickel
8. Which layer of Earth is composed mostly of liquid water and different types of rock crystals such as quartz?
  - A. crust
  - B. mantle
  - C. inner core
  - D. outer core
9. Which type of rock is most likely to form when rocks weather and erode?
  - A. lava
  - B. metamorphic
  - C. igneous
  - D. sedimentary
10. Which statement accurately describes the process that forms a type of rock?
  - A. metamorphic rock forms when igneous rocks are compacted at low temperatures
  - B. sedimentary rock forms when metamorphic rock melts
  - C. sedimentary rock forms when small pieces of rock are compacted and cemented
  - D. metamorphic rock forms when magma cools and crystallizes

PRE-SITE SCORE \_\_\_\_\_  
POST-SITE SCORE \_\_\_\_\_



# PRE-SITE/POST-SITE TEST ANSWER SHEET



- Lithospheric plates beneath the Atlantic Ocean are moving at:
  - millimeters per year
  - centimeters per year
  - meters per year
  - kilometers per year
- Which processes can change a metamorphic rock into an igneous rock?
  - weathering and erosion
  - melting and cooling
  - deposition and cementation
  - heat and pressure
- Which geologic feature was most likely formed when two lithospheric plates collided?
  - Fontana Lake
  - Grand Canyon
  - Mississippi River delta
  - Appalachian Mountains
- Which is the best description of where earthquakes are likely to occur?
  - in the middle of a continent
  - along a coastline
  - along two plate boundaries
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- Which is a biotic factor of a deciduous forest?
  - elk
  - rainfall
  - rocks
  - mountains
- Increased air pollution has led to a decrease in biodiversity in many areas due to tree loss. One potential consequence of deforestation is
  - an increase in the amount of atmospheric oxygen
  - the addition of plants with potential medicinal uses
  - an increase in soil erosion
  - improved habitat for wildlife
- Which of these best describes the composition of the inner core of Earth?
  - liquid iron and nickel
  - carbon dioxide and ice
  - quartz and oxygen
  - solid iron and nickel
- Which layer of Earth is composed mostly of liquid water and different types of rock crystals such as quartz?
  - crust
  - mantle
  - inner core
  - outer core
- Which type of rock is most likely to form when rocks weather and erode?
  - lava
  - metamorphic
  - igneous
  - sedimentary
- Which statement accurately describes the process that forms a type of rock?
  - metamorphic rock forms when igneous rocks are compacted at low temperatures
  - sedimentary rock forms when metamorphic rock melts
  - sedimentary rock forms when small pieces of rock are compacted and cemented
  - metamorphic rock forms when magma cools and crystallizes



# PRE-SITE ACTIVITY: GEOLOGY OF THE SMOKIES



**Grade Level:** Middle School

**Subject Area:** Science

**Activity time:** 45 minutes

**Setting:** Indoors

**Skills:** Collecting Information; Communicating; Describing; Discussing; Generalizing; Public Speaking; Reporting

**Vocabulary:** deposition; erosion; geologic cycle; geology; igneous; metamorphic; National Park; plate boundaries; plate tectonics; sedimentary; weathering

**Objective:** To understand the geology of Great Smoky Mountains National Park.

**Materials:** Internet access

**Procedure:** Visit the park's website for background information on geology in the park. Have students share a two-minute informal presentation about what they learned.

<http://www.nps.gov/grsm/naturescience/geology.htm>.



# ON-SITE ACTIVITY

## PARK RANGER DIRECTED LESSONS



**Grade Level:** Middle School

**Subject Area:** Science

**Activity time:** 3 hours

**Class Size:** Maximum of 50 students

**Setting:** Outdoors

**Skills:** Analyzing; Arranging; Classifying; Communicating; Constructing; Decision Making; Describing; Demonstrating; Discussing; Identifying Cause and Effect; Observing; Problem Solving

**Vocabulary:** erosion; geologic cycle; geology; GPS; igneous; latitude; longitude; metamorphic; National Park; physiographic region; plate boundaries; plate tectonics; rock cycle; sedimentary; topography; weathering

**Objectives:** To learn about the geologic processes that created the Appalachian Mountains. Additionally, students will learn basic map reading skills.

**Materials:** Study equipment provided by park rangers

### **Background:**

The following is a brief description of your on-site activities. These activities will be led by park staff, but please be familiar with them, as the classroom teacher may be asked to assist on-site.

### **GPS Scavenger Hunt (30 minutes)**

Students will learn basic functions of a Global Positioning System (GPS) unit. In small groups (2 or 3 students per group), students will then use their GPS unit to guide them on a geology scavenger hunt.

### **Be a Geologist (20 minutes)**

In small groups students will be given supplies to examine how each of the three major rock types are formed. Students will have a chance to test their knowledge by identifying samples.

### **Read the Story (15 minutes)**

Students will use pictures of National Parks to discuss the importance of protecting these special places. In addition, students will be challenged to think about how they use rocks in everyday life.

### **Map Reading (15 minutes)**

Students will practice basic map reading skills and discuss the various land features seen from Look Rock.

### **Mountain Building (15 minutes)**

Students will place the events that created the Appalachian Mountains in sequential order.



# POST-SITE ACTIVITY

## PROTECTING GEOLOGY



**Grade Level:** Middle School

**Subject Area:** Science

**Activity time:** 1 hour

**Setting:** Indoors

**Skills:** Analyzing; Brainstorming; Communicating; Decision Making; Describing; Demonstrating; Presenting; Problem Solving; Role Playing

**Vocabulary:** Varying vocabulary depending on scenarios

**Objectives:** To give students an opportunity to present solutions to real world problems.

### Materials:

- Optional: art supplies for making posters

### Background:

Everything in Great Smoky Mountains National Park is protected by law, including the rocks.

### Procedure:

Option 1: Divide the class into three groups and give each group a different scenario (list below). After the group has discussed the situation, have them create a short skit to share the scenario and their resolution with the rest of the class.

Option 2: After discussing the scenarios, either one or all of them, have students create posters that will educate park visitors about the need to protect Great Smoky Mountains National Park's geology.

### Scenarios:

1: You are walking along a stream and see another visitor taking large round rocks. You overhear her say that this is the only place that she can find such nicely polished boulders. She adds that there are so many of them that it won't be a problem if she takes a few. Is her reasoning correct? Defend your answer.

2: You are eating lunch on top of a mountain when a large group arrives at the summit. They are standing around enjoying the views, but you notice that they are standing on vegetation. Why is this a problem and what could they do differently?

3: You are on a hike with a friend and you come to a big boulder. On the boulder you can see that previous visitors have etched their names into the rock. You start trying to write your name, but your friend tells you to stop because it is not right. You respond by saying that other people have done it so it doesn't matter. Who's right? Defend your answer.

### Resources:

Protecting Geology. Adapted from Fire and Ice Post-Visit Activity: Protecting the Geology of Acadia: Acadia National Park (Cecily Swinburne).



# POST-SITE ACTIVITY

## STEWARDSHIP



**Grade Level:** Middle School

**Subject Area:** Science

**Activity time:** 30 minutes

**Setting:** Classroom

**Skills:** Applying;  
Communicating; Connecting

**Vocabulary:** conservation;  
protection; stewardship

**Materials:** Internet access

**Objectives:** To understand what the term “Stewardship” means and how students can become a steward in their school and their community.

**Procedure:**

To view the Stewardship podcast video go to

<http://www.thegreatsmokymountains.org/eft/10modules.html> Turn the microscope knob that appears on the computer screen to Section 7, Backyard Stewardship. Click “Watch Video” and view video. Ask students how they can become stewards within their own school and community.



# POST-SITE ACTIVITY

## EXPLORE YOUR NATIONAL PARKS



**Grade Level:** Middle School

**Subject Area:** Science

**Activity time:** 30 minutes

**Setting:** Indoors

**Skills:** Varying skills depending on activities selected

**Vocabulary:** Varying vocabulary depending on activities selected

**Objective:** To teach students about the various aspects of the National Park Service.

**Materials:** Internet access

### Background:

The Great Smoky Mountains are world renowned for their diversity of plant and animal species. This great variety makes the park an exemplary outdoor laboratory for the study of relatively undisturbed native flora, fauna, physical environs, and processes of the Southern Appalachians. The park is the largest federally preserved and protected upland area east of the Mississippi River offering park visitors a refuge from the stresses of everyday life.

You and your students can learn more about this special place as well as participate in on-line activities to further your knowledge

of the National Park Service and other federally protected lands. Please check out the following web addresses:

### Especially for Kids

To learn how to become a web ranger for the National Park Service, go to:

[www.nps.gov/webrangers](http://www.nps.gov/webrangers)

To learn how to become a Junior Park Ranger at Great Smoky Mountains National Park or other parks, go to:

[www.nps.gov/learn/juniorranger.htm](http://www.nps.gov/learn/juniorranger.htm)

### Especially for Teachers

For a comprehensive understanding of the background and development of the National Park Service, that is perfect for teachers and others those who need the maximum amount of accurate information in the minimum amount of time, go to: <http://www.ParkTraining.org> The U.S. Department of Education is pleased to announce the newly remodeled and updated Federal Resources for Education Excellence (FREE) website.

It now provides richer, more expansive resources to teachers and students alike. There are over 1,500 resources to take advantage of at FREE ranging from primary historical documents, lesson plans, science visualizations, math simulations and online challenges, paintings, photos, mapping tools, and more. This easily accessible information is provided by federal organizations and agencies such as the Library of Congress, National Archives, National Endowment for the Humanities (NEH), National Gallery of Art, National Park

Service, Smithsonian, National Science Foundation (NSF), and National Aeronautics and Space Administration (NASA). Go to: <http://www.free.ed.gov/>



# PARENT/CHAPERONE LETTER



Greetings Parents/Chaperones:

Park rangers are pleased to be presenting an educational program to the students in Great Smoky Mountains National Park. In order to achieve the goals for a successful program, the park rangers will need your assistance in the following ways:

(These points will help to ensure that park rangers and teachers will be able effectively conduct the lessons and activities throughout the trip.)

- The program will be conducted outside and there will be some hiking throughout the trip. Prepare your student with appropriate footwear, long pants, layers, and rain gear.
- If your child is bringing a lunch from home, we recommend that students bring water to drink and a lunch with minimal packaging. Soft drinks are usually left unfinished by students, and remaining sugary drinks cannot be poured out on the ground. (Minimally packaged lunches lead to less trash being left behind or scattered by the wind. Additionally, this reduces the accumulated trash to be disposed.

If you are a chaperone attending the field trip:

- Please be an active part of the lessons. Keep up with the group and listen to the information being given in the case that you may be called upon to assist (handing out materials, sub-dividing groups etc.).
- Please do not hold conversations with other chaperones or use a cellular phone while the rangers are teaching the students.
- Refrain from smoking during the trip. If you must smoke, please alert a ranger or teacher and remove yourself from the group.
- Please be aware that the program will be conducted outside and that there will be some hiking throughout the trip. Prepare yourself with appropriate footwear, long pants, layers, and rain gear.
- We recommend that parents and students bring a small towel in their backpacks to sit on at lunch (there are no picnic tables at the program site).

Thank you for your needed assistance. We look forward to meeting you on the program!

Sincerely,

The Education Staff at Great Smoky Mountains National Park

