

# TEACHER'S MANUAL

This Suitcase Program provides the materials and lesson plans for teachers of grades 3-5 with content and activities increasing in difficulty by grade level. Activities in this Suitcase Exhibit may assist in meeting the Tennessee State Standards.

## ACTIVITIES

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## TENNESSEE STATE STANDARDS FOR 3-5

- 3.PS1.3 Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.
- 4.ESS1.1 Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.
- 4.ESS2.1 Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.
- 4.ESS2.2 Interpret maps to determine that the location of mountain ranges, deep ocean trenches, volcanoes, and earthquakes occur in patterns.
- 5.ESS1.7 Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

## ACTIVITY I: Is it a Rock or a Mineral?

**DURATION OF ACTIVITY:** 30-45 minutes

### LESSON OBJECTIVES

Observation is very important tool in the Earth sciences. This activity trains the student to observe and classify while learning to distinguish between minerals and rocks.

### GUIDING QUESTION

How is the Earth affected by long term and short term geological cycles and the influence of man?

**WARNING: \*\*\*The warm-up/pre-assessment portion of this activity assumes that none of the students is diabetic or allergic to chocolate, peanuts, or almonds.\*\*\***

### TENNESSEE STATE STANDARDS

- 3.PS1.2 Differentiate between changes caused by heating or cooling than can be reversed and that cannot.
- 3. PS1.3 Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.
- 4.ESS1.1 Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.
- 4.ESS2.1 Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.
- 5.ESS1.7 Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.

### MATERIALS INCLUDED

Rock bags: each of the 6 bags containing 4 rock and 4 mineral specimens

### MATERIALS PROVIDED BY TEACHER

Several bags of candy to serve as "rock samples," such as Peanut M & M's®, Nestle's Buncha Crunch®, Butterfinger BB's®, and Hershey Kisses with Almonds®. Several bags of candy to serve as "mineral samples," such as Hershey Kisses®, gummy bears, jelly beans, and chocolate or peanut butter chips.  
Plastic baggies, enough for each student in class

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## ACTIVITY II: Mystery Minerals

**DURATION OF ACTIVITY:** 30-45 minutes

### LESSON OBJECTIVES

Observation and description of minerals.

### GUIDING QUESTION

How is the Earth affected by long term and short term geological cycles and the influence of man?

### TENNESSEE STATE STANDARDS

- 3.PS1.2 Differentiate between changes caused by heating or cooling than can be reversed and that cannot.
- 4.ESS1.1 Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.
- 4.ESS2.1 Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.
- 5.ESS1.7 Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.

### MATERIALS INCLUDED

10 Mineral Specimen Boxes  
10 Rock Specimen Boxes  
10 Mineral Testing Kits  
Piece of Sheetrock  
Salt Shaker

### MATERIALS PROVIDED BY TEACHER

None

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

## **ACTIVITY III: This is Your Rock, This is My Rock**

**DURATION OF ACTIVITY:** 30-45 minutes

### **LESSON OBJECTIVES**

To make careful observations and write descriptions of different kinds of rocks.

### **GUIDING QUESTION**

How is the Earth affected by long term and short term geological cycles and the influence of man?

### **TENNESSEE STATE STANDARDS**

- 3.PS1.2 Differentiate between changes caused by heating or cooling than can be reversed and that cannot.
- 4.ESS1.1 Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.
- 4.ESS2.1 Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.
- 5.ESS1.7 Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.

### **MATERIALS INCLUDED**

Rocks for the Rock Kit, one sample/pair of students, use all the samples  
Mineral test kits and magnifier

### **MATERIALS PROVIDED BY TEACHER**

Paper and pencils

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

## ACTIVITY IV: Make Your Own Toothpaste

**DURATION OF ACTIVITY:** 30-45 minutes

### LESSON OBJECTIVES

The Earth is made of minerals and rocks that have distinct properties and provide resources for human activities. Students will learn about the basic composition of a product (toothpaste) that they use daily. The activity can lead to a discussion of what products we use on a daily basis and the importance of minerals in our daily lives.

### GUIDING QUESTION

How is the Earth affected by long term and short term geological cycles and the influence of man?

### TENNESSEE STATE STANDARDS

- 3.PS1.2 Differentiate between changes caused by heating or cooling than can be reversed and that cannot.
- 4.ESS1.1 Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.
- 4.ESS2.1 Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.
- 5.ESS1.7 Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.

### MATERIALS INCLUDED

Several brands of toothpaste  
Antacid tablets, 3 colored tablets (about 1 tsp of powder) per pair of students  
Baking soda, 1/8 tsp per student pair  
Measuring spoons  
Eye dropper for water  
Small paper cups (like the kind you put ketchup in at fast food restaurants)  
Toothpicks  
Small mortar and pestle  
Copy Cat poster on "Every American Born Will Need..."  
Weak solution of hydrochloric acid

### MATERIALS PROVIDED BY TEACHER

Water  
Copies of "Copy Cat Poster: Every American Will Need"  
Plastic baggies for students who want to take their toothpaste home

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

## ACTIVITY V: Birdseed Mining

**DURATION OF ACTIVITY:** 30-45 minutes

### LESSON OBJECTIVES

Mining is a complex process in which relatively small amounts of valuable or useful minerals or metals (ores) are extracted from very large masses of rock. This activity will illustrate how this “needle in a haystack” process works. Students will be able to experience “hands-on” the difficulty that miners face in locating valuable mineral deposits. They will also learn a simple lesson in economics—a less valuable commodity may be more profitable because it is more abundant. Students will be shown the importance of clean, environmentally conscious mining, and will learn that all mining operations must be performed and pay for reclamation work.

### GUIDING QUESTION

How is the Earth affected by long term and short term geological cycles and the influence of man?

### TENNESSEE STATE STANDARDS

- 3.PS1.2 Differentiate between changes caused by heating or cooling that can be reversed and that cannot.
- 4.ESS1.1 Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.
- 4.ESS2.1 Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.
- 4.ESS3.2 Create an argument, using evidence from research, that human activity (farming, mining, building) can affect the land and ocean in positive and/or negative ways.
- 5.ESS1.7 Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.

### MATERIALS INCLUDED

1 gallon of wild bird seed with sunflower seeds  
4 aluminum pans.  
Small blue, gold, and silver beads  
Medium white beads

### MATERIALS PROVIDED BY TEACHER

None

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.

## **ACTIVITY VI: Minerals for Breakfast**

**DURATION OF ACTIVITY:** 15-20 minutes

### **LESSON OBJECTIVES**

Mining for minerals that are precious for decoration, or necessary for construction, are a part of our everyday lives. The human body – being a remarkably complex machine – needs certain substances to stay alive and healthy. These substances are present in the food we eat.

### **GUIDING QUESTIONS**

If humans need minerals to stay alive and healthy, how do they get into our bodies? How do the minerals get into the plants we eat? What kinds of additives are contained in processed foods? How can supplemental iron be removed from a processed food for testing? How does the iron content of different breakfast cereals compare?

### **TENNESSEE STATE STANDARDS**

- 4.ESS3.1 Obtain and combine information to describe that energy and fuels are derived from natural resources and that some energy and fuel sources are renewable (sunlight, wind, water) and some are not (fossil fuels, minerals).
- 4.ESS3.2 Create an argument, using evidence from research, that human activity (farming, mining, building) can affect the land and ocean in positive and/or negative ways.
- 5.ETS1.1 Research, test, re-test, and communicate a design to solve a problem.

### **MATERIALS INCLUDED**

None

### **MATERIALS PROVIDED BY TEACHER**

Breakfast cereal (higher in iron the better; Total, Life, various bran flakes, etc., another cereal for comparison)  
Bowl/large beaker (non-metal)  
Milk / water  
Magnet (preferably a strong magnet or neodymium)  
Tongs/tweezers (to remove magnet)

For the entire activity and materials and to reserve a Suitcase Exhibit, please call 901.636.2362.



## SUITCASE EXHIBIT INVENTORY CHECKLIST

### Suitcase 1 of 2

School: \_\_\_\_\_

Check Out: \_\_\_\_\_

Return Date: \_\_\_\_\_

MoSH Check In:	Teacher Check In:	Item	Books/Videos/Posters	Teacher Return:
		A	Teacher's Manual	
		B	Binder: Teacher's Resource Materials	
		C	Binder: USGS: Life Cycle of a Mineral Deposit	
		D	Binder: Geology (transparencies)	
		E	Book: Eyewitness Handbook: Rocks & Minerals	
		F	Book: Eyewitness Explorers: Rocks and Minerals	
		G	Book: Geology Rocks!	
		H	Book: Eyewitness Books: Rocks & Minerals	
		I	Book: Eyewitness Books: Volcano & Earthquake	
		J	Packet: Earth Science Week – 2006	
		K	Video: Eyewitness: Rock & Mineral	
		L	DVD: Eyewitness: Rock & Mineral	

MoSH Check In:	Teacher Check In:	Item	Materials	Teacher Return:
		1.1-1.10	10 Student Mineral Kits: each w/12 mineral specimens included	
		4	Sheet Rock Sample	
			<b>Box of Materials for "Is it a Rock or Mineral" &amp; "Mystery Minerals" Activity. Containing items 3.1-3.10, 5, 6</b>	
		3.1-3.10	10 Student Mineral Testing Kits: each w/ nail, streak plate, glass slide, magnet, penny & hand lens	
		5	Salt Shaker	
		6	Weak Solution of Hydrochloric Acid	
			<b>Box of Materials for "Make Your Own Toothpaste" Activity. Containing items 8-14</b>	
		8	Antacid Tablets	
		9	Container of Baking Soda	
		10	Measuring Spoons (5)	
		11	Water Droppers (5)	
		12	Small Paper Cups (about 80)	
		13	Toothpicks	
		14.1-14.3	Commercial Toothpaste Samples (3)	



## SUITCASE EXHIBIT INVENTORY CHECKLIST Suitcase 2 of 2

MoSH Check In:	Teacher Check In:	Item	Books/Videos/Posters	Teacher Return:
		M	Poster: Minerals of the World	
		N	Poster: The Rock Cycle	

MoSH Check In:	Teacher Check In:	Item	Materials	Teacher Return:
		2.1-2.10	10 Student Rock Kits: each w/ 12 rock specimens included	
		7.1-7.6	Rock Bags (6 bags each containing 8 rock and mineral specimens)	
		15.1-15.5	Mortar & Pestle Sets (5)	
			<b>Box of Materials for "Birdseed Mining Activity" containing items 16 - 18</b>	
		16.1-16.2	Bags of Birdseed (2 bags)	
		17	Bags of Small Plastic Beads: 10 Gold, 20 Silver, 36 Blue & 16 White	
		18	Measuring Cup	
		19	Aluminum Trays (4)	
		20	Box of Fluorescent Minerals	
		21	Ultraviolet Lamp	