


Teacher Resources

QUICK LAB DIRECTED Inquiry

Timeline of Earth's History

Teacher Notes

 Small groups

 30 minutes

LAB RATINGS

	Easy <	1	2	3	4	> Hard
Teacher Prep						
Student Setup						
Concept Level						
Cleanup						

SAFETY INFORMATION

Remind students to review all safety cautions and icons before beginning this lab.

TEACHER NOTES

In this activity, students will make a timeline of Earth's history to help them visualize geologic time. This activity can be done in 30 minutes if students mark off only the Cenozoic, Mesozoic, and Paleozoic eras and Precambrian time. As students learn more, have them add details about each time interval to their timelines. This lab activity may be easier to conduct in the hallway.

MODIFICATION FOR GUIDED Inquiry

Have students research Earth's history and develop a procedure for making their own scaled timeline of geologic time on Earth. Allow students to proceed with all reasonable plans.

Answer Key

8. Sample answer: Precambrian time represents 88% of Earth's history.
9. Answers should include relevant details from various divisions of geologic time.
10. Sample answer: Precambrian: 4055 million years = 88%; Paleozoic: 300 million years = 7%; Mesozoic: 179 million years = 4%; Cenozoic: 66 million years = 1%.

Student Tip Use the following formula: $(\text{era length} \div 4,600) \times 100$

Sample answer: Precambrian: 316.8°; Paleozoic: 25.2°; Mesozoic: 14.4°; Cenozoic: 3.6°

Accept all reasonable pie charts.

MATERIALS

For each group

- colored pencils (5)
- meterstick
- paper strip (5 m)
- pencil

Benchmarks

SC.7.E.6.4

Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

SC.7.N.2.1

Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.

QUICK LAB DIRECTED Inquiry

Timeline of Earth's History

In this lab, you will develop a timeline that illustrates Earth's history. You can add more details to your timeline as you progress through your study of Earth's history.



PROCEDURE

- 1 Flatten a **5 m strip of paper** vertically on a hard surface. With a **pencil**, make a mark at the top of the paper. Write "Present Time" above this mark.
- 2 Use a **meterstick** to measure and mark 1 m intervals from the "Present Time" indicator. Next to the first mark below "Present Time," write "1 billion years ago." Next to the second mark, write "2 billion years ago." Next to the third mark, write "3 billion years ago." Next to the fourth mark, write "4 billion years ago."
- 3 Make a mark 4.6 m below "Present Time," and label this mark "Earth forms, 4.6 billion years ago."
- 4 Use a **colored pencil** to make a mark 6.5 cm below "Present Time." Label the interval between "Present Time" and this new mark as the "Cenozoic Era."
- 5 Use a different colored pencil to make a mark 25 cm below "Present Time." Label the interval between the end of the Cenozoic era and this new mark as the "Mesozoic Era."
- 6 Use a different colored pencil to make a mark 54 cm below "Present Time." Label the interval between the end of the Mesozoic era and this new mark as the "Paleozoic Era."
- 7 Use a different colored pencil to label the interval between the end of the Paleozoic era and "Earth forms, 4.6 billion years ago" as "Precambrian Time."
- 8 What percentage of the geologic time scale does Precambrian time represent?

- 9 Add to your timeline as you learn about events and life-forms in Precambrian time and in the Paleozoic, Mesozoic, and Cenozoic eras.

OBJECTIVES

- Describe how Earth has changed over its history.
- Understand the geologic time scale.

MATERIALS

For each group

- colored pencils (5)
- meterstick
- paper strip (5 m)
- pencil

Benchmarks

SC.7.E.6.4

Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

SC.7.N.2.1

Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.

Quick Lab continued

- 10 Make a pie chart that relates the amount of time in each era to the total amount of time in Earth's history. To calculate the percentage of the length of each era, divide the length of the era in years by the age of Earth in years and then multiply by 100. Record your results on the lines below.

Precambrian: _____

Paleozoic: _____

Mesozoic: _____

Cenozoic: _____

Now, determine the size of the wedges that make up the pie chart. Multiply each percentage by 360° . Record your results on the lines below.

Precambrian: _____

Paleozoic: _____

Mesozoic: _____

Cenozoic: _____

To check your work, make sure the sum of the percentages is 100 and the sum of the degrees is 360.


Use a compass to draw a circle in the space below. Mark the center of the circle. Use a protractor to draw the angles. Finally, label each part of the chart and choose an appropriate title.


Teacher Resources

QUICK LAB **GUIDED Inquiry**

Fossil Flipbook

Teacher Notes

 Individual students

 15 minutes

LAB RATINGS

	Easy <	1	2	3	4	> Hard
Teacher Prep						
Student Setup						
Concept Level						
Cleanup						

SAFETY INFORMATION

Remind students to review all safety cautions and icons before beginning this lab. Warn students that misuse of staplers can cause puncture wounds.

TEACHER NOTES

In this activity, students will construct a flipbook showing how a fossilized fish could have formed in what is now a desert. To save class time, you may choose to assemble the blank flipbooks ahead of time, or have students make blank flipbooks for homework.

Tip This activity may help students understand how fossils form and how fossils can serve as evidence of geologic change.

Student Tip Imagine what changes have to occur to get from one of the listed scenes to the next, and include those changes in your drawings.

MODIFICATION FOR **DIRECTED Inquiry**

Give students specific instructions as to how to construct a flipbook. Give them exact descriptions of each scene they should be drawing in their flipbooks. It may help to show them photographs of actual fish fossils.



MATERIALS

For each student

- colored pencils
- pieces of paper, small, equally sized (about 20)
- stapler

Benchmarks

SC.7.E.6.4

Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

SC.7.N.1.5

Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

Answer Key

1. Sample answer: Fish live in water, so at the time the fossil was made, the area must have been covered by water. Over a long time, it changed to desert.
5. Sample answer: It is uniformitarianism, because the water slowly dried up and the land changed over time to become desert.

QUICK LAB GUIDED *Inquiry*

Fossil Flipbook

In this lab, you will create a flipbook showing the process of fossilization.



PROCEDURE

1 Think about how a fossil of a fish could appear in rock located in a desert. What would this tell you about how the physical conditions of what is now the desert have changed over time?

2 On the lines below, describe a scenario that would explain how the fossil of the fish formed and how the physical conditions in the area changed. Be sure to include the following scenes: fish dies, fish is buried in sediment, sediment hardens and bones are replaced by rock, and habitat turns to desert.

OBJECTIVES

- Illustrate the process of fossilization.
- Explain how fossils can serve as evidence of geologic change.

MATERIALS

For each student

- colored pencils
- pieces of paper, small, equally sized (about 20)
- stapler

Benchmarks

SC.7.E.6.4

Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

SC.7.N.1.5

Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

Quick Lab continued


- ③ Create a flipbook by stacking the **small pieces of paper** and stapling them along one edge. Then use **colored pencils** to illustrate a **blank flipbook** showing how the fossil of a fish could have formed. Your illustrations should also explain how a fossilized fish could be located in the desert.
- ④ Watch the process happen by flipping through the book quickly.
- ⑤ Explain how your flipbook illustrates the principle of uniformitarianism.


Teacher Resources

QUICK LAB GUIDED Inquiry

Connecting Fossils to Climates

Teacher Notes

 Small group

 30 minutes

LAB RATINGS

	Easy <	1	2	3	4	> Hard
Teacher Prep						
Student Setup						
Concept Level						
Cleanup						

SAFETY INFORMATION

Remind students to review all safety cautions and icons before beginning this lab.

TEACHER NOTES

In this activity, students will interpret fossil evidence to determine a past environment and will explain how the environment could have changed over time.

Tip If possible take the students on a sample-collecting field trip. If you have trouble finding fossil material, contact the state geological survey or the geology department at a local university. There is often a person who can help you find free fossil material.

MODIFICATION FOR DIRECTED Inquiry

Replace Steps 2 and 3 with the following:

2. Look at one of the fossils. Is the organism a plant or an animal?
3. What kind of environment might the organism have lived in?

MODIFICATION FOR INDEPENDENT Inquiry

Have students investigate fossils indigenous to their area. Ask them to work in pairs to research one of the fossils. They will then develop a model of what the environment may have looked like during the fossil's lifecycle. Students can present their completed models to the class.

Answer Key

2. Accept all reasonable answers.
3. Accept all reasonable answers.
4. Sample answer: Yes, that environment is very different from a dry desert environment like the one in which the fossils were found. The area could have been an ocean or lake when the organisms died and were buried by sediment, but later, the area became a desert.



MATERIALS

For each group

- fossil material
- magnifying glass

Benchmarks

SC.7.E.6.4

Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

SC.7.N.1.6

Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.

QUICK LAB GUIDED *Inquiry*

Connecting Fossils to Climates

In this lab, you will examine fossils to learn about the prehistoric organisms and environment from which your fossil came.



PROCEDURE

- 1 Imagine that you go on an expedition to a desert and find the two fossils in front of you. Write a description of each fossil.

- 2 Formulate a hypothesis about the type of organism each fossil represents.

- 3 Formulate a hypothesis about the environment in which these organisms lived.

- 4 Is the environment you described in Step 3 different from the desert environment in which the fossils were found? If so, how would you explain this difference?

OBJECTIVES

- Describe a past environment from fossil evidence.
- Explain how environments can change over time.

MATERIALS

For each group

- fossil material
- magnifying glass

Benchmarks

SC.7.E.6.4

Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

SC.7.N.1.6

Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.