

DINOSAUR DISCOVERY

MIDDLE SCHOOL

TEKS

<i>Sixth:</i>	6.3A, 6.3D
<i>Seventh Grade:</i>	7.3A, 7.3D
<i>Eighth Grade:</i>	8.3A, 8.3D, 8.8E

Vocabulary

Archaean Eon, Cambrian Period, Carboniferous Period, Cenozoic Era, Cretaceous Period, Devonian Period, dinosaurs, eukaryotic cells, extinct, Hadean Eon, igneous rocks, Jurassic Period, mammals, Mesozoic Era, Ordovician Period, Paleontologists, Paleozoic Era, Permian Period, Proterozoic Eon, Quaternary Period, reptiles, Silurian Period, Tertiary Period, theory, Triassic Period

Pre-Show Activity

Pre-Show Lesson: Geological Time

Post this question on the board: “How do scientists know what happened on Earth millions of years ago?”

Materials:

Per group: 22.5 meters of calculator adding tape, colored pencils

Per student: copy of Geological History of Earth

Procedure:

1. Ask:
 - How old is Earth? *Answer: about 4.5 billion years old*
 - How do scientists know this? *Answer: fossils/ radioactive dating*
 - How many million years is in a billion? *Answer: 1,000*

- If 1 cm represents 1 million years, how many centimeters would represent 1 billion years? *Answer: 1000 cm*
- How many meters is that? *Answer: 10 m*
- How many centimeters equal 4.5 billion years? *Answer: 4,500 cm*
- How many meters would that be? *Answer: 45 m*

Lead students to the following calculations and make an anchor chart with this information:

Geological Time	
<i>1 cm</i>	<i>= 1 million years</i>
<i>1,000 cm (10 m)</i>	<i>= 1 billion years</i>
<i>4,500 cm (45 m)</i>	<i>= 4.5 billion years</i>
<i>0.5 cm</i>	<i>= 1 million years</i>
<i>500 cm (5 m)</i>	<i>= 1 billion years</i>
<i>250 cm (2.5 m)</i>	<i>= 0.5 billion years</i>
<i>1,000 cm (10 m)</i>	<i>= 2 billion years</i>
<i>2,000 cm (20 m)</i>	<i>= 4 billion years</i>
<i>2,250 cm (22.5 m)</i>	<i>= 4.5 billion years</i>

2. Tell students that you are going to give each group a piece of calculator adding tape that is 22.5 meters long. Their job is to use this tape to make a timeline showing the history of Earth. One half centimeter will equal one million years. Students will need to mark the Eons and Eras. They can find these on the timeline at http://www.newworldencyclopedia.org/entry/Geologic_time_scale. They will need to illustrate the important events in each time period using their colored pencils and the information gathered from their research. Students can complete the worksheet to accompany this activity (see Appendix A-1).

Post-Show Enrichment Activities

Activity One: Three Facts and a Fib

Materials: note cards, star stickers

Procedure:

1. Students will write three facts that they learned from the show and one fib.
2. They will put a star by the fib.
3. Collect these and read some of them out loud.
4. Students will try to identify the fib in each list as you read them.

Activity Two: Article Review

Materials: article

Procedure:

1. Students will read a current event related to dinosaurs. You may provide an article or assign students to bring one to class. See example bin Appendix A-2.
2. Students will tell the Who, What, Where, When, Why and How details about the story.
3. Students will also state their opinion and/or ask a question about the article.

Activity Three: Dinosaur Extinction Theories

Materials: internet

Procedure:

1. Ask students, "Why did the dinosaurs become extinct? What happened to kill a species that had survived for 150 million years?" Whatever caused the death of the dinosaurs also caused the death of 70% of all the species on Earth.
2. Discuss what a scientific theory is with students and that, for it to be accepted as a theory, there has to be genuine scientific evidence to support it. The more evidence to support it, the more accepted the theory is in the general public. Tell students that they are going to be looking at the scientific theories that are currently held which try to explain dinosaur extinction.

3. Each group will research a theory of how the dinosaurs became extinct and present the scientific evidence which supports their theory. Groups will research their theory using the Internet.
4. Groups will prepare a presentation to try to convince the class that their theory is the best theory. The class can ask questions after each presentation. After all the presentations are through, students will vote on the theory they are most convinced is true.

Possible Theories:

- Asteroid Impact
- Climate Change
- Volcanic Eruptions
- Disease
- Dinosaur Stress
- Ozone Layer Depletion
- Greenhouse Effect

Activity Four: Famous Paleontologists

Materials: picture book, internet or printed background information on paleontologists, poster board

Procedure:

1. Read a picture book about a famous paleontologist. A couple suggestions are:
Stone Girl Bone Girl by Laurence Anholt and Sheila Moxley or
The Dinosaurs of Waterhouse Hawkins: An Illuminating History of Mr. Waterhouse Hawkins by Barbara Kerley and Brian Selznick
2. Discuss the contributions of this paleontologist to our understanding of our world, and what theories their work supported.
3. Students will use the Internet or pre-printed background information to research a famous paleontologist. You may want them to work in partners or alone.
4. Students will design a poster giving pertinent information about their paleontologist to hang in the Paleontologist Hall of Fame in the classroom. This should include the following information:

- Where were they born?
- When and where did they go to school to be a paleontologist?
- Why did they become a paleontologist?
- What are they most famous for discovering?
- What theories do they support?
- Where did they make their discoveries?
- How did they do their research? What types of technology did they use?
- What makes their accomplishing more valuable than other paleontologists?

Here is a list of possible paleontologists:

Edwin H. Colbert

Edward Drinker Cope

Jack Horner

Robert Bakker

Sue Hendrickson

Mary Anning

Barnum Brown

Othniel C. Marsh

Dong Zhiming

Luis Alvarez

Patricia Vickers-Rich

Appendix

A-1

Understanding Geological Time

Directions: You will receive a long strip of paper. Create a timeline of Earth using the chart below. Be sure to mark all of the Eons and Eras, along with important events.

Measurement	.5 cm	250 cm (2.5 m)	500 cm (5 m)	1,000 (10 m)	2,000 (20 m)	2,250 (22.5 m)
Amount of Time	1 million years	.5 billion years	1 billion years	2 billion years	4 billion years	4.5 billion years

As you research the history of Earth, finish this chart by filling in the right hand column. Then, use the chart to create your timeline. Make sure that you label each eon, era, period, and major event. Keep in mind that eons and eras will overlap periods.

Geological Time Period	Major Events	Billions/Millions of Years Ago (bya/mya)
<i>Hadean Eon</i>	Earth forms	4.5 bya - 3.8 bya
<i>Archaean Eon</i>	First unicellular life	
<i>Proterozoic Eon</i>		
<i>Phanerozoic Eon</i>	Abundant animal taxa, our current Eon	
Paleozoic Era		542 mya - 251 mya
Mesozoic Era	"Age of Dinosaurs"	
<i>Cenozoic Era</i>	Diversification of mammals	
<i>Cambrian Period</i>		542 mya - 488 mya
<i>Ordovician Period</i>	MASS EXTINCTION (end-Ordovician)	
<i>Silurian Period</i>	First fish, first land plants	
<i>Devonian Period</i>	MASS EXTINCTION (end-Devonian) First amphibians, first insects	

<i>Carboniferous Period</i>		
<i>Permian Period</i>	MASS EXTINCTION (end-Permian)	
<i>Triassic Period</i>	MASS EXTINCTION (end-Triassic) First dinosaurs, first mammals	
<i>Jurassic Period</i>	Dinosaurs dominate landscape	
<i>Cretaceous Period</i>	MASS EXTINCTION (end-Cretaceous)	
<i>Tertiary Period</i>	Mammals and fish diversify	
<i>Quaternary Period</i>	First <i>Homo sapiens</i>	

A-2

Tyrannosaurus Bones Must Return to Mongolia, U.S. Says

By Patricia Hurtado and Emily Grannis - Jun 18, 2012 6:44 PM CT
Source: Bloomberg

The U.S. is seeking to return a *Tyrannosaurus bataar* to Mongolia after officials there said the dinosaur bones were smuggled into the U.S.

The skeleton, which spans 24 feet in length and is eight feet tall, had been shipped to the U.S. from the U.K. via Florida and then to Texas before arriving in New York in 2010. It was auctioned by Texas-based Heritage Auctions Inc. in New York in May for more than \$1 million.

The auction proceeded even though the president of Mongolia obtained a restraining order in a Texas court before it took place. Under Mongolian law, dinosaur fossils are considered property of the Mongolian government and “one-of-a-kind rare items” that are prohibited from being moved abroad.

U.S. Attorney Preet Bharara in Manhattan said the bones, discovered sometime between 1995 and 2005, were looted from Mongolia’s Gobi Desert.

“The skeletal remains of this dinosaur are of tremendous cultural and historic significance to the people of Mongolia,” Bharara said in a statement. “When the skeleton was allegedly looted, a piece of the country’s natural history was stolen with it, and we look forward to returning it to its rightful place.”

Bharara alleges the customs documents for the dinosaur misstated the bones’ country of origin as Great Britain instead of Mongolia. The government’s paleontologists concluded the skeleton must have come from Mongolia because the dinosaur was native to that region and its bones have only been discovered there.

The *Tyrannosaurus bataar*, which lived about 70 million years ago, was first discovered by paleontologists in 1946, Bharara’s office said. Since 1924, Mongolia enacted laws making any dinosaurs discovered there to be government property.