

Dawn Staples-Knox

9th grade Earth and Environmental Unit: Earth's History

Overview: The Earth is very old and scientists use several methods to learn about its long history. The oceans and atmosphere formed and life began. The evidence comes from fossils, the rock record, and radioactive decay. Using the rock record, scientists have been able to figure out the history of life on the planet. This includes the mass extinctions. Scientists are still working on identifying the causes.

Time frame: 3-4 weeks

Standards to be met:

Students will gain knowledge about the earth and the processes that change it.

Students will apply inquiry and problem-solving approaches in science and technology, and will learn to formulate and justify ideas and to make informed decisions.

Students will understand the history and nature of scientific knowledge and technology and the impacts science and technology have on society and the environment.

Students will communicate effectively in the application of science and technology.

Students will participate effectively in a scientific community.

Essential Question or Challenge:

How old is the Earth and how do we know? What changes have happened? How are organisms affected by these changes?

Objectives (learning outcomes):

~Explain both the evidence used to develop the geologic time scale and why an awareness of geologic time is important to an understanding of the process of change in the universe as well as on earth.

~Describe radioactive decay and half-life.

~Determine how fossils can be used to explain changes in the Earth's surface, life forms, and environments.

~Describe ways that scientists measure long periods of time and determine the age of very old objects.

~Explain how climate change affected life forms during the Cenozoic Era.

Important Vocab to the Unit:

Geologic time scale	Cross cutting relationships	dendrochronology	Cast
Epoch	Key bed	Half life	Mold
Era	Principles of inclusions	Radioactive decay	Trace fossil
Mass extinction	Relative age dating	Radiocarbon dating	Index fossil
Period	Superposition	Radiometric dating	Cenozoic
Precambrian	Absolute age dating	Paleozoic	Mesozoic
Paleontology	fossil	Mammoth	Ice Age

Lessons and Materials needed:

Timeline of Earth Poster

poster paper
chapter 21
colored pencils
notes

Relative-Age Dating vs. Absolute Dating Activities

drawing paper
colored pencils
notes
Half life Lab with materials

Fossils: Making Casts and Molds

plaster of paris
sea shells
clay
notes
newspaper
models of fossils
data table

Paleozoic, Mesozoic, and Cenozoic Club Membership

list of members
requirements
badge designs
craft materials
chapters 22 and 23

Glacier Lab

large blocks of ice
5 ft boards
sand
lab directions
camera

** Mammoth Teeth and Slide Show

*resource books and materials on mammoths
*molds of mammoth teeth
*molar age dating charts
plaster of paris
newspaper
laptops
**"Mammoth in a Trunk" from Mammoth Site (South Dakota) shipped to my school
*camera
notes

** are from the grant*

** Mammoth Teeth and Slide Show

You and your partners are going to become the experts of one of the following mammoths; Woolly, Columbian, and Pygmy.

You will create a slide show and conduct a mammoth tooth lab to demonstrate your knowledge.

You must work together through these activities and share your knowledge in a presentation.

Tooth Lab requirements will be given on the day that your lab is scheduled. You must be in attendance that day as your fellow scientists are relying on you to help conduct this activity.

Time: 7 days (1 lab and 1 presentation day)

Materials:

Your laptop

Books and resources from Mrs S-K's expedition

Camera and video

Need to know to be an expert:

scientific name

when did they live

size

physical features

adaptive abilities for survival

diet

habitat

physical changes in the earth at the time of your mammoth

What happened to your mammoth? Scientists are still working on this question too. Use your research skills, materials, and resources to give an explanation.

**** Mammoth Teeth and Slide Show Rubric**

STANDARDS	DNM	PARTIALLY MEETS	MEETS	EXCEEDS
Students will gain knowledge about the Earth and the processes that change it.		Unclear about the changes in the Earth and their mammoth. Gives specific and general information about the mammoth but does not support it with the facts.	Relates the changes in the Earth to changes in their mammoth. Gives specific information on the mammoth, diet, habitat, and relates what scientists know based on facts.	Relates the changes in the Earth to the changes in their mammoth and can connect to an animal today. Gives specific information on the mammoth, diet, habitat, and relates what scientists know based on facts and can make a connection to the Tooth Lab.
Students will communicate effectively in science and technology		~Presentation was not shared by all members ~Did not use the camera or video ~Some mechanical errors that detract from slide show ~Sources: lack variety or are limited	~All members presented a piece of the slide show ~Used the camera or video ~Minor mechanical error ~Sources: 4 different types	~All members EQUALLY presented the slide show ~Used the camera and the video ~No mechanical error ~Sources: Many and different types
Students will participate in a science community.		~Group struggled at times ~Needed directions and guidance through Tooth Lab ~Missed the age of their mammoth by more than 6 years or guessed at it. Did not use the chart and materials effectively	~Group cooperated and shared jobs ~Followed directions most of the time through Tooth Lab ~ Could determine the age of their mammoth within 4-5 years using the materials and chart correctly	~Group collaborated, everyone worked on all parts ~Followed all directions and very focused on Tooth Lab ~ Could determine the age of their mammoth within 2-3 years using the materials and chart correctly

Works Cited

Agenbroad, Larry D., and Lisa W. Nelson. *Mammoths: Ice-age Giants*. Minneapolis:

Lerner Publications, 2002. Print.

Agenbroad, Larry D. *Pygmy (dwarf) Mammoths of the Channel Islands of California*. Hot Springs, SD: Mammoth Site of Hot Springs, SD, 1998. Print.

Arnold, Caroline, and Laurie A. Caple. *When Mammoths Walked the Earth*. New York: Clarion, 2002. Print.

Bardoe, Cheryl. *Mammoths and Mastodons: Titans of the Ice Age*. New York: Abrams for Young Readers, 2010. Print.

Chorlton, Windsor. *Woolly Mammoth: Life, Death, and Rediscovery*. New York:

Scholastic Reference, 2001. Print.

***Dr Larry Agenbroad Presents The Mammoth Site*. Linn Productions, 2003. DVD.**

Hegner, Barbara, and Mark Hallett. *Ice Age Mammoth: Will This Ancient Giant Come*

Back to Life? New York: Crown, 2001. Print.

Hegner, Barbara, and Mark Hallett. *Ice Age Sabertooth: the Most Ferocious Cat That Ever Lived*. New York: Crown, 2002. Print.

Ice Age. Perf. Ray Romano. Twentieth Century Fox, 2002. Videocassette.

***Ice World*. Discovery Channel, 2009. DVD.**

Lange, Ian M. *Ice Age Mammals of North America: a Guide to the Big, the Hairy, and the Bizarre*. Missoula, MT: Mountain Pub., 2002. Print.

Lauber, Patricia. *Painters of the Caves*. Washington, D.C.: National Geographic Society, 1998. Print.

Lister, Adrian, and Paul G. Bahn. *Mammoths: Giants of the Ice Age*. Berkeley, CA: University of California, 2007. Print.

Macdonald, Fiona, and Alison Roberts. *The Stone Age News*. Cambridge, MA:

Candlewick, 1998. Print.

Malam, John, David Antram, and Karen Barker. Smith. *You Wouldn't Want to Be a*

***Mammoth Hunter!: Dangerous Beasts You'd Rather Not Encounter.* New York: Franklin Watts, 2004. Print.**

Mol, Dick, Larry D. Agenbroad, and Jim I. Mead. *Mammoths*. Hot Springs, SD:

Mammoth Site of Hot Springs, 1993. Print.

Raising the Mammoth. Discovery Communications, 2000. Videocassette.

Bold means that it was purchased with money from the grant.