Sixth Grade

Scientific Theory

(Utah State Core Curriculum: 3060-0402, 3060-0501, and 3060-0502)

Day One:

Objective: What is a Scientific Theory?

Discussion: When a written record is not available, scientists must use natural evidence to make predictions and conclusions about the past. Scientists use clues they find to make educated conclusions or theories about the Earth's history. Ask students if they can think of information they've read or learned that is based on scientific theory. A great example of scientific theory can be found in the study of dinosaurs. Dinosaurs lived before any written record and long before man, therefore the best we can do to explain their existence is study what they left behind – their fossils, including bones, footprints, teeth, eggs, and coprolites (dinosaur feces).

Activity: The dinosaur's skin is not fossilized – in some cases an imprint may be found showing a pattern but the color and texture is lost. Scientists can only theorize about what dinosaurs looked like outside of their bone structure. Using a skeletal picture of a dinosaur, have the students draw the muscles, skin, eyes, etc. Remind them to not expand off the basic structure since scientists always rely on evidence when reaching conclusions about the unknown. When students are finished, compare their pictures and other artistic interpretations of the same dinosaur found in books and encyclopedias.

Day Two

Objective: The Big Bang Theory

Discussion: Even before the dinosaurs, scientists must theorize about the beginning of the earth. Many scientists use evidence found in the rock layers and mineral deposits of the Earth to conclude that a large explosion of energy produced a "Big Bang", forming a hot ball of matter. As this matter cooled gases formed and life began to appear.

Activity: Read The Universe by Seymour Simon. This book gives a grade appropriate explanation to the Big Bang Theory and the beginning of geological time.

Day Three

Objective: Tools used to explain the Scientific Theory.

Discussion: Tools used by scientist throughout history can help explain the concept of the universe. Scientists rely on more than educational guesses on

which to base their scientific theory. Modern technology has greatly increased the believability and justification of current scientific theories.

Activity: Have students use books and computers to research tools used by scientists to study the past. Have students draw a picture time-line showing how technology has improved scientific theory. You could give students a list of tools and have them put the list into its correct time. Space tools: Eye sight, telescope, radio waves, space probe, space station.
Dinosaur excavation tools: shovel, air chisels, carbon-14 dating, computers, CAT-scan technology.

Day Four

Objective: Different Cultures Different Universal Views

Discussion: Students will be discussing world history as part of the sixth grade curriculum. Discuss with students that different cultures often have different perspectives of scientific theories, especially in early history. Some cultures even invented stories called myths to try to explain the past.

Activity: In groups have students read and act out a story of the past that has some relation to science. (Tales about stars and constellations are a good place to start, The Sky is Falling by Betty Miles, Cynthia Fisher, Greek Mythology).

Visit The North American Museum of Ancient Life

In the Bone Cabin Quarry make sure you look into the paleontology lab and identify tools used by scientists to validate their theories about the existence of dinosaurs. List the three tools you think are the most important (they do not have to be tools listed on the find and seek lab chart). Tell why you chose each tool.

After venturing through the star-tunnel find the "Big Bang" Mural. Take the time to read the scientific theory explaining this painting.

In the Mammoth Room, look at the painting across from the Mammoth. This painting gives an excellent example of how real fossils (pieces of history) can be interpreted into mythology. If you take the bones of the mammoth and organize them like a human body you get a one-eyed giant – Cyclops the giant Odysseus fought on his voyage in Homer's *Odyssey*. Try to recall or locate two other fossils in the museum that can be misinterpreted as a myth. (Hint: an excellent example can be identified in the Cretaceous Ocean). List the two you located and the myth associated with them. If you can't find two then list any fossil and create your own myth about it.

Follow up to museum visit

Day One

Objective: Mythology vs. Theory

Discussion: Mistakes in theory have been made in the past. These mistakes lead to stories, guesses, interpretations, and mythology. An excellent example of this is when the skeletal remains of the mammoth were found in ancient Greece the bones where put together like a human body thereby making a large single "eye socket" for the legend of the Cyclops. Today scientists still debate many theories drawn about the past especially about dinosaurs. Because of the large nasal passage in Brachiosaurs some scientists believed they lived in water walking along the bottom of the lakes this being the only way to support their large body weight; other scientists disagree.

Activity: Have students make a theory about a dinosaur – distribute pictures of different dinosaurs to students and have them make a theory about what they ate, how they protected themselves, how they moved (this would be easier if they worked in teams) then have students present their theories to the class. Depending on the scientific evidence they used, have the class vote if their story is a myth or a theory.

Day Two

Objective: Theories of Dinosaur Extinction

Discussion: Discuss what students know or learned from their visit to the museum on how dinosaurs became extinct. The museum supports the theory of a large meteorite hitting the earth, ask if any students remember the five-minute video on extinction in the museum and share their thoughts.

Activity: Have students further research other theories about dinosaur extinction. Have them write up a paper with three paragraphs: the first two explaining two different theories on dinosaur extinction and the last paragraph giving personal support to the theory they believe to most likely be true. Possible reasons for extinction include: a large meteorite falling to earth, large amount of volcanic activity causing greenhouse gases to be released into the atmosphere, changes in the Earth's climate, changes in the Earth's sea level, or a supernova explosion.

Day Three

Objective: Mapping Dinosaurs around the world

Activity: Distribute a world map to each student and books giving locations of dinosaur discoveries. Have students place an "x" on the map for each fossil they find from their readings and own personal knowledge.

Discussion: Discuss why dinosaur bones are discovered in all parts of the world. Ask students to answer and defend their findings to the following "theoretical" questions. Where are most dinosaurs found? What type of environment is in this location of the world? Where would you expect dinosaurs to be discovered that is not currently marked on your world map?

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Sixth Grade

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Place an "x" on the map for each fossil you locate in the museum, try to locate fossils from many different countries. Write in the names of five of the dinosaurs on the map in their correct country. Write in two additional dinosaur fossil locations not found in the museum (research in the discovery room, books, computers, and personal knowledge).

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