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The following lessons were created by **Cindi Wallendal**, a teacher participating in a National Endowment for the Humanities Summer Institute for Teachers entitled Touch the Past: Archaeology of the Upper Mississippi River Region.

Footprints of the Past

An Introduction to Historical Science and its Importance

Grade Level: Middle School—7th grade

Subjects: Life Science, Biology

Objectives: My major objectives are threefold:

- Students will be introduced to Historical Science and gain knowledge on its function and value to understanding science
- Students will understand how new evidence changes our science understanding
- Students will perform a problem solving activity by collecting and graphing data and making inferences

Standards:

Nature of Science

B.8.1 Describe how scientific knowledge and concepts have changed over time in the earth and space, life and environmental, and physical sciences

B.8.2 Identify and describe major changes that have occurred over in conceptual models and explanations in the earth and space, life and environmental, and physical sciences and identify the people, cultures, and conditions that led to these developments

B.8.4 Describe types of reasoning and evidence used outside of science to draw conclusions about the natural world

Science of Inquiry

C.8.2 Identify* data and locate sources of information including their own records to answer the questions being investigated

C.8.4 Use inferences* to help decide possible results of their investigations, use observations to check their inferences

C.8.5 Use accepted scientific knowledge, models*, and theories* to explain* their results and to raise further questions about their investigations*

C.8.6 State what they have learned from investigations*, relating their inferences* to scientific knowledge and to data they have collected

Life and the Environment

F.8.2 Show how organisms have adapted structures to match their functions, providing means of encouraging individual and group survival within specific environments

F.8.7 Understand that an organism's behavior evolves through adaptation to its environment

F.8.8 Show through investigations how organisms both depend on and contribute to the balance or imbalance of populations and/or ecosystems, which in turn contribute to the total system of life on the planet

F.8.9 Explain how some of the changes on the earth are contributing to changes in the balance of life and affecting the survival or population growth of certain species

Duration: 4-5 class periods, 54 minutes in length

Materials/Supplies: handouts, copies of Laetoli Trackway and Prints, enlarged footprints (see references below for links to handouts), rulers, meter sticks, graph paper, computers

Vocabulary: The following are vocabulary words that will be addressed in this lesson: Historical Science, Evolution, Hominid, Topographical, Paleontology, Archaeology, Forensic Science

Background: This lesson is designed to reinforce student's knowledge of the Nature of Science. It is hopeful students will understand that science is ongoing and inventive; and our scientific understanding changes overtime as new evidence is found. Using the Laetoli trackway as a tool for students to develop questions about who and where these tracks were made, students are provided with a problem solving exercise that brings to light the importance of Historical Science. After investigating information gained from studying the track way, students will investigate the Hominids and develop a possible scenario for the footprints. Students will need to demonstrate their ability to use accumulated knowledge and evidence of the Hominids to infer what life was like for them.

Setting the Stage: My students will have just finished a 12 week "Life Through Time" unit in which students examine how the earth and its' life forms changed over long periods of time. Students create a tree of life to observe how life forms have adapted and evolved. The unit ends with humans being added to the tree. This lesson will provide more insight into how humans evolved through time by looking at early species and comparing them to modern man.

Procedure: Method to teaching this unit is by Inquiry, so I do the ABC way of Action Before Content

Day 1- Students will be told that we are going to investigate a species called Hominids, or *Ardipithecus afarensis*. The students will begin by collecting data about themselves and classmates. Students will take measurements of their foot length and their height and combine the entire class data. Students will graph the data on a stem and leaf graph. From this draw inferences on foot size compared to height.

Day 2- Hand out the Laetoli Trackway diagrams and ask students what they see or observe. Lead the discussion into what do they actually see and can they infer or assume from these observations. Hand out puzzle worksheet in groups of 2-3 and have students complete. When all groups are done, discuss and have all groups share. After sharing are there any groups that change their interpretations as new evidence is revealed from other groups? Can we infer anything else considering our activity from yesterday? Have groups compute what the height might be of these species.

Day 3- Students will be asked to consider what else we could discover about Hominids. Solicit ideas that students might be thinking about as they studied the footprints. Assign student groups research on the Hominid by using the pbs.org/evolution website and complete the following questions and provide the evidence found.

- How did these species move?
- What did these species look like?
- When did these species live?
- Did these species make and use tools?
- What did they eat?

Explain to students that at the end of their research they will be creating a short story about the footprints.

Day 4- Students will complete their research and begin writing their 3 paragraph short story.

Closure: At the end of the 4-5 days when students have completed their research and have created their scenario, review as a class what we learned about Historical Science. What are our best explanations to events using the evidence found? How does this better help us understand science? Can this explanation change as new evidence is found? Conclude with the understanding that Historical Science involves studying past events by using knowledge that is already known to tell the story of what happened in the past. Where else is Historical Science been used?

Evaluation: Students will be asked to create a short story about the Laetoli tracks. They will need to use the knowledge gained by their research and develop a viable explanation to the life of the Hominid by using evidence found. Stories should be creative and demonstrate use of their research.

Links/Connections: This lesson can be extended by researching what new evidence has been found that may change our assumptions of early man. Have students investigate early man in North America, then compare and contrast them to the Hominids. Students can also investigate the "Kennewick Man" or "Otzi- The Ice Man".

References: The following are references and sources used for this lesson.

- www.indiana.edu/~ensiweb/
 - ENSI- Evolution and Nature of Science Institute
 - Laetoli Track way Puzzle (for handouts)
 - Footsteps in Time (for handouts)
- www.pbs.org/wgbh/evolution/humans/index.html
 - Origins of Humankind
 - How did Humans Evolve
 - Dexterity and Early Tools
 - Pass the Termites, Please