

Dinosaur Footprints

Grade Level:

- 3
- 4
- 5
- 6
- 7
- 8
- 9

Lesson Time:

45 minutes

Objective:

- Students will be able to investigate how scientific knowledge changes due to differing viewpoints and additional data by making observations and developing scientific explanations on a set of footprints.

Preparation

Before going to the classroom, you will need to:

1. Contact the teacher to find out the length of the class period. Alert the teacher that this investigation is set up for groups of four and whole class discussion. You will also need to arrange for an overhead projector and screen.
2. Make a plaster of Paris or clay imprint of a couple of different-sized footprints in two shoeboxes to bring to the class. You could use a man's shoe and a woman's high heel; two different sizes of bare feet; or a flip flop and a tennis shoe. These will be "grabbers" to start your discussion about footprints as evidence.
3. Make an overhead transparency of the Dinosaur Footprint handout.
4. Collect any giveaways for the students, such as fossil posters or geologic time bookmarks.

Materials:

For instructional purposes:

- Overhead transparency of the Footprints Puzzle handout
- Paper and pencils for students to record their thoughts and predictions

- Plaster of Paris or clay footprints in shoeboxes

Purpose

Trace fossils, which are physical evidence of life activities of now vanished organisms, are more prevalent than body (bones) fossils. One organism can leave behind many traces (e.g. footprints), but only one set of hard parts (e.g. bones) actually becomes a fossil. Trace fossils include tracks, trails, burrows, feeding marks, and resting marks. Trace fossils are valuable to paleontologists, because they can tell us more about the behavior of the ancient organisms.

The purpose of this investigation is to give the students the opportunity to describe what they see, and to use evidence and logical reasoning to support an explanation. They will be able to duplicate the experience of paleontologists, who make observations and use these observations as evidence to develop scientific explanations about what the behavior of ancient organisms. They will learn that, as scientists learn new things and make more observations, their explanations often change.

Safety

This investigation is considered safe to do with students.

Investigation Question

How do additional data and different viewpoints change explanations?

What to do

1. **(10 minutes)** Hold up the first footprint in the shoebox so that everyone can see. Be sure to accept as many explanations as you can. Some questions you might ask include:
 - What can you tell about the person who made this footprint by just looking at it? (*Show them the second footprint.*)
 - What can you tell me about who made this footprint? How is it different from the first one?
2. **(2 minutes)** Tell students that scientists use footprints and other visual data to make inferences about events. This is the job of detectives and forensic specialists as well. Let them know that today, they will be using footprint data as scientists do to try to infer what happened in the past.
3. **(8 minutes)** Put the Dinosaur Footprint transparency on the overhead projector, covering up Positions 2 and 3 with a piece of paper. Ask students: "What do you think is happening here?" Let students talk this over in their small groups for a few minutes, and then ask them to share their thoughts. Be sure to accept as many explanations as you can. Some questions you can ask the students during the discussion are:
 - How many animals do you think this picture shows? What is your evidence for that?
 - In which direction are the animals moving? How do you know?
 - Do you think these animals are the same size? Why or why not?
 - What do you think will happen next, and why? Write down your predictions.
4. **(8 minutes)** Now, show students Positions 1 and 2 on the transparency. Again, ask them to discuss this in their small groups for a few minutes and then ask for their thoughts. Be sure to accept as many explanations as you can. Questions that could help during the discussion

include:

- What do you think happened here? What is your evidence for that?
- What do you think will happen next, and why? Write down your predictions.

5. **(8 minutes)** Finally, show all three positions on the transparency and ask students to think again about what might have happened. Let them share their thoughts and their reasons for those thoughts. Were their predictions accurate?
 6. **(7 minutes)** Ask students why they thought there were so many different explanations for what happened. For older students, ask them what additional evidence they could collect that would help them to be more certain about their explanations [dating procedures, etc.] Let students know that scientific knowledge is constantly changing for many reasons. Sometimes new data are collected that result in changes in explanations or new techniques are developed that allow scientists to learn more about existing data. Other times, different scientists interpret the same data differently.
 7. **(2 minutes)**. Thank students for their time and attention. You can leave giveaways behind for the classroom teacher to distribute.
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