

Making Tracks

Elementary School 5-E Lesson

Objectives

- Student will analyze fossil footprints of two and four legged dinosaurs to learn more about how these animals lived.
- Students will experiment with their own walking patterns (on two feet compared to “all fours”) and compare their walking patterns to patterns left by these extinct animals

Engagement (5 minutes...more time will be needed if the students are not familiar with a K-W-L-H chart)

Use a K-W-L-H chart (instructions for use are included at the end of this lesson) to list what the students already know about dinosaur behavior. Focus on things that would be recorded in dinosaur tracks..

Possible questions include:

- How many legs did they have?
- What kind of feet did they have?
- Are they all the same? Why are some dinosaurs different than others?
- Did they eat different foods?

Write the student responses in the K (know) column of the K-W-L-H chart.

Use the K-W-L-H chart to list what the students want to know about how dinosaurs lived. Put a star by the things that we might be able to find out by looking just at their foot prints

Write their ideas in the W (want to know) column of the K-W-L-H chart.

Exploration (5 minutes)

Divide the students into pairs or small groups. **Explain** that they are going to have a few minutes to pretend that they are two legged and four legged dinosaurs.

Encourage the students to pay close attention (**watch** others, **feel** how you step, **listen** to the noise made as each hand or foot hits the floor) to analyze how they move when they are acting like two and four legged dinosaurs. **Ask** the students to look for a pattern that could describe how two footed and four legged dinosaurs moved.

Explanation (10 minutes)

Explain that scientists look at modern living things to help understand how extinct animals lived. We can use what we learned from our own two and four legged walking to imagine (form a hypothesis) about how dinosaurs lived. **Ask**

the students to share the different patterns they observed when they were acting like dinosaurs. **Guide** the discussion to include the following walking patterns. **List** the patterns on the K-W-L-H- chart under the L (learned) column

Dinosaur walking patterns

For both two leg and four leg: You can tell which way the person or animal was moving by the shape of the footprint – toes and claws are in the front of the foot. You can guess where it might be going. You can tell its right foot from its left foot. You can tell something about the size of the person or animal from (1) the size of its feet (2) the size of its steps, (3) the width of the trackway between the left and right footprints (width of its hips)

-two leg pattern: one foot, then the other foot; (both feet off the floor at the same time is running, skipping, or jumping! check this idea next time you are supposed to be walking in the hall). You can tell walking footprints from running and jumping footprints (try this at recess).-four leg patterns: One common pattern is right foot, left hand, left foot, right hand. Other students may use a pattern left foot, left hand, right foot, right hand. Students will discover that they have different gaits (like horses trot and gallop, see <http://www.funnysnaps.com/igait.html>).

Note that in most animals the front foot (our hand) looks different than the back foot so we can tell them apart when we make footprints. The back footprint comes up to be quite near where the hand just was.

Elaboration (15 minutes)

Show the dinosaur footprint picture and drawing found under the Geodetective tab. **Explain** that a •crime• is preserved in the rock. **Encourage** the students to figure out what happened?

Tips

- How many types of animals made tracks here?
- In what order were the tracks made?
- Looking at the picture, make a drawing of each animal as it walked through the mud.
- Can you and a few friends reenact what happened?
- What can you guess about the relationship among the animals?
- What things can you tell for sure?
- What things are guesses?

Answer: There are three types of footprints in the pictures – big round ones with visible claw marks on the front edge, smaller slightly crescent shaped holes (like tracks of a jumbo horse) and smaller three-toed ones.

The big round ones with claws and the smaller holes are parts of the same tracks – can you see the right and left front and back feet? From our four foot experiment we deduce that they are the big (elephant like) back feet and smaller (jumbo horse like) front feet of an animal walking on four legs. There are three clear sets of these four-footer footprints that have been uncovered by the excavators, and may be more partly hidden. The three animals were all going the same direction, away from us in the picture. Students probably can make a guess what this dinosaur looked like from previous experience. If they imagine any sauropod (like the Apatosaurus, formerly known as brontosaurus) they will be imagining something quite like what paleontologists imagine. Remember we are imagining the animal from its footprints so if we are imagining different bodies, that is scientific uncertainty.

The three-toed animal made tracks composed of right and left feet. We can't see front and back feet. From our experiments, we deduce that the animal with three-toed feet walked on two legs. Students should know this kind of dinosaur from previous experience, imagining something in the T-Rex shape is about right.

The animals are going along a trail from one place to another (the river wasn't here then, it was the muddy shore of inland ocean that covered most of Texas). Look and see that the tracks are not going every which way, like students do at recess, nor are they walking back and forth over the same area, like students and especially teachers do in the classroom. Where do students think they are going? If students think about themselves going to lunch, they will probably not be far wrong.

You can see the tracks of at least three four-leggers walking along together. Students have experienced this type of behavior when they walk with their families or see horses or other animals in a herd. Do they think that this is a family or a herd of four legged dinosaurs? Some people think that the one in the middle was a little smaller, and might be the young one in walking in a safer place between two older sauropods

The three-toed ones are following along beside and in a few places you can see that a three three-toed animal stepped on top of the round tracks, showing that the three toed animal was following behind the round foot animal. Students probably know from their previous knowledge that the four legged round foot dinosaurs are generally plant eaters, and the two legged, three toed ones are mostly meat eaters. (scientist deduce this from information not here, mostly from the teeth associated with fossiled bones). We don't know for sure, but we guess that the two legged meat eaters were not a friendly part of the family or herd, that they were following or chasing their prey. This is the "crime" part, we see the tracks of a hunt of four legged plant eating dinosaurs by predatory meat eating two legged dinosaurs. One of the fossil hunters who first studied these tracks thought that the footprints show that the meat eater almost caught on of the plant eater (see his reenactment at http://www.beg.utexas.edu/UTopia/dinosaur/dino_locations/dino_quotes.html)

Evaluation (5-10 minutes)

Check-for-understanding

Ask the students to explain how the behavior of living things today help us understand the lives of extinct animals. Ask a few groups of students to reenact what they think happened 100 million years ago at the track site. How can you tell what you know from what you guess? We can't tell for sure where the animals were going, or how far behind the four footers the two footers were.

Use the K-W-L-H chart to list how the students could find out more about the way dinosaurs lived. What other information would students like to see? Dinosaur bones? Look at footprints of animals living today? .

Write their ideas in the H (how to find out more) column of the K-W-L-H chart. Students can look at the web sites under resources to find out more.

K-W-L-H Chart Instructions

Constructing meaning, as the term implies, involves using what is already known to make sense of what is to be learned. There are many strategies, most developed from the research and theory on reading comprehension, that can help students construct meaning. The **K-W-L-H** chart is but one strategy. The **K** and **W** sections are generally completed prior to instruction. The **L** and **H** sections are completed following instruction.

K- stands for helping students recall what they **KNOW** about a subject.

W- stands for helping students determine what they **WANT** to learn.

L- stands for helping students identify what they have **LEARNED**, and

H- stands for **HOW** they can learn more (other sources where additional information on the topic can be found).

References

Ogle, D. (1986) K-W-L: A teaching Model that Develops Active Reading of Expository Text. *The Reading Teacher*, 39:564-576.

Marzano, R. & Pickering D., (1991) *Dimensions of Learning: An Integrative Instructional Framework*. Developing Minds, Alexandria, Virginia: Association for Supervision and Curriculum Development.

Name:

Topic:

K What I Know	W Want to know	L What I Learned	H How I can find more information