

Dinosaur Footprints

Tracks and Traces



MUSEUM INFORMATION:

Ichnology is the study of plant and animal traces. Implicit to this definition is that the traces made by plants and animals reflect some sort of behavior. The students will integrate science and math to estimate the general size of a dinosaur based on foot and stride lengths.

- Museum staff will assist students during this assignment. This assignment calls for the measurement of fossils. Students will have selected specimens that they may touch.
- The largest selection of Dinosaur Tracks is located on the lower level of the museum.
- When your students arrive at the museum, they will be given a brief greeting by a museum staff member.
- After this greeting is a good time for you to talk to your students and chaperones about the *Dinosaur Footprints "Tracks and Traces"* activity.

PREPARING AN ACTIVITY:

- Make photocopies of the *Dinosaur Footprints "Tracks and Traces"* activity for your students. The museum will NOT have copies available.
- *Dinosaur Footprints "Tracks and Traces"* will require some writing, please supply students with pencils
- Provide a measuring tape at least 1 meter or 3 feet in length for each team of students
- The museum asks that students refrain from leaning on any of the glass cases while drawing. We recommend providing students with clipboards or notebooks to lean on.
- *Dinosaur Footprints "Tracks and Traces"* has a brief set of directions printed at the top for chaperones to use.

IN THE CLASSROOM:

Extend the fun!

- While museum staff will be able to assist students, discuss with them the terms bipedal and quadrupedal. They will need to know the term bipedal, meaning two-legged, in order to complete the worksheet.
- Have the students go over some basic metric measurements. The worksheet can be done using Standard English units, but most science uses metric units.



Dinosaur Footprints “*Tracks and Traces*” Information for Chaperones

Complete this activity in the Beneski Museum of Natural History.

- Please allow your students a few minutes to explore the main and bottom floor before beginning the Vertebrate Hunting activity.
 - Consult with other chaperones and have students break into smaller groups and assign them each a question to start with so they start in different areas of the museum. This way not all of the students are looking for the same thing.
 - The height and length questions can be done in either standard or metric. Push students towards metric if the teacher has given the say so.
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- ✓ Remind your students to look all around them, even above their heads.
 - ✓ Remember: While most exhibits are in reach of students, remind them that the exhibits in the museum are fragile. Please do not allow them to touch any of the exhibits.

Acknowledgments

We wish to acknowledge and thank the staff of the following organizations for permitting us to share some of the best lab and field guide materials created for use in the Beneski Museum of Natural History:

- Amherst Public Schools
- Brown University
- Four Rivers Charter School
- Greenfield Community College
- Holyoke Community College
- McAuliffe Regional CPS
- Mount Holyoke College
- Northampton Montessori School
- Northampton Public Schools
- Smith College
- University of Massachusetts
- Williamsburg Schools

Dinosaur Footprints (Tracks and Traces)

Name: _____ Date _____

Make a sketch of at least 4 different kinds of dinosaur footprints you can see below. There are several different kinds of dinosaur prints, so look carefully for the different shapes of prints.

1	2
3	4

What is the difference between a footprint and a trackway?

What is the longest trackway you can find? _____ prints long.

Describe or draw each trace fossil below and explain how the trace may have been made.

Name	What may have made the fossil?	Describe or draw what it looks like
Footprints		
Crater Impressions		
Ripple Marks		
Other Fossils?		

Background

Scientists have extrapolated formulas to help estimate the size of dinosaurs based on the size of their footprints.

- **Step 1.** Find a slab of rock with bi-pedal footprints. Most of the slabs will have an identification number on them. Locate this number on the slab you are observing and write it under the ID #.
- **Step 2** Determine the length of a dinosaur footprint. Measure the length from the back of the heel to the tip of its center claw.
- **Step 3** Multiply the length of the footprint by 4 to get the hip height.
- **Step 4** Multiply the length of the footprint by 10 to get the head-to-tail length

SPECIMEN A

ID # Footprint length Multiplied times 4 Equals the Hip Height

		X 4	
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ID # Footprint length Multiplied times 10 Equals the Dinosaur Length

		X 10	
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SPECIMEN B

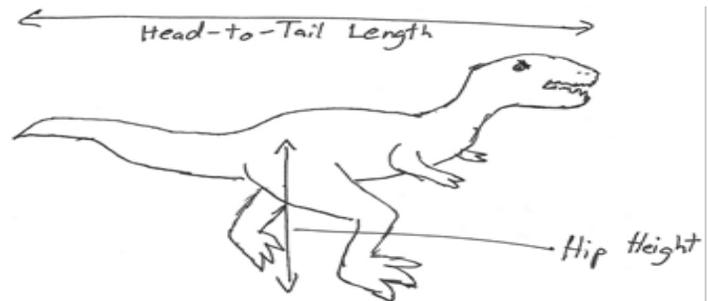
ID # Footprint length Multiplied times 4 Equals the Hip Height

		X 4	
--	--	------------	--

ID # Footprint length Multiplied times 10 Equals the Dinosaur Length

		X 10	
--	--	-------------	--

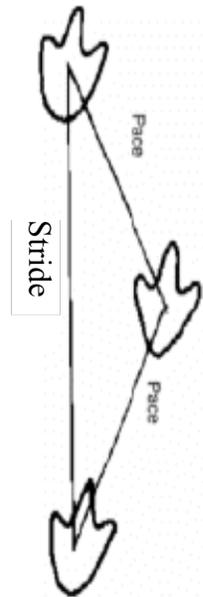
Using the information above, was this dinosaur smaller, bigger, or about the same size as you?



Background

Scientists have extrapolated formulas to help estimate whether or not a dinosaur was walking, trotting or running based on a ratio of stride lengths to hip heights.

- **Step 1** Determine the length of a dinosaur footprint. Measure the length from the back of the heel to the tip of its center claw.
- **Step 2** Multiply the length of the footprint by 4 to get the hip height.
- **Step 3** Determine the stride length, distance between one "left footprint" and the next "left footprint".
- **Step 4** Calculate ratio to determine relative rate of dinosaur movement, divide the stride length by the hip height. *Keep in mind: that when you are running, your stride is longer.*
 - If the ratio is less than 2.0, the dinosaur was walking.
 - If the ratio is between 2.0 and 2.9, the dinosaur was trotting.
 - If the ratio is greater than 2.9, the dinosaur was running.



SPECIMEN A

ID # Footprint length Multiplied times 4 Equals the Hip Height

		X 4	
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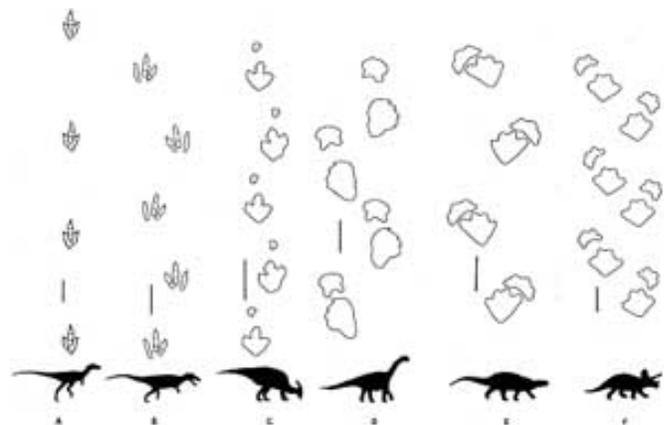
ID # Stride length Hip Height Equals Ratio

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Was the dinosaur walking, jogging, or running? _____



Coelophysis, one of the dinosaurs that may have walked in this area.



THINKING QUESTIONS

1. Can you tell by looking at the footmarks in the sedimentary rocks if a specimen was moving quickly or slowly? What evidence supports this idea?
2. How was this area different when the dinosaurs roamed here? How long ago was this?
(Observe the Diorama)



3. Make an observation of your choice about an object on display on the ground floor.

4. Could you estimate the size of a human based upon foot size? Could you estimate the hip height? If yes, how tall might a person with a 12.5 inch long foot be?