Dino Challenge

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Dino Challenge

Target Audience: 3rd Grade

Introduction:

Students will measure dinosaur bones with calipers at the Maryland Science Center. After the visit, they will use their collected data to investigate the origin of the museum's mystery dinosaur bone.

Time:

Measuring Up! pre-visit activity: 10 minutes

Measuring at the Museum Maryland Science Center visit: 5 minutes

What Am I? post visit activities: 1 class period, 45 minutes

Lesson Objectives:

Students will use calipers to measure width and collect data.

Students will analyze data and read informative text to form an argument about dinosaur bones.

Common Core State Standards:

CCSS.MATH.CONTENT.3.MD.B.4: Generate measurement data by measuring lengths. Show the data by making a line plot.

CCSS.ELA-LITERACY.W.3.8: Recall information from experiences and sort evidence.

CCSS.ELA-LITERACY.W.3.2: Write informative/explanatory texts.

CCSS.ELA-LITERACY.RI.3.10: Read and comprehend informational texts.

Next Generation Science Standards:

3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

3-LS3-1: Similarities and differences in patterns can be used to sort and classify natural phenomena.

3-LS4-3: Construct an argument with evidence.

Measuring Up!

Time:

10 minutes; completed before visiting the Maryland Science Center

Lesson Objective:

Students will read and discuss text.

Materials:

- *Dino Challenge* letter

Procedure:

Activity 1

Read the *Dino Challenge* letter aloud or separately. Encourage students to discuss what bone features they could look for to help them solve the Maryland Science Center's problem.

Maryland Science Center
601 Light Street
Baltimore, MD 21230

Dear Class,

The Maryland Science Center has a dinosaur mystery for you to help solve. We found a new leg bone in our collections, but don't know whether it is from a Pachyrhinosaurus or a Struthiomimus dinosaur.

The bone bed in our dinosaur exhibit has a mix of fossilized bones from a few different animals, including Pachyrhinosaurus and Struthiomimus dinosaurs. During your visit, we'd like you to measure the fossilized leg bones (femurs) of each dinosaur using calipers and a measuring tape. Calipers are tools that measure objects that are rounded. They have two bow-shaped arms that can wrap around an object.

You'll use your calipers to measure the width and a measuring tape to measure the length of both dinosaur femurs. Record your measurements here at the Maryland Science Center, and then take them back to school to analyze.

Thank you for all of your help. We can't wait to see what our mystery bone is!

Sincerely,
Your friends at MSC

Measuring at the Museum

Time:

5 minutes during a visit to the Maryland Science Center

Lesson Objective:

Students will use calipers to collect data.

Materials:

- *Recording Sheet*
- Pen or pencil

Procedure:

Each chaperone group should visit the Dinosaur Mysteries exhibit during their visit to the Maryland Science Center. The Dinosaur Mysteries exhibit is located on the first floor of the museum.

During the visit, students should explore the dinosaur bone bed located in the center of the exhibit. Once there, they will use the museum-supplied bow calipers to measure the width of Pachyrhinosaurus and Struthiomimus bones. The museum-supplied measuring tapes can be used to measure the length. Students should record their measurements on the provided recording sheet.

Back at school, students should discuss the following questions using the information gathered:

1. Are each group's measurements of the Pachyrhinosaurus and Struthiomimus bones identical?

2. What could explain any differences?

Recording Sheet

Dinosaur Bone Measurements

1. Find the dinosaur bone bed located in the center of the Dinosaur Mysteries exhibit.
2. Use the exhibit's *Bone Bed Map Key* to find the Pachyrhinosaurus and Struthiomimus femurs (leg bones).
3. Use the calipers to measure the width of the Pachyrhinosaurus and Struthiomimus femurs at their thinnest point.
4. Use the measuring tape to measure the length of the Pachyrhinosaurus and Struthiomimus femurs.
5. Record each measurement below. Bring this page back to school.

	Width (cm)	Length (cm)
Struthiomimus		
Pachyrhinosaurus		

What Am I?

Time:

45 minutes; completed after visiting the Maryland Science Center.

Lesson Objective:

Students will analyze data and read informative text to form an argument.

Materials:

- Students' completed *Recording Sheet*
- *Struthiomimus and Pachyrhinosaurus* informative text
- *Mystery Bone* letter
- Pencil
- *Dino Line Plot* template
- Three colors of markers, crayons, or colored pencils per group

Procedure:

Have the students read *Struthiomimus and Pachyrhinosaurus* and the *Mystery Bone* letter. Encourage students to discuss what they could look for in the mystery bone's measurements.

Split the class into groups of four or five. Provide each group with the *Dino Line Plot* template and three colors of markers, crayons, or colored pencils. Have each group create two line plots: one that shows the mystery bone's width compared to the width measurements collected by each member of the group, and one that shows the mystery

bone's length compared to the length measurements collected by each member of the group. The line plots should have a key that shows the color used for the mystery bone's measurements, as well as their own Struthiomimus measurements and Pachyrhinosaurus measurements.

Students will use the line plots to decide which dinosaur the mystery bone belongs to. The students should then write a letter to the Maryland Science Center making an argument with supporting evidence that explains their analysis. The letter should include answers to the following guiding questions:

1. Which dinosaur do you think it is?
2. How confident are you?
3. Are there other possibilities?
4. What evidence do you have to support your argument?

Student measurements will vary, but Struthiomimus femurs are shorter and thinner than Pachyrhinosaurus. The Mystery Bone should more closely match Pachyrhinosaurus. An assessment rubric for the project is included along with these resources.

A Maryland Science Center Appreciation Award will be sent to each class that submits their letters to coreexperience@marylandsciencecenter.org

Struthiomimus and Pachyrhinosaurus

Struthiomimus was a dinosaur that lived 70 million years ago in Alberta, Canada and Wyoming. Struthiomimus walked on two feet. It had a neck, a small head, and a long beak with no teeth.

There are still some mysteries about Struthiomimus. Scientists don't know if it was an herbivore that only ate plants or an omnivore that ate plants and animals. Maybe it used its beak to eat tiny animals from the water. Maybe it used its hands to grab tree branches, bring them close, and eat the leaves.

There were many predators in the time and place that Struthiomimus lived, including Tyrannosaurus Rex. Struthiomimus would not have been good at fighting predators, but it was fast enough to run away. It had thin legs and a light body, which may have helped it to run between 30 and 50 miles per hour, as fast as a racehorse.

Pachyrhinosaurus was a dinosaur that lived 70 million years ago in Alberta, Canada and Alaska. Pachyrhinosaurus walked on four legs. It weighed over four tons, which is as much as two and a half cars. If had a flat bony frill on the back of its head and a large hard bump on its nose.

Pachyrhinosaurus grabbed leaves with its sharp beak and chewed them with strong flat teeth in the back of its mouth. It probably lived in a herd. It may have hit other dinosaurs with its nose bump to show how strong it was. Its frill may have made it look bigger and helped it to show off.

Pachyrhinosaurus's thick legs supported its heavy body, but could not move fast enough to outrun predators. To escape from predators, it would need to fight. Its strong body, frill, and nose bump might have helped to protect it.

Maryland Science Center
601 Light Street
Baltimore, MD 21230

Dear Class,

We need your help! We found that the mystery bone is another femur, just like the fossilized leg bones you measured in the exhibit. The mystery bone is 67 cm long and 9 cm wide.

Do you think that it is more likely to come from Struthiomimus or Pachyrhinosaurus?

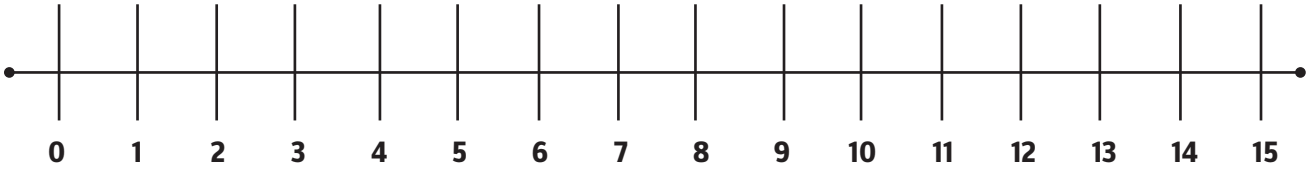
Once you've read more about the two dinosaurs and analyzed the data, please send us a report to let us know the results of your investigation. Thanks for helping the Science Center!

Sincerely,
Your friends at MSC

Dino Line Plot

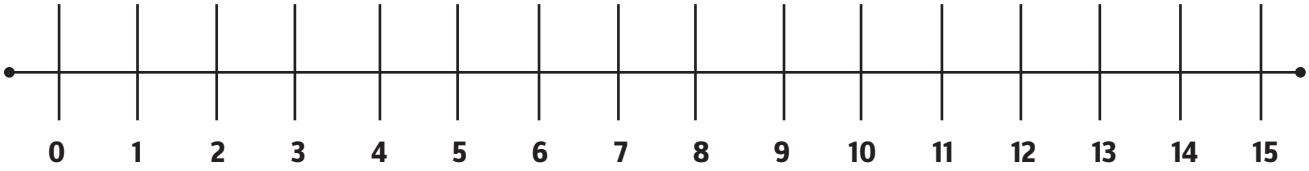
Bone Widths (in centimeters)

Color Key
☐ Struthiomimus
☐ Pachyrhinosaurus
☐ Mystery Bone



Bone Lengths (in centimeters)

Color Key
☐ Struthiomimus
☐ Pachyrhinosaurus
☐ Mystery Bone



Mystery Dinosaur Rubric

Team Members: _____

Task	Points Earned	Possible Points
Graph · Followed the scale of the line plot – 1pt · Included a key for the plot – 1pt · Placed the mystery bone on the line plot at 67 cm and 9 cm – 2pts		4
Letter Content · Letter states an opinion on the mystery dinosaur – 1pt · Choice supported by evidence from the text and their plots – 3pts · Explains why there could be other possibilities – 1pt · Provides a concluding statement – 1pt		6
Grade Level Expectations · Uses correct punctuation and capitalization in written text – 2pts · Uses parts of speech correctly in written text – 1pt · Includes a heading, greeting, body, closing, and signature – 2pts		5
Total Points Earned =	/	15

Teacher Comments:

Key Terms

Caliper: A tool with two legs that is used to measure thickness.

Frill: A bone plate on the back of the head.

Herbivore: An animal that eats only plants.

Omnivore: An animal that eats a variety of food including animals and plants.

Predator: An animal that hunts and eats other animals.

Paleontologist: A scientist who studies fossil evidence of animals and plants that lived a long time ago.