



Science Objectives

- Students will investigate the anatomical similarities and differences between modern and ancient organisms.
- Students will analyze the structure of fossils to infer evolutionary relationships.

Vocabulary

- adaptation
- common ancestor
- comparative anatomy
- homologous structure
- fossil
- fossil record

About the Lesson

- In this lesson, students will:
 - Describe evolutionary advantages of bone structure in modern and ancient organisms.
 - Identify patterns seen in homologous structures in organisms to understand evolutionary relationships and patterns.

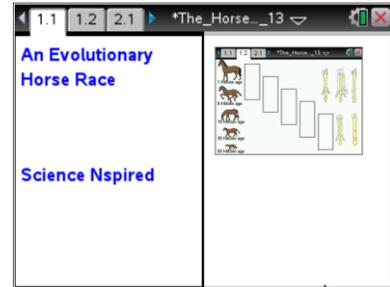


TI-Nspire™ Navigator™

- Send out the *Evolutionary_Horse_Race.tns* file.
- Monitor student progress using Class Capture.
- Use Live Presenter to spotlight student answers.

Activity Materials

- Compatible TI Technologies:  TI-Nspire™ CX Handhelds,  TI-Nspire™ Apps for iPad®,  TI-Nspire™ Software



Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>

Lesson Files:

Student Activity

- An_Evolutionary_Horse_Race_Student.doc
- An_Evolutionary_Horse_Race_Student.pdf

TI-Nspire document

- An_Evolutionary_Horse_Race.tns

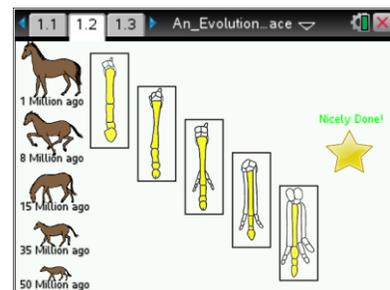
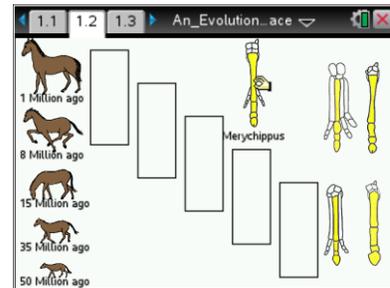


Discussion Points and Possible Answers

Have students read the background information stated on their activity sheet.

Move to page 1.2.

- Students will select a set of leg bones and put in the correct order by considering how the structure of the bone has evolved over time. Students should drag the bones to the boxes that correspond with the correct animal in the evolutionary time line. If correct, a green border will appear around the box.
- Once all bones are placed in the correct order, a star will appear with the text "Nicely Done."



Tech Tip: To access the Directions again, select  > **Evolutionary Horse Race > Directions.**



Tech Tip: To access the Directions again, select **menu** or **Document Tools** () > **Evolutionary Horse Race > Directions.**

Move to pages 1.3 - 1.9.

Have students answer questions 1-7 in the .tns file, the activity sheet, or both.

- Q1. Describe how the leg bones in the horse have changed over time

Sample Answer: 50 million years ago the bones were shorter with many toes. Over time, the bones became longer with only one toe.

- Q2. Which is the oldest ancestor of the modern horse?

Answer: A. Hyracotherium



Q3. Which is the closest ancestor of the modern horse?

Answer: D. Pilohippus

Q4. How many toes did the Hyracotherium have?

Answer: D. 4

Q5. The Hyracotherium was a small, forest-dwelling animal. Why would its leg structure benefit this animal?

Sample Answer: Having short legs and multiple toes would help it move through the dense forest terrain.

Q6. Approximately, when did only one toe structure appear?

Answer: B. 8 million years ago

Q7. What are the evolutionary advantages of the body structure of the modern horse?

Sample Answer: Answers may vary. Modern horses are grazing animals and are no longer forest dwelling animals like their ancient ancestors. Longer legs and one toe may help with speed in their grassland environment.



TI-Nspire Navigator Opportunities

Make a student a Live Presenter to show how to select and drag the fossils into the boxes. Throughout the activity, monitor student progress. At the end of the activity, collect the .tns file and save to Portfolio.

Wrap Up

When students are finished with the activity, retrieve the .tns file using TI-Nspire Navigator. Save grades to Portfolio. Discuss activity questions using Slide Show.



Assessment

- Formative assessment will consist of questions embedded in the .tns file. The questions will be graded when the .tns file is retrieved. The Slide Show will be utilized to give students immediate feedback on their assessment.
- Summative assessment could consist of questions/problems on the chapter test on evolution.