GENERATIONGENIUS
ALWAYS QUESTION. ALWAYS WONDER.

TEACHER GUIDE

ROCK LAYERS
GRADES 6-8

COMMON MISCONCEPTIONS

- **Mastodons and mammoths are the same.**
  Mammoths and mastodons lived at the same time, but they are two different species. Scientist believe mammoths lived starting about 5.1 million years ago in Africa while mastodons lived about 27 million years ago mostly in North and Central America. Mammoths and modern elephants are closely related and both members of the same family.

- **The mass extinction killed all the dinosaurs.**
  The mass extinction event killed most of the dinosaurs. However, evidence suggests that the birdlike dinosaur *Archaeopteryx* survived the mass extinction. Some scientists believe that modern day birds evolved from this species of dinosaur, making birds the closest living relative to dinosaurs.

- **Radiometric dating gives an exact age.**
  Radiometric dating is used to estimate how long ago a rock was formed and to estimate the age of the fossils found within it. Although radiometric dating does not give scientists an exact age of the rock, it is a better indicator of age than relative dating.

GEOLOGIC TIME SCALE

The geologic time scale is a history of Earth because Earth was formed 4.6 billion years ago. The geologic time scale is the "calendar" for events in Earth's history. It subdivides all time into named units of abstract time called, in descending order of duration, eons, eras, periods, epochs, and ages.

WEATHER AND EROSION

Weather and erosion are often used together but are different processes. Weathering is the breaking down of rocks into smaller pieces. Erosion is when those weathered pieces get moved around from wind and water.

RELATIVE DATING AND ABSOLUTE DATING

Relative dating is based on where the rock layer is positioned (before or after). Relative dating is used to get a general idea of the order of events only. Absolute dating is a process that scientists use to get a general age of objects like rocks

and fossils. Radiometric dating is used to figure out the age of certain rocks that contain certain elements. Carbon dating is also used to figure out the age of objects, but in order to carbon date an object, it must contain carbon-14.

TEACHER TIPS

Many students have seen fossils and rock layers but do not understand how they are used for scientific research. As fossils and rock layers are usually familiar, it will be important to allow students to share their ideas and models to surface misconceptions and incomplete ideas they come with from their previous experiences. Use initial student models as formative assessments to gauge what students know about these concepts.

ABOUT THIS LESSON

This lesson was created by the National Science Teaching Association (NSTA) to pair with the Generation Genius video and support *NGSS*.

They have requested we provide the following background with this lesson:

The Next Generation Science Standards (NGSS) are the national standards on how students learn science, and they are based on contemporary research presented in *A Framework for K–12 Science Education (the Framework).* The shift in science teaching and learning required by the Framework is summarized in this infographic: A New Vision for Science Education.

At the start of each Generation Genius lesson, students are presented with a phenomenon, then they try to explain it. Students will notice they have gaps in their knowledge and ask questions, which motivates them to build ownership of science ideas they need in order to explain how or why the phenomenon occurred. The way students build ownership of science and engineering ideas is through active engagement in the science and engineering practices (SEPs). This process of sensemaking, or doing science to figure out how the world works, is one of the major shifts the *Framework* encourages.

To engage in the SEPs, students should be part of a learning community that allows them to share their ideas, evaluate competing ideas, give and receive critiques, and reach consensus. Students can start by sharing ideas with a partner, then with a small group, and finally, with the whole class. This strategy creates opportunities for all students to be heard, build confidence, and have something to contribute to whole-class discussions. Each Generation Genius lesson provides conversational supports to facilitate such productive student discussions to contribute to sensemaking.

Excited to continue your shift toward the new vision for science education? Check out the Generation Genius Teacher Guide page on the NSTA website for resources and strategies to engage every student in your classroom in **doing** science.