

## When did the rocks in the Great Lakes basin form?

It is sometimes difficult for people to get a feeling for very large numbers or long periods of time. In this activity you will get an idea of how long ago the rocks in the Great Lakes Basin formed.

### OBJECTIVES

After successfully completing this activity, you will be able to:

- Describe in general terms the expanse of geologic time.
- Explain how long ago the rocks in the Great Lakes Basin formed.
- Compare the ages of Great Lakes rocks with some other events in ancient and modern time.



### PROCEDURE

The accompanying page is a sheet with 2000 dots on it. Let each dot represent 1 year of time. The first dot in the top line represents the current year. Each dot after that one is a previous year.

1. Draw a circle around the dot that represents the year you were born. Now draw circles around the dots that represent the years that your brothers and sisters (if any) were born.
2. Draw squares around the dots that represent the year that Mt. St. Helen's exploded (1980), the year your school building was built, the year the light bulb was invented (1879), and the year the Declaration of Independence was signed (1776).

### Source

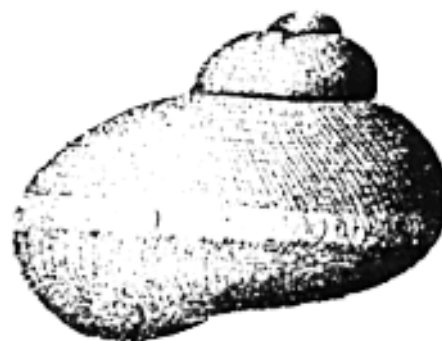
Modified from "When did the rocks in the Great Lakes basin form?" by Dan Jax. In *Great Lakes in My World*. 1989. Lake Michigan Federation.

### Earth Systems Understandings

ESU 5 (change through time): Planet Earth is more than 4 billion years old, and its subsystems are continually evolving. An extension addresses ESU 6 (Earth as subsystem).

### Materials

- A sheet of 2000 dots.
- Ruler.
- Pen or pencil.
- Ream of paper (unopened).



Source: Art on this page created by Sue Abbati in *The Fossil Fauna of the Islands Region of Western Lake Erie*, compiled by Lulu M. Bowe, Ohio Sea Grant Program.

**Answers**

- One ream of paper represents one million years.
- You will need 10 reams of paper to represent ten million years, 40 reams for 40 million, and 400 reams for 400 million years, respectively.
- A ream of paper is approximately 5cm thick.
- $400 \text{ million years} = 400 \text{ reams} \times 5 \text{ cm/ream} = 2000 \text{ cm}$ . This is 20 meters.
- A ream of paper consists of 500 sheets. If each sheet of paper in a ream is identical to your sheet of dots, how many years would one ream of paper represent?
- How many reams of paper would be needed to represent 10 million years? 40 million years? 400 million years?
- Measure the thickness of a ream of paper.
- How tall would a stack of paper have to be to represent 400 million years of time? How many meters is this? How high would such a stack reach on the side of the school building?

Many of the rocks in the Great Lakes Basin formed from about 600 to 225 million years ago.

Remember how the year you were born was represented by one dot on the top line of the dot page?

**Evaluation**

Experiment with graphs and charts to demonstrate the difference between the two values. The difference will be very large, which makes it challenging to create a scale. Individual students could represent a certain number of years, and participants could extend the geologic time scale around the room.

**Extension Hints**

Erosive processes of land and water interactions are related to tides and the moon, evaporative processes that form rock layers are related to the sun, and meteors affect topography.

Find a height needed to represent the middle of the late Cretaceous, or 80 million years ago, and a height that would represent 160 million years ago, or the late Jurassic period, i.e.,  $160 \text{ million years} = 160 \text{ reams of paper} \times 5 \text{ cm/1 ream} = 800 \text{ cm}$ .

The height when some of the dinosaurs lived would be represented by 4 and 8 m. Compare this to 20 meters, the age of some of the Great Lakes rocks, for a perspective of the magnitude of differences between time periods. The middle rock layers are more than twice as old as some of the dinosaurs.

**EVALUATION**

Human-like organisms began to evolve about 2 million years ago. Devise a scale to compare this amount of time (2 million years) to the time when rocks formed in the Great Lakes Basin.

**EXTENSION**

- We often observe geologic processes on Earth. Processes of change occur in the universe as well. How does the interaction of Earth with the sun and moon relate to Earth System processes? How do these processes affect rock formation during Earth's geologic time?
- The rock layers in the Great Lakes basin are actually older than some of the dinosaurs that existed during the Cretaceous period, 70-141 million years ago, and during the Jurassic period 146-195 million years ago. How high would a stack of paper need to be to represent the later years of either period of dinosaurs?

**REFERENCES**

Hertzberg, Hendrik. 1970. *One Million*, Simon and Schuster, New York.