

Name: _____

Score (first try): _____
 Score (with corrections): _____

Scientific Notation

Glacial Geologist Lauren Miller Simkins spends time in Antarctic waters, studying the history of Earth's glaciers. The opportunity to think about the passage of time in "thousands and millions and billions of years" attracted her to geology, the study of Earth.

To describe time, all the way back to Earth's formation, and sediment, which includes particles much smaller than sand, a geologist must use very large and very small numbers. **Scientific notation** helps scientists use these kinds of numbers efficiently.

Look over these lists of sediment size and geologic time. **Pay close attention to their units of measure.** Then answer the questions below.

Sediment (measurements represent the diameter of each type of particle)
boulder \geq 25.6 cm
6.4 cm \leq cobble < 25.6 cm
.2 cm \leq gravel/pebble < 6.4 cm
62.5 μ m \leq sand < .2 cm
.004 mm \leq silt < 62.5 μ m
clay \leq .004 mm

Time (Earth's History)	<i>mya = million years ago bya = billion years ago</i>
Earth's age	4.6 billion years
formation of Australian zircon crystals	4.4 bya
oldest rocks found on Earth	4.28 billion years old
the Hadean eon	4540 mya - 4000 mya
the Archean eon	4000 mya - 2,500 mya
the Proterozoic eon	2500 mya - 541 mya
the Phanerozoic eon	541 mya - present

1. Complete and study the table below, to practice using scientific notation and to compare it with standard numbers. Name each type of sediment **or** eon in the third column.

Scientific Notation	Decimal Notation	Type of Sediment/Eon
3.2×10^{-2} mm		
	.053 mm	
2.786×10^{-4} mm		
	4,250,000,000 years ago	
5.4×10^8 years ago		
	4,280,000,000 years old*	
2.3×10^8 years**		
	.000005 m	
3.4×10^{-6} m		

* = what happened about then?

** = Dinosaurs appeared about then

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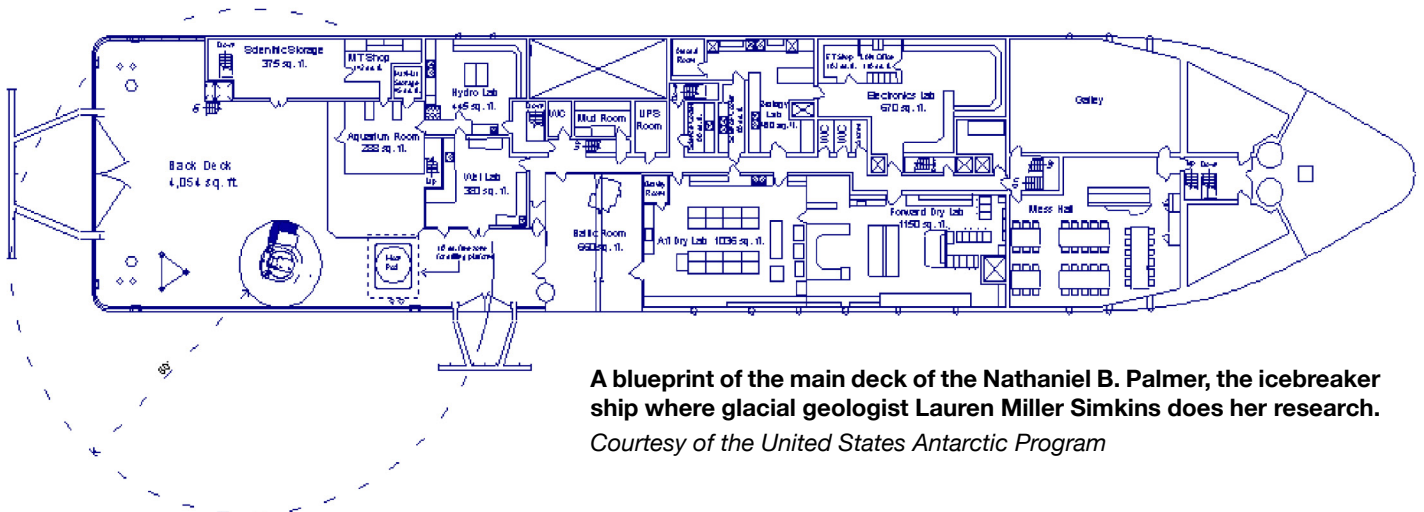
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2. Use the information on page one about sediment and geologic time to answer these questions:

- a) Simkins recently tweeted a request for pipettes with three-mm openings, to use with sediment. List all types of sediment which would fit through those pipettes.
- b) Zircon:
 - i) In which eon were the zircon crystals found in Australia formed?
 - ii) What's zircon? (Use the internet to find a clear answer.)
- c) Land plants appeared on Earth about 400 million years ago.
 - i) In which eon did land plants appear?
 - ii) Express the age of land plants in years, using scientific notation.
- d) Stromatolites — sedimentary structures formed by marine algae — have been found in 3.5 billion year old limestone.
 - i) In which age did these algae live?
 - ii) Express the number of years ago that the algae lived, using scientific notation:

3. When did ginkgo trees (*Ginkgo biloba*) first appear? Use the internet or library to find an answer. Express it in years, using scientific notation AND name the eon in which ginkgo trees appeared on Earth.

4. How old is our planet? Use the information above to answer in years, using scientific notation.



A blueprint of the main deck of the Nathaniel B. Palmer, the icebreaker ship where glacial geologist Lauren Miller Simkins does her research.
Courtesy of the United States Antarctic Program