QUICK FIX

How Many Years Is Five Billion?

WILLIAM H. LEONARD

Here is a short and easy-to-do activity that might help to provide a more complete and concrete understanding of large numbers accompanying the concept of deep time. Students who struggle with an appreciation for the vast amounts of time occupied by life on Earth may have a problem understanding and therefore accepting evolutionary concepts.

Materials

- clock with second hand
- sharp pencil
- sheet of clean paper

Student Procedure

1. One thousand is 10^3. One million is 10^6. One billion is 10^9That is 1,000,000,000 or one thousand million. Five billion would be five times that. The number of persons presently living on Earth is approximately five billion. The Earth is approximately 13 billion years old and has had life on it for almost five billion years. But how long is that?

   How long would it take you to put five billion dots on a piece of paper? Try putting as many dots as you can on a piece of paper in just 10 seconds. Go ahead–try it. Working with another person as a timer, time yourself tapping dots quickly on the paper for 10 seconds. Tap each dot so it is distinct and can be counted.
2. Count your dots. How many are there? Record that value and the following numbers you will calculate later.
3. Now that you have counted the number of dots you made in 10 seconds, estimate how many you could put on the paper in one minute.
4. Predict how long you think it would take you to be able to put five billion dots on a piece of paper.
5. Multiply your answer to #3 times the number of minutes in an hour.
6. Multiply that times the number of hours in a day.
7. Multiply that times the number of days in a year. What is your answer?
8. Assume that for 30 years you did nothing but put as many dots on a piece of paper as you could. (This would likely drive you crazy even if you actually could do it, but let's just pretend anyway.) How many total dots would you be able to tap in 40 years?
9. How close are you to five billion? Compare your number to five billion.

Assessment

What you have calculated is the number of **dots** you could put on paper during nearly half of a typical human lifetime. But to put just a dot on a paper took a fraction of a second. Assuming that every dot represented an entire year, how long does five billion years now seem to you?

In your own words, provide a description of the length of time represented by **five billion years**?

How does your description of how long five billion years is compare to the description by others in your class?

What other ways could you represent the passage of five billion years? For example, if 1 mm on a 94-meter football field represented one year, approximately how many football fields would you need to represent five billion years? Think about other ways to represent five billion of something else.•

BIO

WILLIAM H. LEONARD, Ph.D., is Emeritus Professor of Science Education at Clemson University, Clemson, SC 29664 and Interim Editor of *The American Biology Teacher*; e-mail: leonard@clemson.edu.