# POWERS OF TEN

## Purpose

This video gives you a quick look into how different things appear from different distances—or, in other words, how scale impacts our viewpoint. Understanding scale is a key part of Big History, and this video is a great visual overview of how changing scales can impact what we understand. As a part of this, you will also learn about scientific notation. If you've already learned scientific notation, this will be a quick review. If you haven't, you'll quickly see how useful it is.

## Process

Have a piece of paper and a pencil ready. You'll need this while watching the video.

As the video zooms out and in, write the number that corresponds to each zoom in the area below on this page.

For example, you'll start at 1, then go to 10, then to 100, and so on. You have to rewrite the number each time. You can't just add on zeros to the original number. Try to keep up as long as you can—this isn't as easy as it seems!

Now, think about the following questions and discuss with your class. You might want to use the Notations and Measures Infographic.

1. When you want to add three zeros to a number, such as going from 1,000 to 1,000,000, how many additional powers of 10 are required?
2. What makes a billionth different from a billion or a hundredth different from a hundred?
3. When you write out $10^2$ or $10^3$, do you write the zeros before or after the 1?
4. When you write out $10^{-2}$ or $10^{-3}$, do you write the zeros before or after the 1?
5. If you had to write out the number $10^{-17}$, how many zeros would you write and would you put them before the 1 or after the 1?