## Lesson 11: Representing Small Numbers on the Number Line

Let’s visualize small numbers on the number line using powers of 10.

### 11.1: Small Numbers on a Number Line

Kiran drew this number line.



Andre said, “That doesn’t look right to me.”

Explain why Kiran is correct or explain how he can fix the number line.

### 11.2: Comparing Small Numbers on a Number Line



1. Label the tick marks on the number line.
2. Plot the following numbers on the number line:
* A. $6⋅10^{-6}$
* B. $6⋅10^{-7}$
* C. $29⋅10^{-7}$
* D. $\left(0.7\right)⋅10^{-5}$
1. Which is larger, $29⋅10^{-7}$ or $6⋅10^{-6}$? Estimate how many times larger.
2. Which is larger, $7⋅10^{-8}$ or $3⋅10^{-9}$? Estimate how many times larger.

### 11.3: Atomic Scale

1. The radius of an electron is about 0.0000000000003 cm.
	1. Write this number as a multiple of a power of 10.
	2. Decide what power of 10 to put on the right side of this number line and label it.
	3. Label each tick mark as a multiple of a power of 10.
	* 
	1. Plot the radius of the electron in centimeters on the number line.
2. The mass of a proton is about 0.0000000000000000000000017 grams.
	1. Write this number as a multiple of a power of 10.
	2. Decide what power of 10 to put on the right side of this number line and label it.
	3. Label each tick mark as a multiple of a power of 10.
	* 
	1. Plot the mass of the proton in grams on the number line.
3. Point $A$ on the zoomed-in number line describes the wavelength of a certain X-ray in meters.
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	1. Write the wavelength of the X-ray as a multiple of a power of 10.
	2. Write the wavelength of the X-ray as a decimal.

### Lesson 11 Summary

The width of a bacterium cell is about $2⋅10^{-6}$ meters. If we want to plot this on a number line, we need to find which two powers of 10 it lies between. We can see that $2⋅10^{-6}$ is a multiple of $10^{-6}$. So our number line will be labeled with multiples of $10^{-6}$



Note that the right side is labeled $10⋅10^{-6}=10^{-5}$

The power of ten on the right side of the number line is always *greater* than the power on the left. This is true for powers with positive or negative exponents.



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