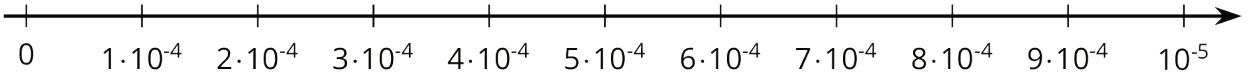
Lesson 11: Representing Small Numbers on the Number Line

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

11.1: Small Numbers on a Number Line

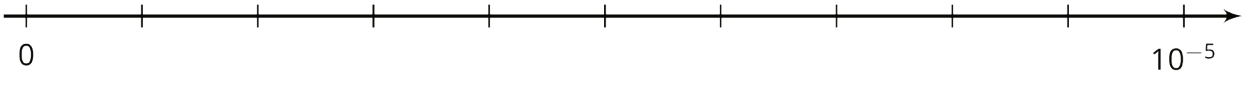
Kiran drew this number line.



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. $6 \cdot 10^{-6}$ B. $6 \cdot 10^{-7}$ C. $29 \cdot 10^{-7}$ D. $(0.7) \cdot 10^{-5}$

3. Which is larger, $29 \cdot 10^{-7}$ or $6 \cdot 10^{-6}$? Estimate how many times larger.

4. Which is larger, $7 \cdot 10^{-8}$ or $3 \cdot 10^{-9}$? Estimate how many times larger.

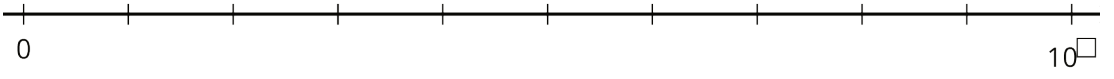
11.3: Atomic Scale

1. The radius of an electron is about 0.0000000000003 cm.

   a. Write this number as a multiple of a power of 10.

   b. Decide what power of 10 to put on the right side of this number line and label it.

   c. Label each tick mark as a multiple of a power of 10.



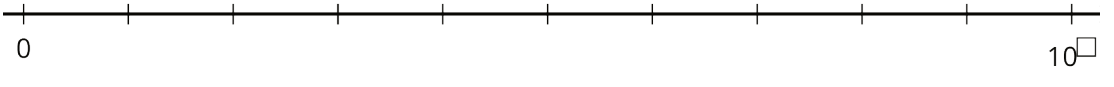
   d. Plot the radius of the electron in centimeters on the number line.

2. The mass of a proton is about 0.000000000000000000000017 grams.

   a. Write this number as a multiple of a power of 10.

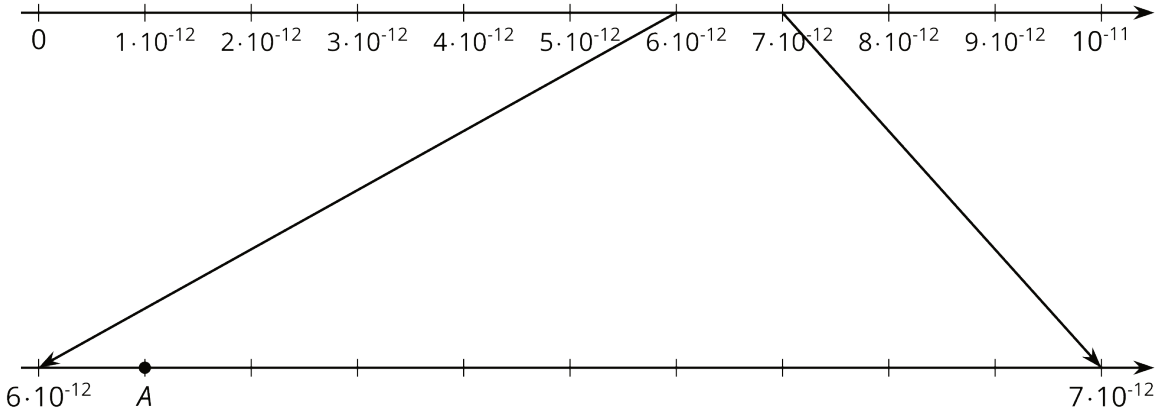
   b. Decide what power of 10 to put on the right side of this number line and label it.

   c. Label each tick mark as a multiple of a power of 10.



   d. 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.



a. Write the wavelength of the X-ray as a multiple of a power of 10.

b. Write the wavelength of the X-ray as a decimal.

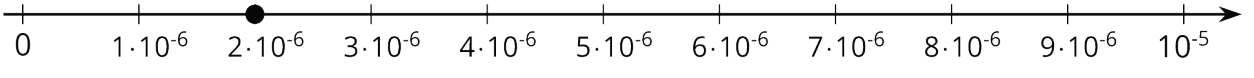
Lesson 11 Summary

The width of a bacterium cell is about

$$2 \cdot 10^{-6}$$

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 $2 \cdot 10^{-6}$ 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

$$10 \cdot 10^{-6} = 10^{-5}$$

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.