

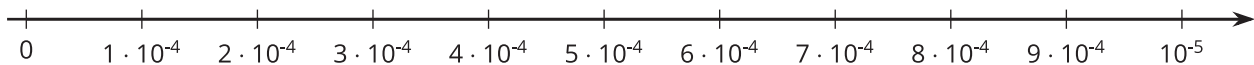


# Representing Small Numbers on the Number Line

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

## 11.1 Small Numbers on a Number Line

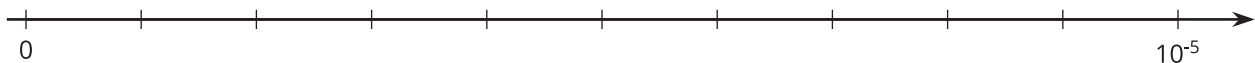
Kiran drew this number line.



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

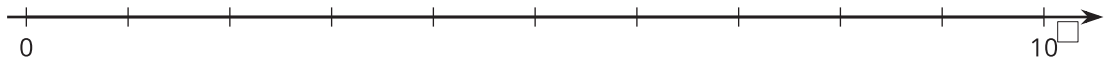


1. Label the tick marks on the number line.
2. Plot the following numbers on the number line:  
 A.  $6 \cdot 10^{-6}$       B.  $6 \cdot 10^{-7}$       C.  $29 \cdot 10^{-7}$       D.  $(0.7) \cdot 10^{-5}$
3. Which is larger,  $29 \cdot 10^{-7}$  or  $6 \cdot 10^{-6}$ ? Estimate how many times larger.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

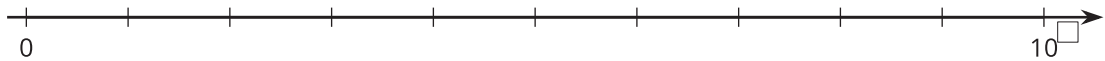
## 11.3

## Atomic Scale

1. The radius of an electron is about 0.00000000000003 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.

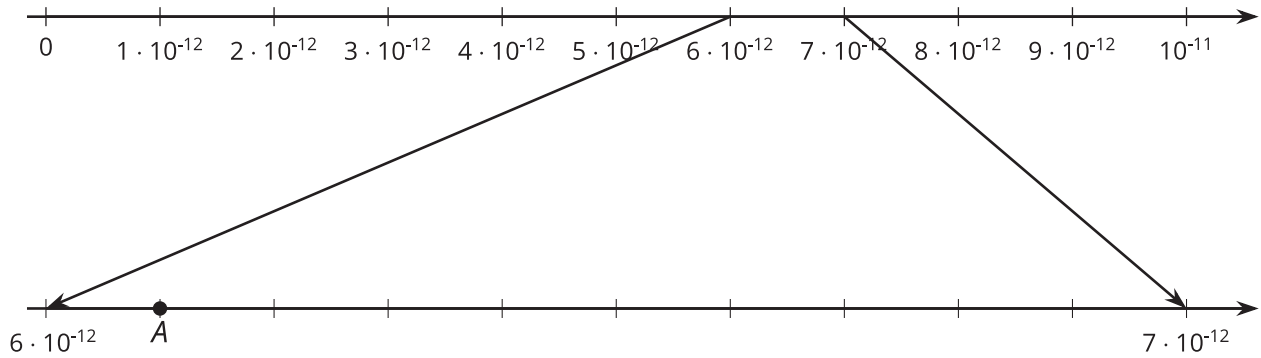


- d. Plot the radius of the electron in centimeters on the number line.
2. The mass of a proton is about 0.000000000000000000000017 grams.
  - a. Write this number as a multiple of a power of 10.
  - b. Decide what power of 10 to put on the right side of this number line and label it.
  - c. Label each tick mark as a multiple of a power of 10.



- d. Plot the mass of the proton in grams on the number line.

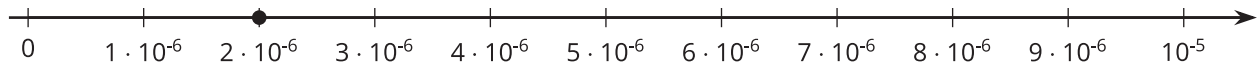
3. Point  $A$  on the zoomed-in number line describes the wavelength of a certain X-ray in meters.



- Write the wavelength of the X-ray as a multiple of a power of 10.
- 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  $10^{-5}$  because  $10^{-6} \cdot 10 = 10^{-5}$ .

The power of 10 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.