## Lesson 2: Points on the Number Line

Let’s plot positive and negative numbers on the number line.

### 2.1: A Point on the Number Line

Which of the following numbers could be $B$?



2.5

$\frac{2}{5}$

$\frac{5}{2}$

$\frac{25}{10}$

2.49

### 2.2: What’s the Temperature?

1. Here are five thermometers. The first four thermometers show temperatures in Celsius. Write the temperatures in the blanks.
* 
* The last thermometer is missing some numbers. Write them in the boxes.
1. Elena says that the thermometer shown here reads $-2.5^{∘}C$ because the line of the liquid is above $-2^{∘}C$. Jada says that it is $-1.5^{∘}C$. Do you agree with either one of them? Explain your reasoning.
* 
1. One morning, the temperature in Phoenix, Arizona, was $8^{∘}C$ and the temperature in Portland, Maine, was $12^{∘}C$ cooler. What was the temperature in Portland?

### 2.3: Folded Number Lines

Your teacher will give you a sheet of tracing paper on which to draw a number line.

1. Follow the steps to make your own number line.
	* Use a straightedge or a ruler to draw a horizontal line. Mark the middle point of the line and label it 0.
	* To the right of 0, draw tick marks that are 1 centimeter apart. Label the tick marks 1, 2, 3. . . 10. This represents the positive side of your number line.
	* Fold your paper so that a vertical crease goes through 0 and the two sides of the number line match up perfectly.
	* Use the fold to help you trace the tick marks that you already drew onto the opposite side of the number line. Unfold and label the tick marks -1, -2, -3. . . -10. This represents the negative side of your number line.
2. Use your number line to answer these questions:
	1. Which number is the same distance away from zero as is the number 4?
	2. Which number is the same distance away from zero as is the number -7?
	3. Two numbers that are the same distance from zero on the number line are called **opposites**. Find another pair of opposites on the number line.
	4. Determine how far away the number 5 is from 0. Then, choose a positive number and a negative number that is each farther away from zero than is the number 5.
	5. Determine how far away the number -2 is from 0. Then, choose a positive number and a negative number that is each farther away from zero than is the number -2.
* Pause here so your teacher can review your work.
1. Here is a number line with some points labeled with letters. Determine the location of points $P$, $X$, and $Y$.
* 
* If you get stuck, trace the number line and points onto a sheet of tracing paper, fold it so that a vertical crease goes through 0, and use the folded number line to help you find the unknown values.

#### Are you ready for more?

​At noon, the temperatures in Portland, Maine, and Phoenix, Arizona, had opposite values. The temperature in Portland was $18^{∘}C$ lower than in Phoenix. What was the temperature in each city? Explain your reasoning.

### Lesson 2 Summary

Here is a number line labeled with positive and negative numbers. The number 4 is positive, so its location is 4 units to the right of 0 on the number line. The number -1.1 is negative, so its location is 1.1 units to the left of 0 on the number line.



We say that the *opposite* of 8.3 is -8.3, and that the *opposite* of $\frac{-3}{2}$ is $\frac{3}{2}$. Any pair of numbers that are equally far from 0 are called **opposites**.

Points $A$ and $B$ are opposites because they are both 2.5 units away from 0, even though $A$ is to the left of 0 and $B$ is to the right of 0.



A positive number has a negative number for its opposite. A negative number has a positive number for its opposite. The opposite of 0 is itself.

You have worked with positive numbers for many years. All of the positive numbers you have seen—whole and non-whole numbers—can be thought of as fractions and can be located on a the number line.

To locate a non-whole number on a number line, we can divide the distance between two whole numbers into fractional parts and then count the number of parts. For example, 2.7 can be written as $2\frac{7}{10}$. The segment between 2 and 3 can be partitioned into 10 equal parts or 10 tenths. From 2, we can count 7 of the tenths to locate 2.7 on the number line.

All of the fractions and their opposites are what we call**rational numbers**. For example, 4, -1.1, 8.3, -8.3, $\frac{-3}{2}$, and $\frac{3}{2}$ are all rational numbers.



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