1 | Human Number Line

LESSON 1

Human Number Line

Introduction to Negative Numbers

KEY TERMS

negative numbers

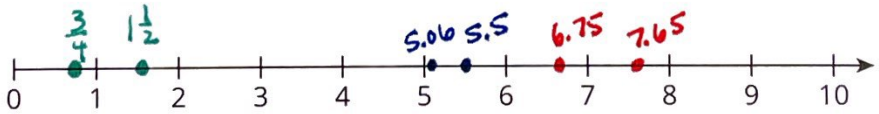
infinity

Learning Goals

- Use positive and negative numbers to describe quantities having opposite directions.
- Explain the meaning of 0 in contexts represented by positive and negative numbers.
- Identify and represent a number and its opposite on a number line.
- Represent, interpret, and order positive and negative integers and other rational numbers using number lines and inequality statements.

REVIEW (1–2 minutes)

› Use the number line to plot and compare each pair of numbers. Then, insert a > or < symbol to make each inequality statement true.



1. $\frac{3}{4} < 1\frac{1}{2}$
2. $5.5 > 5.06$
3. $7.65 > 6.75$

You have used numbers equal to or greater than 0 to represent real-world situations.

How can you use numbers less than 0 to describe real-world situations?

Investigating Time on a Number Line

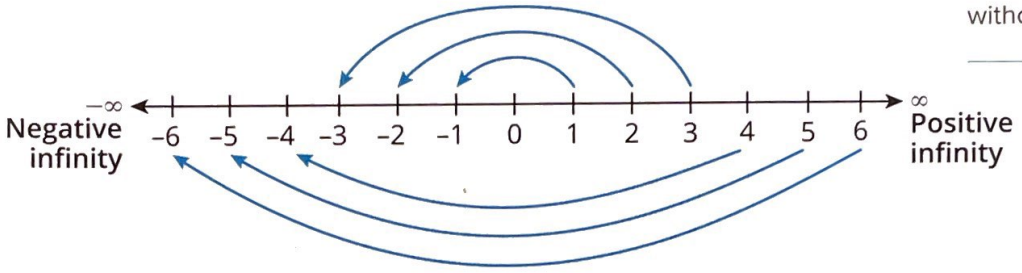
HABITS OF MIND
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.

You can reflect the positive numbers on a number line across 0 to create a number line with *negative numbers*.

Negative numbers are to the left of 0 on the number line.

Positive numbers extend to positive *infinity*, and negative numbers extend to negative *infinity*. **Infinity**, represented by the symbol ∞, means a quantity with no end or bound.
The number line goes on forever in both directions!

TAKE NOTE...
You write a negative number with a negative sign. You can write a positive number with a positive sign or without any sign.



1. Describe the change in the values of the numbers as you move to the right on the number line.

The numbers get larger

2. Describe the change in the values of the numbers as you move to the left on the number line.

The numbers get smaller

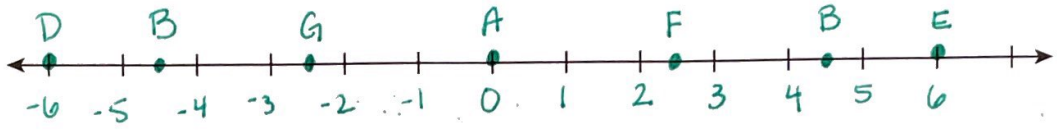
Representing Opposites on a Number Line

HABITS OF MIND
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Let's think more about both sides of 0 on a number line.

Your teacher will model a number line.

1 Create and label a number line according to the model.



2 Plot and label the location where each student stands on the number line. In the table, identify the value represented by the location where the student is standing.

- **Student A:** Stand at 0.
- **Student B:** Stand at 4.5.
- **Student C:** Stand at the opposite of 4.5.
- **Student D:** Stand at −6.
- **Student E:** Stand at the opposite of −6.
- **Student F:** Stand at a location between 2 and 3.
- **Student G:** Stand at the location that is the opposite of Student F.

Student	Value
A	0
B	4.5
C	-4.5
D	-6
E	6
F	2.5
G	-2.5

3 Describe the number line relationship of the students who were opposites of each other.

They are the same distance from zero just on different sides of zero

Opposite numbers are reflections of each other across 0 on the number line.

- The opposite of a positive number is a corresponding negative number.
- The opposite of a negative number is a corresponding positive number.

THINK ABOUT...
There is only one number that is its own opposite.

Attaching a negative sign to a number means reflecting that number across 0 on the number line.

4 Use symbols to represent the opposite of each number and the value it represents.

(a) $-(4.5) =$ -4.5 (the opposite)

(b) $-(-6) =$ 6 (the opposite)

5 What do you notice about the distance from 0 of corresponding opposite numbers?

They are the same distance from zero

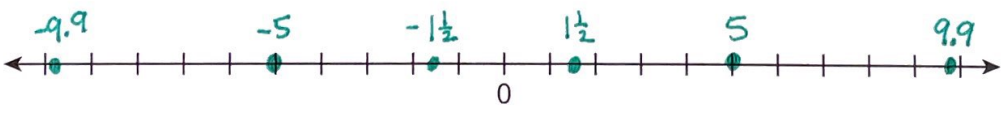
6 What is the opposite of 0?

0, it is its own opposite

7 Name the opposite of each number. Then plot each number and its opposite on the number line.

(a) $1\frac{1}{2}$ $-1\frac{1}{2}$ (b) -5 5 (c) -9.9 9.9

REMEMBER...
Don't forget to label the number line!



Representing Money on a Number Line

The value 0 can have different meanings depending on how you interpret a situation.

HABITS OF MIND

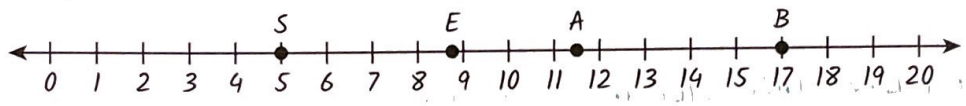
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.

Alyson and her friends are trying to decide whether they can go to the movies. Each ticket costs $9.00. Each friend comments on how much money they have.

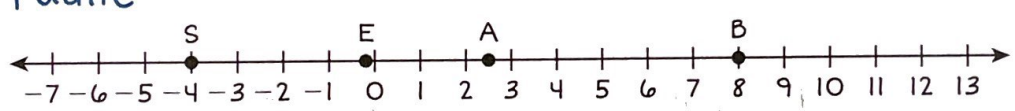
- Alyson: I have $2.50 more than the movie costs. → $11.50
- Sharon: Oh, I don't have enough money. I'm $4.00 short. → $5
- Brian: Not only can I buy a ticket, but I have just enough money to buy the $8.00 snack combo! → $17
- Eileen: If I can find one more quarter, I can go. → $8.75

Myron and Paulie created different number lines to represent the scenario.

Myron



Paulie



› Analyze each representation of the scenario.

1. What does each point represent on Myron's number line?

Myron's number line points represents the total amount of money each person has

2. What does each point represent on Paulie's number line?

Paulie's number line points represents whether each person has enough money for the movies. To the right of zero (positive) you have enough money (and extra). To the left of zero (negative) you don't have enough money to see the movie.

3. Myron and Paulie are thinking about 0 differently. Explain what 0 represents on each number line.

Myron's zero represents $0

Paulie's zero represents the cost of a movie ticket ($9)

4. Suppose the four friends decide to go to a matinee instead, where the ticket price is $7.50.

   (a) How would Myron's number line change?

Myron's number line doesn't change.

DID YOU KNOW?
A matinee is a movie played at a theater in the afternoon.

   (b) How would Paulie's number line change?

All points would move 1.5 to the right.