

Today you will need the following:

- **Pencil**
- **Text Book**
- **Vocabulary Sheet**
- **Corrected Homework Sheet**
- **Graph Notebooks**

2.2 Extending Subtraction to Rational Numbers

In Problem 2.1, you explored some important properties of rational numbers. You found that the Commutative Property is true for addition of rational numbers.

You also found that the sum of an integer and its opposite is 0.

$$50 + ^{-}50 = 0 \quad ^{-}17 + 17 = 0$$

Numbers such as 50 and -50 are **additive inverses** of each other. Their sum is 0. Zero is the **additive identity** for rational numbers. This means that zero added to a number does not change the value of the number.

$$^{-}7 + 0 = ^{-}7 \quad \frac{1}{2} + 0 = \frac{1}{2}$$

These properties will be useful as you explore subtraction problems with rational numbers.

As a team, answer the questions on page 38.
Record the answers in your graph paper.

D Apply the algorithm you developed on these rational number problems.

1. $-1 - +3$

2. $-1 - \frac{+3}{4}$

3. $-1\frac{1}{2} - -2$

4. $-1\frac{1}{2} - \frac{-3}{4}$

Class Work Answers:

D. 1. $-1 - +3 = -4$

2. $-1 - +\frac{3}{4} = -1\frac{3}{4}$ OR $-\frac{7}{4}$

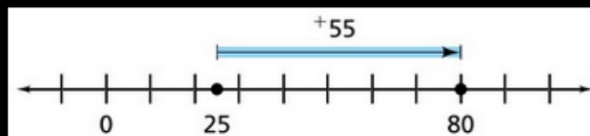
3. $-1\frac{1}{2} - -2 = +\frac{1}{2}$

4. $-1\frac{1}{2} - -\frac{3}{4} = -\frac{3}{4}$

You can also use subtraction to find the distance between two points:

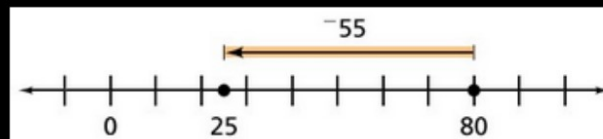
The Arroyo family just passed mile 25 on the highway. They need to get to the exit at mile 80.

You can use a number line to show this difference.



The number line above shows that they have to travel $80 - 25 = 55$ more miles. The arrow on the number line points in the direction that the Arroyos are traveling. They are traveling in a positive direction, from lesser values to greater values.

Suppose the Arroyos drive back from mile 80 to mile 25. They would travel the same distance as before. However, they would travel in the opposite direction.



The number line above represents the Arroyos' distance as $25 - 80 = -55$ miles. In this case, the arrow on the number line points to the left and has a label of -55 . Their distance is 55, but their direction is negative.

In some situations, such as driving, it makes more sense to describe an overall distance without including the direction. You can find the Arroyos' overall distance by taking the **absolute value** of the difference between the two points on the number line.

You can write two absolute value expressions to represent the distance between 25 and 80:

$$|25 - 80| \text{ and } |80 - 25|$$

You can evaluate these two expressions to show that the distance between the points 25 and 80 on a number line is 55.

$$|25 - 80| = |-55| = 55 \text{ and } |80 - 25| = |55| = 55$$

absolute value

A number's distance from zero on a number line, and the value of a number when its sign is ignored.

ex:

absolute value 3 and -3

$$|3| = 3$$

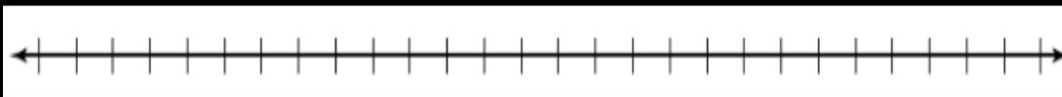
$$|-3| = 3$$

E 1. Consider the points -10 and 5 on a number line.

a. Write two absolute value expressions to represent the distance between these two points.

b. Evaluate both of your expressions. What is the distance between the points -10 and 5 on a number line?

c. Draw a number line to represent the distance you found in part (b).



2. Write two absolute value expressions for the distance between the two points on the number line below. Then evaluate your expressions.



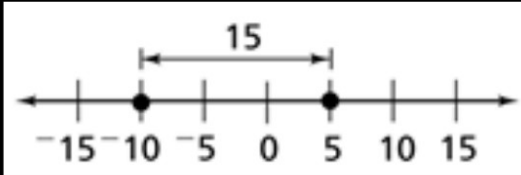
Class Work Answers:

E. 1a. $|-10 - 5|$ and $|5 - -10|$

b. $|-10 - 5| = |-15| = 15$ and

$$|5 - -10| = |15| = 15$$

c.



2. $|-20 - -14| = |-6| = 6$ and

$$|-14 - -20| = |6| = 6$$

Homework:

p.45 #18-29

(write number sentences to show work)