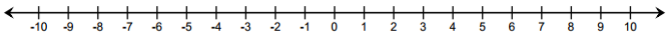
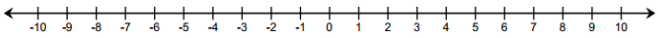
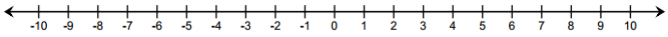
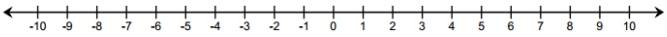
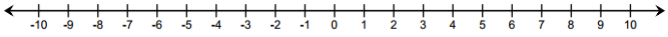
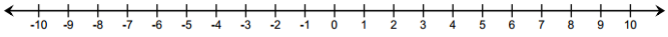
Lesson 6: The Distance Between Two Rational Numbers

Classwork

Exercise 1

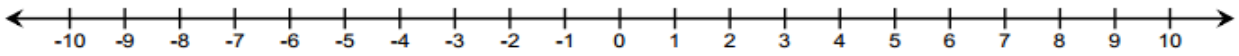
Use the number line to answer each of the following:

Person A	Person B
What is the distance between -4 and 5? 	What is the distance between 5 and -4? 
What is the distance between -5 and -3? 	What is the distance between -3 and -5? 
What is the distance between 7 and -1? 	What is the distance between -1 and 7? 

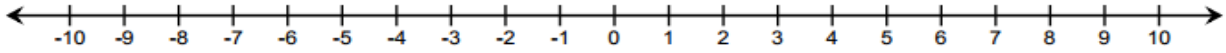
Exercise 2

Use the number line to answer each of the following:

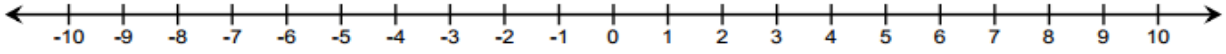
a. What is the distance between 0 and -8?



b. What is the distance between -2 and $-1\frac{1}{2}$?



c. What is the distance between -6 and -10?

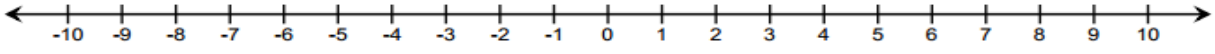


Example 1: Formula for the Distance Between Two Rational Numbers

Find the distance between –3 and 2.

The steps are:

1. Start on -3.
2. Count the number of units from -3 to 2.



Using a formula: _____

For two rational numbers p and q, the distance between p and q is $|p - q|$.

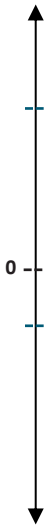
Example 2: Change in Elevation vs. Distance

Distance is positive. Change in elevation or temperature may be positive or negative depending on whether it is increasing or decreasing (going up or down).

1. A hiker starts hiking at the beginning of a trail at a point which is 200 feet below sea level. He hikes to a location on the trail that is 580 feet above sea level and stops for lunch.
   a. What is the vertical distance between 200 feet below sea level and 580 feet above sea level?

   b. How should we interpret 780 feet in the context of this problem?

2. After lunch, the hiker hiked back down the trail from the point of elevation, which is 580 feet above sea level, to the beginning of the trail which is 200 feet below sea level.



a. What is the vertical distance between 580 feet above sea level and 200 feet below sea level?

b. What is the change in elevation?

Exercise 3

The distance between a negative number and a positive number is $12\frac{1}{2}$. What are the numbers?

Exercise 4

Use the distance formula to find each answer. Support your answer using a number line diagram.

a. Find the distance between -7 and -4.

b. Find the change in temperature if the temperature rises from -18°F to 15°F (use a vertical number line).

c. Would your answer for part (b) be different if the temperature dropped from 15°F to -18°F?

d. Beryl is the first person to finish a 5K race and is standing 15 feet beyond the finish line. Another runner, Jeremy, is currently trying to finish the race and has approximately 14 feet before he reaches the finish line. What is the minimum possible distance between Beryl and Jeremy?

e. What is the change in elevation from 140 feet above sea level to 40 feet below sea level? Explain.

Lesson Summary

- To find the distance between two rational numbers on a number line, you can count the number of units between the numbers.
- Using a formula, the distance between rational numbers, p and q, is $|p - q|$.
- Distance is always positive.
- Change may be positive or negative. For instance, there is a -4° change when the temperature goes from 7° to 3°.

Problem Set

1. $|-19 - 12|$
2. $|19 - (-12)|$
3. $|10 - (-43)|$
4. $|-10 - 43|$
5. $|-1 - (-16)|$
6. $|1 - 16|$
7. $|0 - (-9)|$
8. $|0 - 9|$
9. $|-14.5 - 13|$
10. $|14.5 - (-13)|$
11. Describe any patterns you see in the answers to the problems in the left and right-hand columns. Why do you think this pattern exists?