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 questions.

1. What is the distance between $0$ and $-8$?



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



1. What is the distance between $-6$ and $-10$?



Example 1: Formula for the Distance Between Two Rational Numbers

Find the distance between –$3$ and $2$.

Step 1: Start on an endpoint.

Step 2: Count the number of units from the endpoint you started on to the other endpoint.



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.
		1. What is the vertical distance between $200$ feet below sea level and $580$ feet above sea level?
		2. 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.

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* + 1. What is the vertical distance between $580$ feet above sea level and $200$ feet below sea level?
		2. 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.

* 1. Find the distance between $-7$ and $-4$.
	2. Find the change in temperature if the temperature rises from $-18°F$ to $15°F$ (use a vertical number line).
	3. Would your answer for part (b) be different if the temperature dropped from $15°F$ to $-18°F$? Explain.
	4. Beryl is the first person to finish a $5$K 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?
	5. What is the change in elevation from $140$ feet above sea level to $40$ feet below sea level? Explain.

Problem Set

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 $3$◦.

|  |  |
| --- | --- |
| 1. $\left|-19-12\right|$
 | 1. $\left|19-\left(-12\right)\right|$
 |
| 1. $\left|10-\left(-43\right)\right|$
 | 1. $\left|-10-43\right|$
 |
| 1. $\left|-1-\left(-16\right)\right|$
 | 1. $\left|1-16\right|$
 |
| 1. $\left|0-\left(-9\right)\right|$
 | 1. $\left|0-9\right|$
 |
| 1. $\left|-14.5-13\right|$
 | 1. $\left|14.5-\left(-13\right)\right|$
 |

1. 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?