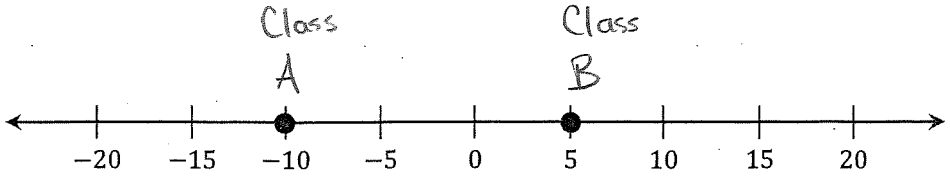
Teacher Copy.

Lesson 9: Comparing Integers and Other Rational Numbers

Classwork

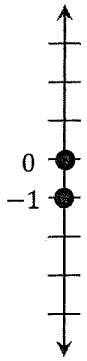
Example 1: Interpreting Number Line Models to Compare Numbers



Every year, Mrs. Carley's class goes on a 40 mile hike. At the half way point (20 miles into the hike), there is a check point station. Mrs. Carley has split her classes into two groups A and B. By Wednesday, Class A has 10 miles to go before reaching the check point & Class B is 5 miles beyond the check point station. Zero on the # line = Check point station

Exercises

1. Create a real-world situation that relates to the points shown in the number line model. Be sure to describe the relationship between the values of the two points and how it relates to their order on the number line.



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For each problem, determine if you *agree or disagree* with the representation. Then, defend your stance by citing specific details in your writing.

2. Felicia needs to write a story problem that relates to the order in which the numbers $-6\frac{1}{2}$ and -10 are represented on a number line. She writes the following:

   "During a recent football game, our team lost yards on two consecutive downs. We lost $6\frac{1}{2}$ yards on the first down. During the second down, our quarterback was sacked for an additional 10-yard loss. On the number line, I represented this situation by first locating $-6\frac{1}{2}$. I located the point by moving $6\frac{1}{2}$ units to the left of zero. Then, I graphed the second point by moving 10 units to the left of 0."

Agree. -10 is less than $-6\frac{1}{2}$. Since both numbers are negative, they indicate the team lost yards on both football plays, but they lost more yards on the second play.

3. Manuel looks at a number line diagram that has the points $-\frac{3}{4}$ and $-\frac{1}{2}$ graphed. He writes the following related story:

   "I borrowed 50 cents from my friend, Lester. I borrowed 75 cents from my friend, Calvin. I owe Lester less than I owe Calvin."

Agree. $-3/4$ is equivalent to -0.75 and $-1/2$ is equivalent to -0.50. -0.50 and -0.75 both show that he owes money. But -0.50 is further to the right on the # line, so Manuel does not owe Lester as much as he owes Calvin.

4. Henry located $2\frac{1}{4}$ and 2.1 on a number line. He wrote the following related story:

   "In gym class, both Jerry and I ran for 20 minutes. Jerry ran $2\frac{1}{4}$ miles, and I ran 2.1 miles. I ran a farther distance."

Disagree. $2\frac{1}{4}$ is greater than 2.1 since $2\frac{1}{4}$ is equivalent to 2.25. On the number line, the point associated with 2.25 is to the right of 2.1. Jerry ran a farther distance.

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5. Sam looked at two points that were graphed on a vertical number line. He saw the points -2 and 1.5. He wrote the following description:

"I am looking at a vertical number line that shows the location of two specific points. The first point is a negative number, so it is below zero. The second point is a positive number, so it is above zero. The negative number is -2. The positive number is $\frac{1}{2}$ unit more than the negative number."

Disagree: Sam was right when the negative # is below zero & the positive number is 3½ units more than -2.

6. Claire draws a vertical number line diagram and graphs two points: -10 and 10. She writes the following related story:

"These two locations represent different elevations. One location is 10 feet above sea level, and one location is 10 feet below sea level. On a number line, 10 feet above sea level is represented by graphing a point at 10, and 10 feet below sea level is represented by graphing a point at -10."

Agree: Zero in this problem represents sea level. Both locations are 10 ft from zero but in opposite directions so they are graphed on the number line at 10 & -10.

7. Mrs. Kimble, the sixth-grade math teacher, asked the class to describe the relationship between two points on the number line, 7.45 and 7.5, and to create a real-world scenario. Jackson writes the following story:

"Two friends, Jackie and Jennie, each brought money to the fair. Jackie brought more than Jennie. Jackie brought \$7.45, and Jennie brought \$7.50. Since 7.45 has more digits than 7.5, it would come after 7.5 on the number line, or to the right, so it is a greater value."

Disagree: Jackson is wrong by saying that 7.45 is to the right of 7.5 on the # line. 7.5 is the same as 7.50, & it is greater than 7.45.

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8. Justine graphs the points associated with the following $\frac{1}{2}$ numbers on a vertical number line: $-1\frac{1}{4}$, $-1\frac{1}{2}$, and 1. She then writes the following real-world scenario:

"The nurse measured the height of three sixth-grade students and compared their heights to the height of a typical sixth grader. Two of the students' heights are below the typical height, and one is above the typical height. The point whose coordinate is 1 represents the student who has a height that is 1 inch above the typical height. Given this information, Justine determined that the student represented by the point associated with $-1\frac{1}{4}$ is the shortest of the three students."

Disagree: Justine was wrong with -1 1/4 representing the shortest of the three students. If 0 stands for no change from the typical height, than the point -1 1/2 is farther below zero than the point -1 1/4. The greatest value is positive 1. 1 represents the tallest person. The shortest person is represented by -1 1/2.

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