LESSON 2

Objective

Represent, compare, and order integers.

Common Core State Standards

- **6.NS.5** Understanding that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- **6.NS.6a** Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.
- **6.NS.6c** Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs or integers and other rational numbers on a coordinate plane.
- **6.NS.7a** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.*
- **6.NS.7b** Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3°C > –7°C to express the fact that –3°C is warmer than –7°C.*

Introduction to Integers

Students are typically introduced to negative numbers using temperatures below zero, losses in games, and money owed. The concepts of *magnitude, direction,* and *opposites* are important for understanding integers. Students can think about an integer as a distance (the magnitude, or absolute value) in one or the other direction on the number line. Numbers to the right of zero are positive, and numbers to the left of zero are negative. A number some distance from zero in one direction is the opposite of the number the same distance from zero in the other direction.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- Discuss the correct way to say negative numbers—for example, *negative four* for –4. **Ask:** *What situations can you represent using negative integers?*
- **Ask:** *What is the opposite of 3? –4? 0?* Have students represent the integers and their opposites on a number line. Point out that 0 is neither positive nor negative and is its own opposite.
- **Ask:** *Is it possible for a positive integer to be less than a negative integer? Why or why not?* **Say:** *Explain why –4 is less than –1.*

Solve It

Reread the problem with students. Have them explain how they know that 3 is the first-place score and –4 is the last-place score for the round.

More Ideas

For other ways to teach integers—

- Have students use a vertical number line (BLM 2 in portrait orientation) to show temperature or altitude, with tick marks representing increments of 1, 2, 5, or 10. With the number line as a guide, students use color tiles to represent temperatures or altitudes greater than or less than a given value. Have students use < or > to demonstrate comparisons between the integers.
- Have students use an integer number line (BLM 2) with only certain numbers labeled, such as –4, 0, and 4. Have them use Two-Color Counters to locate various integers on the number line, such as –3 or the opposite of 2. Have students write the integers below the tick marks.

Formative Assessment

Have students try the following problem.

Which of the following is the lowest altitude?

A. –32 meters **B.** –8 meters **C.** –3 meters **D.** 2 meters

Try It! 20 Minutes | Pairs

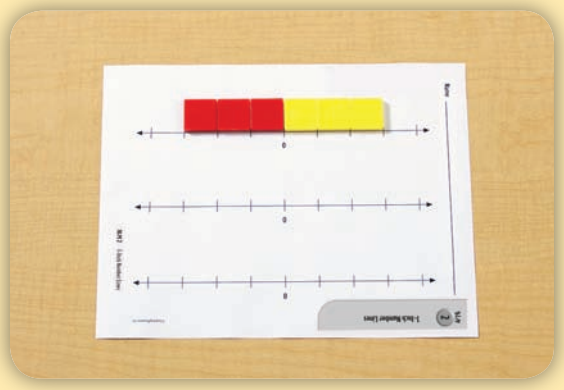
Here is a problem about representing and ordering integers.

Dustin, Kyle, and Emma are playing a word game. After one round of play, Dustin lost 4 points, Emma gained 3 points, and Kyle lost 1 point. How can you use integers to represent the scores for this round of play? Which scores represent first place and last place?

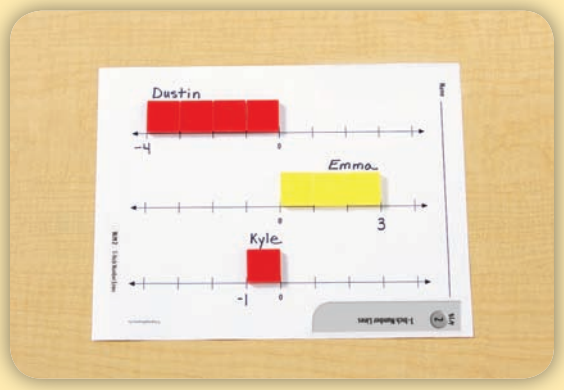
Introduce the problem. Then have students do the activity to solve the problem. Distribute Color Tiles, number lines sheets, paper, and pencils to students. Draw a number line from –4 to 4 on the board. Label the tick marks. Have students copy the numbering onto the number lines on the sheet.

Materials

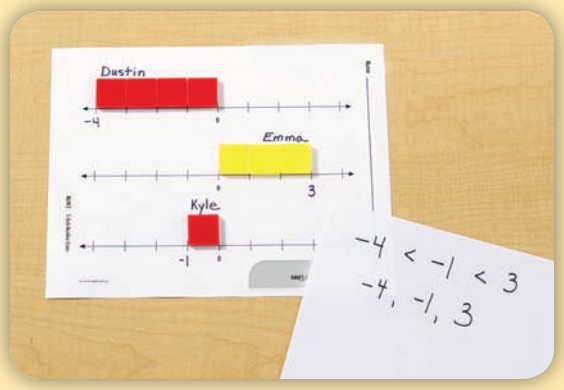
- Color Tiles (11 per pair)
- 1-Inch Number Lines (BLM 2; 1 per pair)
- paper (1 sheet per pair)
- pencils (1 per pair)



1. Say: *Integers are the counting numbers, their opposites, and 0.* Have students place 3 red tiles to the left of 0 and 3 yellow tiles to the right of 0 on the number line. **Say:** *–3 and 3 are opposites because they are the same distance from 0 on the number line.*



2. Say: *Negative integers can represent losses, below-zero temperatures, and below-sea-level altitudes.* **Ask:** *What do positive integers represent?* Have students represent the losses and gains from the game on the number lines.



3. Say: *You can use number lines to compare and order integers. The values of the numbers increase as you move left to right.* Have students use symbols to compare the three integers from the game. Then have them write the integers in order from least to greatest.

⚠ Look Out!

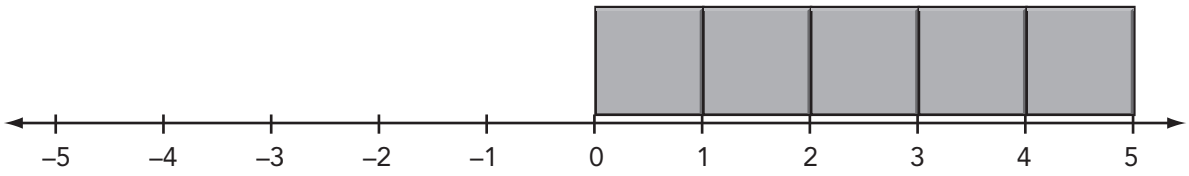
Some students may be confused by an integer such as –8 is less than –1. Use real-world contexts to help them see that the farther a negative integer is from 0, the less is its value. For example, the person who owes $8 has less money than the person who owes $1, or –8°F is below –1°F on the thermometer.

Answer Key

Use Color Tiles and a number line to model each integer. Write the integer.

(Check students' work.)

1.



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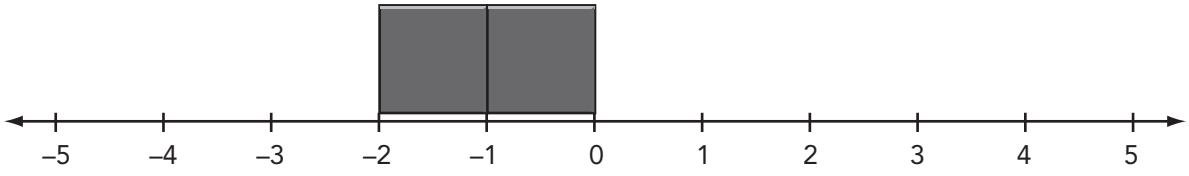
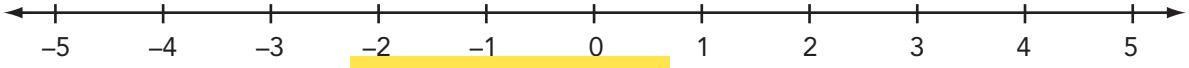
2.



–2

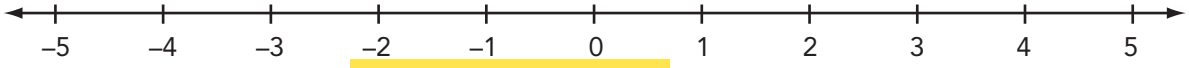
Using Color Tiles, model each integer. Sketch the model.

3. –4



Check students' model.

4. 1



Check students' model.

Use a number line to locate and compare each pair of integers. Write an inequality.

5. 5 > –2

6. –8 < –6

7. 9 > –9

8. 4 > 3

9. –10 < 11

10. –7 < –6

Use <, =, or > to complete each inequality.

11. 87 (>) –78

12. –31 (<) 28

13. –914 (=) –914

Answer Key

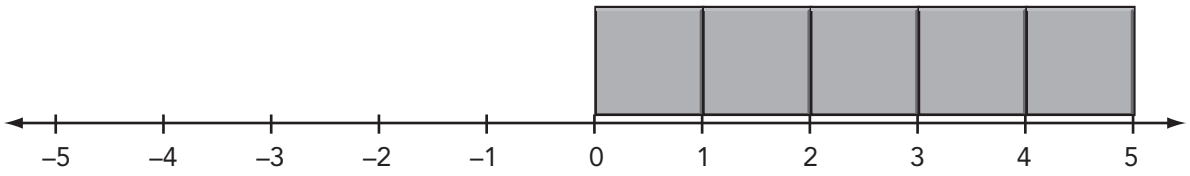
Challenge! When comparing integers, a number line is not always available or practical. Write guidelines you can use when comparing integers without a number line.

Challenge: (Sample) Negative numbers are always less than positive numbers. When comparing negative numbers, look at the number without the negative sign; the greater that number is, the lesser the negative number.

Name _____

Use Color Tiles and a number line to model each integer. Write the integer.

1.



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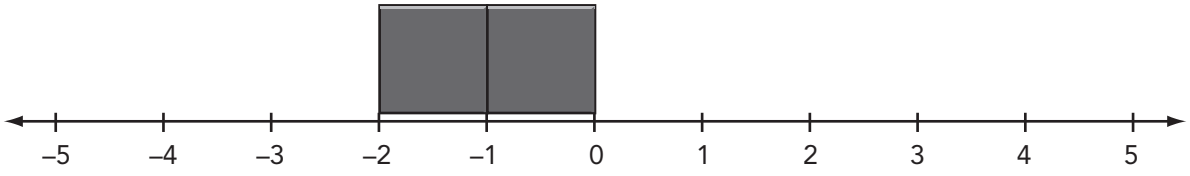
2.



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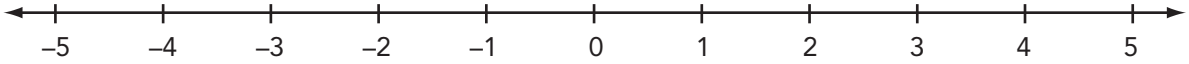
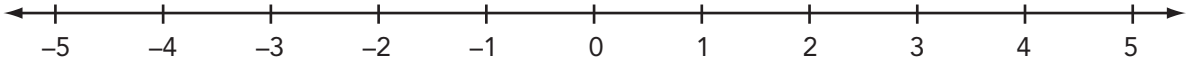


4. 1



Use a number line to locate and compare each pair of integers. Write an inequality.

5. 5 and –2

6. –8 and –6

7. 9 and –9

8. 4 and 3

9. –10 and 11

10. –7 and –6

Use <, =, or > to complete each inequality.

11. 87 ◯ –78

12. –31 ◯ 28

13. –914 ◯ –914

Name _____

Challenge! When comparing integers, a number line is not always available or practical. Write guidelines you can use when comparing integers without a number line.

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