POSITIVE AND NEGATIVE NUMBERS

A

Today's Destination
What is a negative number?

Vocabulary

Integers   The set of whole numbers and their opposites

Negative Number   A number that is less than zero

Plot   To draw a dot at a certain point on a number line or graph

Positive Number   A number that is greater than zero

Problem of the Day

How much money has Matt spent?   *$15.28*

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POSITIVE AND NEGATIVE NUMBERS

Objectives

By the end of this lesson:
- Students will know that negative numbers represent values less than zero.
- Students will be able to identify and represent positive and negative integers on a number line.

Vocabulary

Students will learn these terms during the lesson. However, you may wish to assess their prior knowledge before beginning the lesson. Ask students to write some examples of positive numbers and negative numbers on a piece of paper. Have volunteers read their examples and write them on the board. If appropriate, you may add some examples of positive and negative decimals and fractions. Then ask a volunteer to circle the integers only.

Problem of the Day

Invite students to try this problem; assess their responses.

Some students may still struggle with regrouping in subtraction. Encourage students to draw a place-value chart in order to line up the numbers 20 and 4.72. Help students get started by showing how to regroup two 10s into a 10 and ten 1s.

Introduce the lesson question: "What is a negative number?"

Connect the Problem of the Day to the lesson by pointing out that Matt had $20, spent $15.28, and was still left with money in his wallet ($4.72). Ask students what would have happened if Matt had spent $25—perhaps by borrowing money from Marta. Explain that the amount of money Matt had left would be described by a negative number.

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RULES OF THE ROAD
Instruction

approx. 20 min.

Delivery

Introduce the use of negative numbers to describe real-world situations.
- Read the introductory text and examples with students.
- Explain that negative numbers can be used to describe situations such as owing someone money, an elevation that is below sea level, or a temperature that is below 0°F.
- Emphasize that subtracting a greater number from a smaller number results in a negative difference.

Teacher's Note
Help students begin to make the connection between the concepts of negative numbers and subtraction. Point out that some people say, "It's negative 5 degrees," and others might say, "It's minus 5 degrees." Discuss the fact that the same symbol used for subtraction also denotes a negative number.

Strategies for Differentiation
Support for English Language Learners and Students with Special Needs

Developing Vocabulary
Lead a discussion about the definition of the word *negative*. Help students see that in both the real world and in mathematics, *negative* means something that is the opposite of its positive counterpart.

ELL
You may wish to quickly review the word *degrees* with students. Write −5° on the board. Then ask students what letters they sometimes see after the degree symbol. Students should reply that they see an *F* or a *C*. Tell students that both symbols represent temperature, but they use different scales. Note that some ELL students may be more familiar with the Celsius scale than the Fahrenheit scale.

Hands-On Activity
Place students in small groups and ask them to write a real-world scenario that involves negative numbers. Have students role-play the scenarios for the class.

A   RULES OF THE ROAD

Imagine that you have $20. However, you owe your older brother $15. You really have $5.

$$20 - 15 = 5$$

Now imagine that you have $15. However, you owe your older brother $20.

$$15 - 20 = -5$$

Even if you give your brother all your money, you will still owe him $5. You can describe the money you really have as −5 dollars. The number −5 has a value *less* than zero.

Write It! −5

Say It! *"negative five"*

The number −5 can be used to describe each situation below.

Elevation

Since sea level is considered to have an elevation of 0 feet, we can use −5 to describe an elevation of 5 feet *below* sea level.

Temperature

A temperature of 5 degrees below 0 can be described using the negative number −5.

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✎ TEST DRIVE
Standardized Test Practice

approx. 5 min. 🕐

Delivery

Have students solve the problems independently. If any students' responses indicate misunderstanding of the lesson content, you may wish to reteach this topic to a smaller group while the rest of the class completes the Side Trips section of the lesson.

Answer Analysis

1   B

Students can find the symbol at -2 by counting two units to the left of zero.

A   Students may have counted two units to the left of the circle.

C   Students may have counted two units to the right of zero.

D   Students may have counted two units to the right of the trapezoid.

2   F

Students can draw a number line to organize the same set of numbers in each answer choice. Then they can choose the answer that shows the numbers in order from least to greatest.

G   Students may have ordered the negative numbers by their absolute values without understanding the significance of the negative symbol.

H   Students may have ordered the numbers as if they were all positive values.

J   Students may have ordered the negative numbers correctly with the exception of zero.

A   ✎ TEST DRIVE

1   **Which symbol is located at -2 on the number line below?**

A   ☐

B   ◯

C   ⏢

D   △
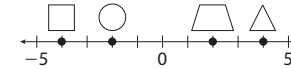
JUMPSTART   *Remember, negative numbers always lie to the left of zero.*

2   **Which set of numbers is in order from *least* to *greatest*?**

F $-15, -10, -8, -5, 0$

G $-5, -8, -10, -15, 0$

H $0, -5, -8, -10, -15$
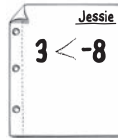
J $0, -15, -10, -8, -5$

JUMPSTART   *You can draw a number line to help you solve this problem.*

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SIDE TRIPS

A

1) Jessie compared the following integers incorrectly.

> Jessie
>
> 3 < -8

Explain why 3 is actually greater than −8. You can use money or temperature as examples, or you may wish to draw a number line.

Explain It! *You can think about money: −8 means that you owe someone 8 dollars, but 3 means that you have 3 dollars.*

2) Circle the integers in the picture below. Put an *X* through the numbers that are not integers. If you are correct, the circles will win the game of tic-tac-toe!
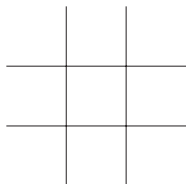
Draw It! **INTEGER TIC-TAC-TOE**

17	$\frac{1}{2}$	3
$\frac{4}{3}$	7.6	−24
2.5	−5	0

Play tic-tac-toe with a partner, but instead of using *O's* and *X's*, have one player use integers and the other player use fractions.

Draw It!

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SIDE TRIPS
Applications and Connections

approx. 5 min.

Delivery

If time allows, have students complete the Side Trips section.

Because the activities involve a range of response types, you may wish to have students select those activities that are most interesting to them. If time permits, invite students to share their responses with a neighbor or the entire group.

To close the lesson, have students answer the lesson question: "What is a negative number?"

Strong responses should include that a negative number represents a value less than zero. Ask students to describe real-world situations that might be represented with a number such as −7.

Extension Activities

Make Thermometers

Have students create a model of a thermometer. Use the model to discuss negative temperatures. Ask where and when these types of temperatures occur.

Weather Trackers

Have students use the Internet, a weather page from a local newspaper, or an outdoor thermometer to determine the temperature on a daily basis using positive and negative integers.

Time Zones

Have students explore real-world uses of negative and positive integers through the Figure This! informative Time Zone game.

Web Resource: **http://www.figurethis.org/challenges/c46/challenge.htm**