

Less Than Nothing

Purpose

Students will understand and apply the basic concept of negative numbers, represent positive and negative numbers on a number line, and understand the meaning of and find the absolute value of numbers.

Materials

For the teacher: chalk, chalkboard

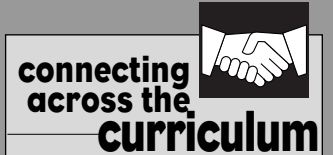
For each pair of students: 36-inch strip of adding machine tape, yard-stick, black marker, red marker, green marker, copy of Black Line Master (BLM) *More or Less Than Zero*

Activity

A. Introduction

1. Ask students if it is possible to have less than nothing. Remind them that a person can owe money or materials to someone. Tell students that there are numbers that are less than zero that help represent those situations. Remind them that temperatures below zero are represented by these numbers.
2. Write a negative number on the board. Tell students that numbers less than zero are called negative numbers and are represented by a negative (or minus) sign. Note the negative sign next to the number.
3. Draw a simple number line on the chalkboard and plot the negative number you chose on the line. Discuss the fact that the value of the number is still determined by which number is to the right of the other on the number line. Thus, -1 has a higher value than -6 . Compare that to a real-life situation such as owing money (e.g., if you owe \$1 to someone, you “have more money” than if you owe \$6 to someone).
4. Explain to students that the distance the number is from zero is called the absolute value and absolute value is always positive. Discuss the absolute value of the number you chose and show how that represents the distance from zero.
5. Show that there is also a positive number that has the same absolute value as the negative number you chose. Demonstrate this concept by showing the distance from zero is the same for both numbers.
6. Have students assist you in plotting a few more positive and negative numbers and finding the absolute values of those numbers. Compare the numbers by using the terms “greater than” and “less than.”

(continued)



Social Studies

Have students find a variety of geographic locations that are above sea level and below sea level. Have them plot the locations on a number line with sea level being represented by zero. Have them compare the locations they have chosen.



Have students who are having difficulty visualizing negative numbers consider negative and positive as direction from zero on the number line. Tell them that numbers on the left side of zero are in the negative direction and numbers on the right are in the positive direction. Tell them that the absolute value shows how far in that direction those numbers are from zero.

Activity (continued)

B. Pre-Activity Discussion

1. Ask students if they can think of everyday situations where a negative number might be used. Tell them that any situation that has a “starting point” that could be thought of as zero and where there are gains and losses could have negative numbers to represent the loss.
2. Discuss how the following situations could be represented by positive and negative numbers and discuss what zero would represent:
 - Below sea level ... above sea level
 - Yards gained ... yards lost (football game)
 - Income ... Debt
 - Calories Eaten ... Calories Burned
 - Stock market gain ... Stock market loss


C. Partner Activity


1. Divide the classroom into groups of two. Give each group a 36-inch piece of adding machine tape.
2. Have groups fold the tape into halves to find the center. Tell them to use the black marker to draw a number line on the tape and plot zero at the center. Have them make a mark every inch and label the numbers, reminding them to label the numbers to the left of zero with the negative sign. They should have at least 17 inches on both the negative and positive sides of the number line.
3. Give each group a copy of the BLM *More or Less Than Zero* and have them use their number lines to complete the activity.
4. Discuss the results of the activity.


Classroom Assessment


Basic Concepts and Processes


Throughout the activity, ask the following questions:

 Show me where -3 would be on the number line.

 How did you determine where -3 should be?

 Is -5 greater than or less than -25 ?

 How did you determine which number was greater?

 Is the absolute value of -5 greater than or less than the absolute value of -25 ?

 How did you determine your answer?

← More or Less Than Zero →

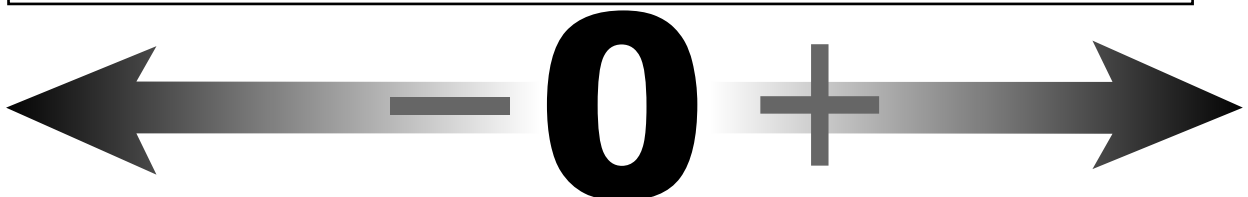
Using the number line you created, plot the points and answer the questions as instructed below.

Plot all negative numbers in red and all positive numbers in green.

1. Consider all money that you owe others to be negative numbers and all money that you receive to be positive numbers. Plot the numbers that are represented by the situations below.
- You borrow \$5.50 from your sister to go to the movies.
 - Your mom gives you \$4.60 in allowance.
 - You get \$5 from your grandmother for your birthday.
 - You owe your friend \$6.25 for video games that you played at the arcade last Saturday.

2. Consider 0°C to be the “zero” of your number line. Above 0°C is represented by positive numbers and below 0°C is represented by negative numbers. Plot the temperatures using the information below.
- At noon, the temperature is $2\frac{1}{2}^{\circ}\text{C}$ above zero.
 - At 5:00 p.m., the temperature is $1\frac{1}{8}^{\circ}\text{C}$ above zero.
 - At 5:30 p.m., the temperature is $1\frac{1}{8}^{\circ}\text{C}$ below zero.
 - At 9:00 p.m., the temperature is $1\frac{3}{4}^{\circ}\text{C}$ below zero.

3. Consider the ground level of a skyscraper to be the “zero” of your number line. All floors above ground level are in the positive direction and all floors below the ground level are considered in the negative direction. Plot the positions of you and your friend as described and answer the questions below.
- You take the elevator up to the 13th floor.
 - Your friend takes the elevator down two floors from ground level to B2 floor.
 - What is the absolute value of your position? _____
 - What is the absolute value of your friend’s position? _____
 - How many floors apart are you and your friend? _____



More or Less Than Zero

Teacher Directions

Give each pair of students a copy of the BLM to complete during the Partner Activity. Have students plot the points as instructed on the number lines they created on the adding machine tape. The negative numbers should be plotted in red and the positive numbers in green. Instruct students to answer the questions concerning absolute value and distance in question 3.

Answer Key



The number lines should span at least -17 to 17 and should have the above points plotted. All points plotted on the negative side should be in red and all points plotted on the positive side should be in green.

The answers to question 3 are as follows:

3. c. What is the absolute value of your position? 13
- d. What is the absolute value of your friend's position? 2
- e. How many floors apart are you and your friend? 15