

9.3.15 Period __

We will represent¹ quantities using positive and negative numbers.

Common Core Standard 7.NS.1

Apply and extend previous understandings of addition and subtraction to add and subtract integers (AND other rational numbers); represent addition and subtraction on a horizontal or vertical number line diagram.

CFU

What are we going to do?

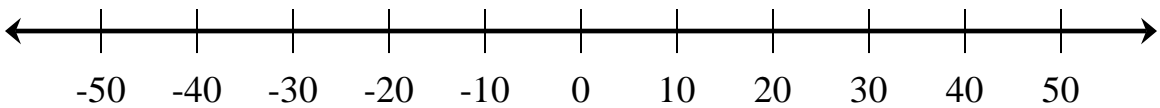
What does *represent* mean?
Represent means _____.

Activate Prior Knowledge

A **number line** shows the order of numbers based on their value.

Locate the number on the number line that represents **40 positive units** from zero.

Locate the number on the number line that represents **20 negative units** from zero.



Vocabulary

¹ show

Make Connection

Students, you already know how to work with positive and negative numbers on a number line. Now, we will use this knowledge to represent quantities using positive and negative numbers.

Key Ideas

Adding Integers with Different Signs

Words Subtract the lesser absolute value from the greater absolute value. Then use the sign of the integer with the greater absolute value.

Numbers $8 + (-10) = -2$ $-13 + 17 = 4$

Additive Inverse Property

Words The sum of an integer and its **additive inverse**, or opposite, is 0.

Numbers $6 + (-6) = 0$ $-25 + 25 = 0$

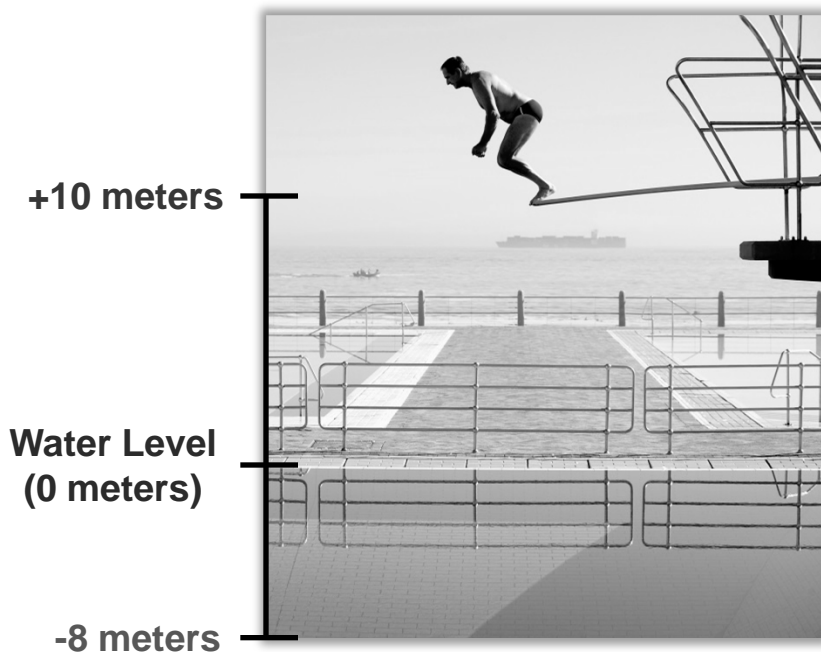
A **quantity** is a measured amount.

Quantities can be measured using **positive** or **negative numbers**.

- *Positive or negative value is determined by comparing the quantity to zero.*

Positive and Negative Numbers

Juan is practicing diving. He dives from the **10-meter** platform, and sinks to about **8 meters deep** in the pool.



Juan's position before the dive is **10 meters**.

Juan's position after the dive is **-8 meters**.

CFU

Which example can be represented using a positive number? How do you know?

Which example can be represented using a negative number? How do you know?

What quantity is shown by the third example?

- A Mt. George is 1200 feet above sea level.
- B A large fish was seen about 10 feet below sea level.
- C A boat is floating on the sea.

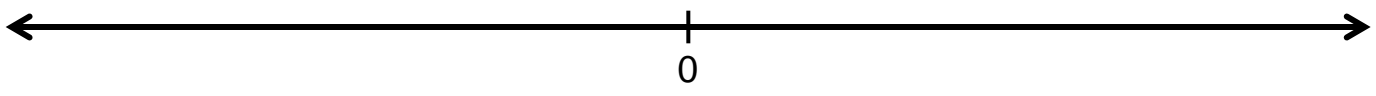
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Represent quantities using positive or negative numbers.

- 1 Read the problem.
- 2 Identify² the quantities in the word problem. (underline)
- 3 Represent the quantity using positive or negative numbers.
Hint: Compare the numbers to zero.
- 4 Explain why each number is positive or negative
- 5 Explain what zero means in the problem. .

1. Last summer, the high temperature was 37 degrees Celsius. Today in winter, the low temperature is 7 degrees below zero Celsius.



Explain the value of the zero on the number line.

CFU

- 2 How did I/you identify the quantities in the problem?
- 3 How did I/you represent the quantity using positive or negative numbers?
- 4 How did I/you explain why each number was positive or negative?
- 5 How did I/you explain what zero meant?

Vocabulary

² find (synonym)

Quantities can be measured using **positive** or **negative** numbers.

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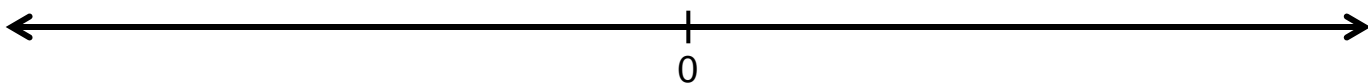
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2. The weatherman said today's high temperature will be only 45 degrees Farenheit. Overnight, the temperature is expected to drop to 5 degrees below zero.



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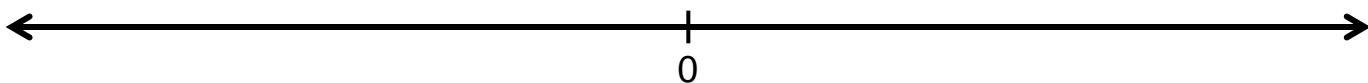
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3. Death Valley, Calif., is the lowest area in the U.S. at 282 feet below sea level. Mt. Whitney is the highest area in the U.S. at 14,505 feet above sea level.



Explain the value of the zero on the number line.

 **Application**

T: Redraw the number line vertically. Explain why it makes sense to use a vertical number line for this question.

CFU

- 2 How did I/you identify the quantities in the problem?
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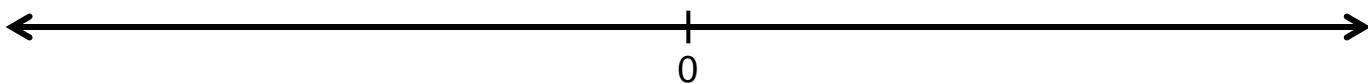
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4. The pilot radioed that his airplane was at 10,000 feet. The submarine captain said his ship was at a depth of 2,000 feet.



Explain the value of the zero on the number line.

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Application

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Solving Math Problems

- 1 Determine what the question is asking.
- 2 Determine the math concept required.
- 3 Determine relevant information.
- 4 Solve the problem, then interpret the answer.
- 5 Check the reasonableness of your answer.

Maria looked at her bank statement for the last few days. She saw the transactions₃ below. Explain why each value is shown as a positive or negative number.

BANK ACCOUNT STATEMENT

Date	Description	Quantity
10/16	Deposit check	+\$67.00
10/20	Purchase groceries	-\$182.46
10/22	Pay car loan	-\$112.48
10/22	Deposit cash	+\$121.83

5. The check deposit is positive because _____
6. The grocery purchase is negative because _____
7. The pay car loan is negative because _____
8. The cash deposit is positive because _____

CFU

- 1 How did I/you determine what the question is asking?
- 2 How did I/you determine the math concept required?
- 3 How did I/you determine the relevant information?
- 4 How did I/you solve and interpret the problem?
- 5 How did I/you check the reasonableness of the answer?

Vocabulary

³ the act of obtaining and paying for an item or service

Solving Math Problems

- 1 Determine what the question is asking.**
- 2 Determine the math concept required.**
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- 5 Check the reasonableness of your answer.**

Abdul was calculating how much of the large sub sandwiches he would have left over after a party. He found that if every guest ate 6 inches of sandwich, he would have -4 inches of sandwich left over. Explain why this cannot happen.

Milena wants to give apples from her apple tree away to all her friends. She calculated that if she gave each friend ten apples, she would have -15 apples left. Explain why she cannot have -15 apples.

CFU

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1 *Representing quantities using positive and negative numbers will help you manage your world better.*

You will be able to adjust your clothing for temperature, adjust your direction up or down, balance your bank account, and understand how electricity works.

2 *Representing quantities using positive and negative numbers will help you do well on tests.*

Sample Test Question:

32. The Cake Factory bakes cakes for a grocery chain. All cakes must be within 3 ounces of the target weight of 30 ounces. Cakes were assigned a negative number if they were below 30 ounces and a positive number if above 30 ounces.

Which cake weights below would be accepted?

- A A cake with a reading of -1.2 oz.
- B A cake with a reading of 2.7 oz.
- C A cake with a reading of -5.3 oz.
- D A cake with a reading of 3.1 oz.

CFU

Does anyone else have another reason why it is relevant to represent quantities using positive and negative numbers? (Pair-Share) Why is it relevant to represent quantities using positive and negative numbers? You may give one of my reasons or one of your own. Which reason is more relevant to you? Why?

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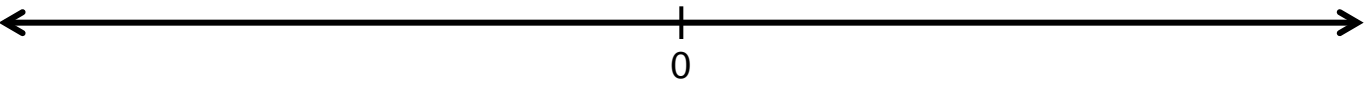
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Skill Closure

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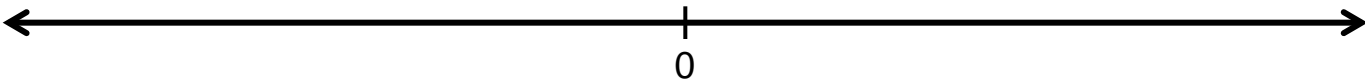
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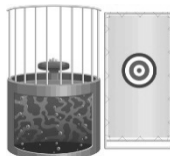
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2. At the carnival, the Ferris wheel was 30 feet high. The water in the dunk tank, however, was 4 feet below the ground.



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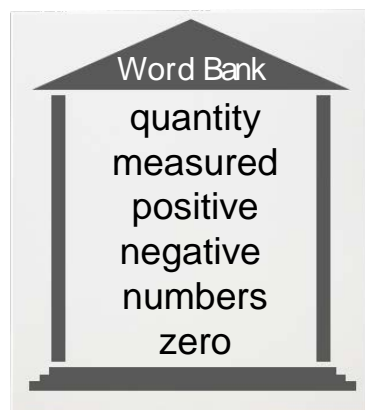
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The school's swimming pool was 14 feet deep and the diving board was 3 feet above the water. Charles said these quantities could be represented with positive and negative numbers as 14 and -3. Do you agree? Explain.

Summary Closure

What did you learn today about representing quantities using positive or negative numbers? (Pair-Share) Use words from the word bank.



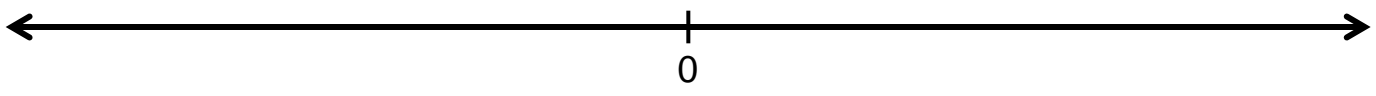
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1. The refrigerator keeps food at about 4 degrees Celsius, while the freezer keeps them at about 18 degrees below zero Celsius.



Explain the value of the zero on the number line.



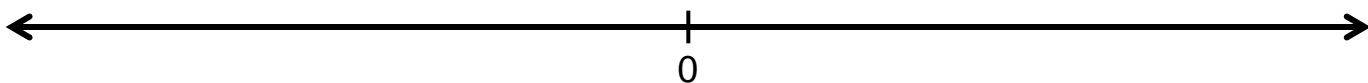
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2. To make iced tea, you need to heat water to 100 degrees Celsius, and freeze ice cubes at 0 degrees Celsius.



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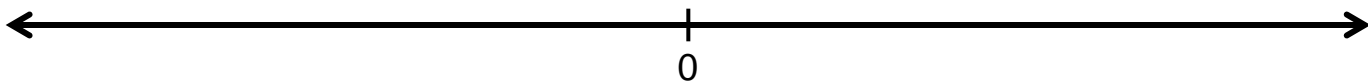
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3. The latest poll showed the presidential candidate was up 12 points in the East, but down 15 points in the West.



Explain the value of the zero on the number line.



1. To save for a new bike, Amandeep transferred \$50 from her checking to her savings account. How would you describe the values below?

The change in her checking account: _____

The change in her savings account: _____

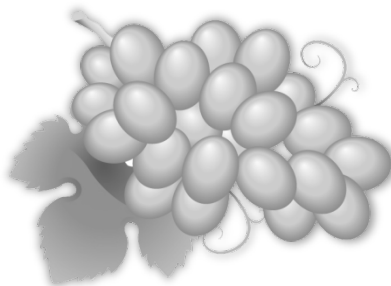
What is the value of zero in these examples? _____

2. Juan is looking at his grape vines this year. His first field yielded 110 more pounds of grapes than last year. The second field yielded 68 fewer pounds than last year. How would you describe these changes?

1st field: _____

2nd field: _____

What is the value of zero in this example? _____



Access Common Core

Look at the quantities in this bank account statement. Represent each quantity as a positive or negative number.

BANK ACCOUNT STATEMENT		
Date	Description	Quantity
06/14	Deposit check	\$268.00
06/16	Purchase grocery	\$38.72
06/23	Pay phone bill	\$45.39
06/24	Deposit cash	\$120.00

Representation

1. When building a house, the plumbing pipes are set 3 feet deep in the ground, and allowed to rise up in the air about 2 feet.

Above ground: _____

Below ground: _____

What is the value of zero in this example? _____

2. A 30-foot high oak tree was found to have 15-foot deep roots, giving it strength and stability.

Tree: _____

Roots: _____

What is the value of zero in this example? _____



Access Common Core

Determine whether these statements correctly represent quantities as positive or negative numbers.

Statement	Represented as a Pos. or Neg. Number	Yes or No
1. The hot air balloon went 200 feet high.	- 200 feet	<input type="radio"/> Yes <input type="radio"/> No
2. The scuba diver explored a 300-foot depth.	- 300 feet	<input type="radio"/> Yes <input type="radio"/> No
3. The aluminum melted at 1220 degrees F.	-1220 degrees	<input type="radio"/> Yes <input type="radio"/> No
4. George missed 3 hours of work today.	3 hours	<input type="radio"/> Yes <input type="radio"/> No
5. Construction of the tall building started with a 20-foot deep foundation.	- 20 feet	<input type="radio"/> Yes <input type="radio"/> No
6. John got \$1.00 off on his tickets for the movie.	\$1.00	<input type="radio"/> Yes <input type="radio"/> No

1. The radio reported that the Dow Jones Average of the stock market was up 200 points today after being down 53 points yesterday.

Today: _____

Yesterday: _____

What is the value of zero in this example? _____



Access Common Core

Read the paragraph and represent all quantities as positive or negative numbers.

Contestants on the reality show *Survivor* had to participate in many challenges. They had to climb 30-foot trees, dive into 50-foot deep lakes, hike four miles one way, then come back and hike four miles the opposite way. The temperature averaged 85 degrees above zero, plus they had 1 inch of rain per day. Each participant had to commit to a maximum of 44 days for the adventure, but if he or she got voted off, their time could be shortened by 7, 14, or 21 days. The winner would receive \$1 million dollars, but had to spend \$5000 to go to the interviews. A total of 396 people have competed so far.