

Understand Addition of Positive and Negative Integers

Name: _____

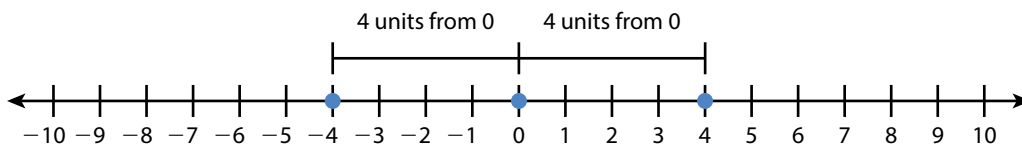
Prerequisite: What is the absolute value of a number?



Study the example showing how to find the absolute value of a number. Then solve problems 1–10.

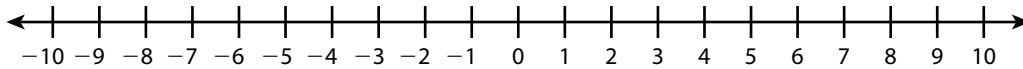
Example

The *absolute value* of a number is the distance from the number to 0 on a number line. Both -4 and 4 are 4 units from 0, so $|-4| = 4$ and $|4| = 4$.



- 1 What is the absolute value of 0? _____

Use the number line to solve problems 2–4.



- 2 Graph the numbers 6, 0, -10 , 9, and -6 on the number line.
- 3 Which number that you graphed has the greatest absolute value? What is the absolute value of that number? _____
- 4 Which two numbers that you graphed have the same absolute value? Explain.

- 5 Write $<$, $=$, or $>$ to compare the numbers.

- a. -7 -1
- b. $|-7|$ $|-1|$
- c. 0 -1
- d. $|0|$ $|-1|$
- e. 12 $|12|$
- f. -12 $-|12|$

Vocabulary

absolute value the distance a number is from 0 on the number line.

$$|2| = 2 \quad |-3| = 3$$

Solve.

The table shows information about each of the Great Lakes. It shows the elevation of the surface of each lake and the elevation of the deepest point of each lake, both relative to sea level.

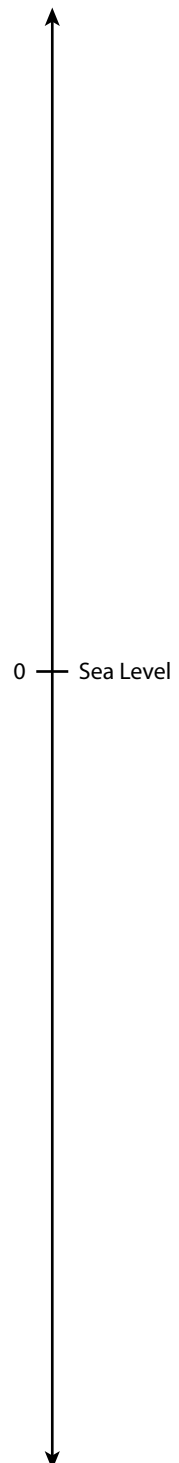
	Surface Level (ft)	Deepest Point (ft)
Lake Superior	601	-732
Lake Michigan	577	-346
Lake Ontario	243	-559
Lake Huron	577	-173
Lake Erie	569	210

- 6 Show the surface levels and deepest points from the table on the number line.
- 7 Which number in the table has the greatest absolute value? What is the absolute value of that number?

- 8 Which of the Great Lakes, if any, is entirely above sea level? Explain.

- 9 How can you use absolute value to find the distance from the surface of Lake Michigan to its deepest point? What is the distance?

- 10 The deepest point of Lake Titicaca in South America is -922 feet relative to its surface. The deepest point is $11,542$ feet above sea level. What is the elevation of the surface of the lake? Use absolute value to explain.



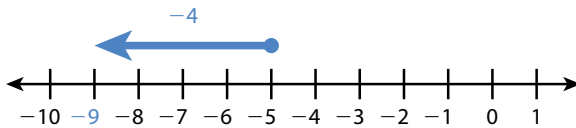
Add Positive and Negative Integers

Study the example problem showing how to add positive and negative integers. Then solve problems 1–8.

Example

Graph each situation on a number line. Then, model each situation with an equation.

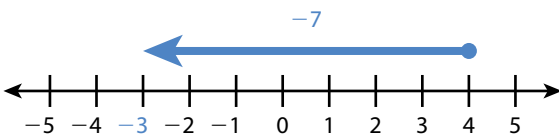
- Jordan already owes \$5 to Kiara and borrows \$4 from Don. How much money does Jordan have?



$$-5 + (-4) = ?$$

$$-5 + (-4) = -9$$

- Micah has \$4 and owes Ben \$7.

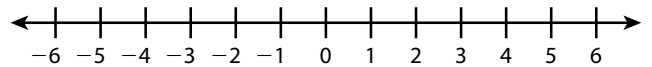


$$4 + (-7) = ?$$

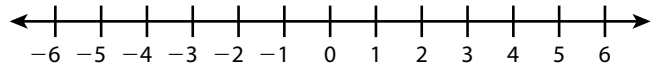
$$4 + (-7) = -3$$

1 Complete the equation and model each sum on a number line.

a. $\square + 4 = 0$



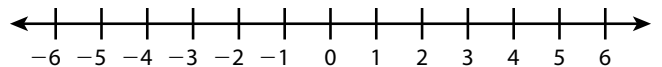
b. $-5 + \square = 0$



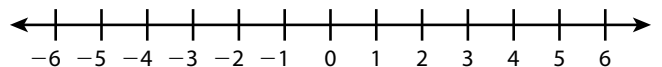
c. When will the sum of two numbers be zero?

2 In the first box of each equation, write an example of an integer that will result in the sum described. Then write the sum. Model each sum on a number line.

a. positive sum: $-5 + \square = \square$



b. negative sum: $-4 + \square = \square$



Solve.

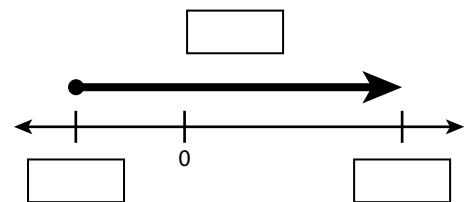
- 3 Explain how you can use absolute value to tell whether the sum of two integers is positive or negative.

- 4 An elevator is two floors below ground level and goes up 5 floors. Write an addition equation that models the location of the elevator relative to ground level. What integer represents the new location?

- 5 One morning, the temperature was -5°F . By noon, the temperature had increased 12 degrees. What was the temperature at noon? Use a model to explain your answer.

- 6 A lobster fisherman moves a lobster trap from 20 feet below sea level to a location that is 15 feet deeper. Draw a number line and write an addition equation that models this situation. What integer represents the new location relative to sea level?

- 7 The sum of integers p and q is modeled on a number line, where $|p| < |q|$. In each box, write p , q , or $p + q$. Then write an addition equation using integers that could represent p , q , and $p + q$.



- 8 Show how the model in problem 7 would change if $|p| > |q|$. Draw the model, labeling p , q , and $p + q$. Then write an addition equation using integers that could represent p , q , and $p + q$.



Reason and Write

Study the example. Underline two parts that you think make it a particularly good answer and a helpful example.

Example

You are designing a hike that starts at the bottom of a small mountain, below sea level. You plan to stop at three locations:

- a scenic location, which is below sea level
- a picnic area for lunch, which is at sea level
- the top of the mountain, which is 800 feet above sea level

Design the hike. Choose the location of each stop. Make a table that shows each location, the change in elevation from the previous location, and the elevation of each location relative to sea level. Show how you found the elevation of each location using integer addition. Graph your locations on a number line. Describe your hike, including the total change in elevation from the start of the hike to the mountaintop.

Show your work. Use integers, tables, models, equations, and words to explain your answer.

Elevation (feet)

Location	Change in Elevation	New Elevation
Start		-200
Scenic location	150	-50
Lunch	50	0
Mountaintop	800	800

Addition of integers also shows the elevation at each location and the total change in elevation.

$$-200 + 150 = -50$$

$$-50 + 50 = 0$$

$$0 + 800 = 800$$

Total change: $800 + 50 + 150 = 1,000$

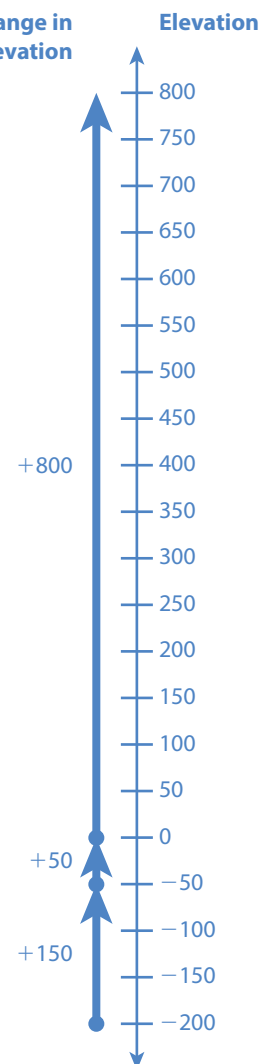
Starting at -200 feet and climbing 150 feet will bring me to an elevation of -50 feet. After climbing another 50 feet, I will be at sea level, or an elevation of 0 feet. Finally, climbing the final 800 feet will bring me to the mountaintop at an elevation of 800 feet. The total change in elevation will be 1,000 feet.

Where does the example...

- use integers?
- use a table and a number line?
- use an equation to model?
- use words to explain?
- answer the question?



Change in Elevation



Solve the problem. Use what you learned from the model.

You are designing a hike that starts at the top of a canyon, above sea level. You plan to stop at three locations:

- a scenic landmark, which is at sea level
- a famous boulder, which is below sea level
- the bottom of the canyon, which is 600 feet below sea level

Design the hike. Choose the location of each stop. Make a table that shows each location, the change in elevation from the previous location, and the elevation of each location relative to sea level. Show how you found the elevation of each location using integer addition. Graph your locations on a number line. Describe your hike, including the total change in elevation from the start of the hike to the bottom of the canyon.

Did you ...

- use integers?
- use a table and a number line?
- use an equation to model?
- use words to explain?
- answer the question?



Show your work. Use integers, tables, models, equations, and words to explain your answer.