Integers

MODULE 1

ESSENTIAL QUESTION

How can you use integers to solve real-world problems?

LESSON 1.1
Identifying Integers and Their Opposites
TEKS 6.2.B

LESSON 1.2
Comparing and Ordering Integers
TEKS 6.2.C

LESSON 1.3
Absolute Value
TEKS 6.2.B

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Real-World Video

Integers can be used to describe the value of many things in the real world. The height of a mountain in feet may be a very great integer while the temperature in degrees Celsius at the top of that mountain may be a negative integer.

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Are YOU Ready?

Complete these exercises to review skills you will need for this chapter.

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Compare Whole Numbers

EXAMPLE

3,564 ● 3,528	Compare digits in the thousands place: $3 = 3$
3,564 ● 3,528	Compare digits in the hundreds place: $5 = 5$
3,564 ○ 3,528	Compare digits in the tens place: $6 > 2$

Compare. Write $<$, $>$, or $=$.

1. 471 ○ 468 **2.** 5,005 ○ 5,050 **3.** 398 ○ 389

4. 10,973 ○ 10,999 **5.** 8,471 ○ 9,001 **6.** 108 ○ 95

Order Whole Numbers

EXAMPLE

356, 348, 59, 416	Compare digits. Find the greatest number.
356, 348, 59, 416	Find the next greatest number.
356, 348, 59, 416	Find the next greatest number.
356, 348, 59, 416	Find the least number.
$416 > 356 > 348 > 59$	Order the numbers.

Order the numbers from greatest to least.

7. 156, 87, 177, 99

_____

8. 591, 589, 603, 600

_____

9. 2,650, 2,605, 3,056, 2,088

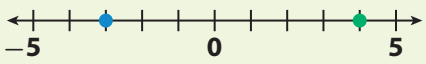
_____

10. 1,037, 995, 10,415, 1,029

_____

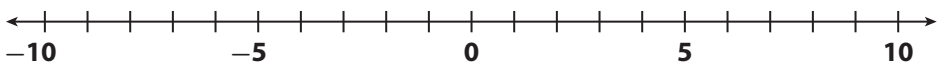
Locate Numbers on a Number Line

EXAMPLE



Graph $+4$ by starting at 0 and counting 4 units to the right. Graph -3 by starting at 0 and counting 3 units to the left.

Graph each number on the number line.



11. -1 **12.** $+10$ **13.** 2 **14.** -8

Reading Start-Up

Visualize Vocabulary

Use the ✔ words to complete the chart. Write the correct vocabulary word next to the symbol.

Symbol	
	<
	>
	=
	+
	–

Understand Vocabulary

Complete the sentences using the preview words.

1. An _____ is a statement that two quantities are not equal.
2. The set of all whole numbers and their opposites are _____.
3. Numbers greater than 0 are _____. Numbers less than 0 are _____.

Vocabulary

Review Words

- ✔ equal *(igual)*
- ✔ greater than *(más que)*
- ✔ less than *(menos que)*
- ✔ negative sign *(signo negativo)*
- number line *(recta numérica)*
- ✔ plus sign *(signo más)*
- symbol *(símbolo)*
- whole number *(número entero)*

Preview Words

- absolute value *(valor absoluto)*
- inequality *(desigualdad)*
- integers *(enteros)*
- negative numbers *(números negativos)*
- opposites *(opuestos)*
- positive numbers *(números positivos)*

Active Reading

Key-Term Fold Before beginning the module, create a key-term fold to help you learn the vocabulary in this module. Write the highlighted vocabulary words on one side of the flap. Write the definition for each word on the other side of the flap. Use the key-term fold to quiz yourself on the definitions in this module.

MODULE 1

Unpacking the TEKS

Understanding the TEKS and the vocabulary terms in the TEKS will help you know exactly what you are expected to learn in this module.

TEKS 6.2.B

Identify a number, its opposite, and its absolute value.

Key Vocabulary

Integers *(enteros)*
The set of all whole numbers and their opposites.

opposites *(opuestos)*
Two numbers that are equal distance from zero on a number line.

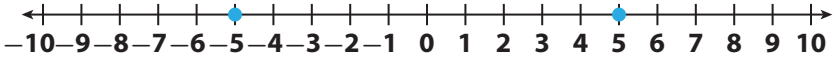
absolute value *(valor absoluto)*
A number's distance from 0 on the number line.

What It Means to You

You will learn see that the absolute value of a number is its distance from 0.

UNPACKING EXAMPLE 6.2.B

Use the number line to determine the absolute values.



$|-5| = 5$ because −5 is 5 units from 0

$|5| = 5$ because 5 is 5 units from 0

TEKS 6.2.C

Locate, compare, and order integers and rational numbers using a number line.

Key Vocabulary

rational number *(número racional)*
Any number that can be expressed as a ratio of two integers.

What It Means to You

You can use a number line to order rational numbers.

UNPACKING EXAMPLE 6.2.C

At a golf tournament, David scored +6, Celia scored −16, and Xavier scored −4. One of these three players was the winner of the tournament. Who won the tournament?

The winner will be the player with the lowest score. Draw a number line and graph each player's score.

Celia's score, −16, is the farthest to the left, so it is the lowest score. Celia won the tournament.

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LESSON 1.1

Identifying Integers and Their Opposites

TEKS **Number and operations—6.2.B** Identify a number, its opposite, and its absolute value.

ESSENTIAL QUESTION

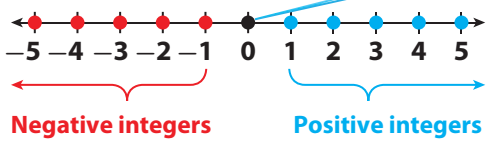
How do you identify an integer and its opposite?

EXPLORE ACTIVITY 1 Real World TEKS 6.2.B

Positive and Negative Numbers

Positive numbers are numbers greater than 0. Positive numbers can be written with or without a plus sign; for example, 3 is the same as +3. **Negative numbers** are numbers less than 0. Negative numbers must always be written with a negative sign.

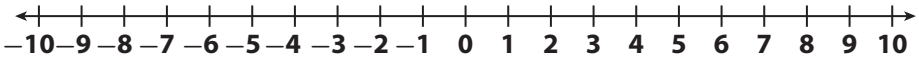
The number 0 is neither positive nor negative.



The elevation of a location describes its height above or below sea level, which has elevation 0. Elevations below sea level are represented by negative numbers, and elevations above sea level are represented by positive numbers.

A The table shows the elevations of several locations in a state park. Graph the locations on the number line according to their elevations.

Location	Little Butte *A*	Cradle Creek *B*	Dinosaur Valley *C*	Mesa Ridge *D*	Juniper Trail *E*
Elevation (ft)	5	–5	–9	8	–3



B What point on the number line represents sea level? _____

C Which location is closest to sea level? How do you know?

_____

D Which two locations are the same distance from sea level? Are these locations above or below sea level?

_____

E Which location has the least elevation? How do you know?

_____

EXPLORE ACTIVITY *(cont'd)*

Reflect

1. **Analyze Relationships** Morning Glory Stream is 7 feet below sea level. What number represents the elevation of Morning Glory Stream?

_____

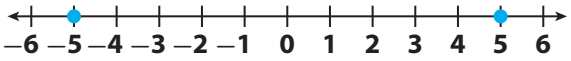
2. **Multiple Representations** Explain how to graph the elevation of Morning Glory Stream on a number line.

_____

EXPLORE ACTIVITY 2 TEKS 6.2.B

Opposites

Two numbers are **opposites** if, on a number line, they are the same distance from 0 but on different sides of 0. For example, 5 and −5 are opposites. 0 is its own opposite.



Integers are the set of all whole numbers and their opposites.

Remember, the set of whole numbers is 0, 1, 2, 3, 4, 5, 6, ...

On graph paper, use a ruler or straightedge to draw a number line. Label the number line with each integer from −10 to 10. Fold your number line in half so that the crease goes through 0. Numbers that line up after folding the number line are opposites.

A Use your number line to find the opposites of 7, −6, 1, and 9. _____

B How does your number line show that 0 is its own opposite?

_____

C What is the opposite of the opposite of 3? _____

Reflect

3. **Justify Reasoning** Explain how your number line shows that 8 and −8 are opposites.

_____

4. **Multiple Representations** Explain how to use your number line to find the opposite of the opposite of −6.

_____

_____

_____

Integers and Opposites on a Number Line

Positive and negative numbers can be used to represent real-world quantities. For example, 3 can represent a temperature that is 3 °F above 0. −3 can represent a temperature that is 3 °F below 0. Both 3 and −3 are 3 units from 0.

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EXAMPLE 1

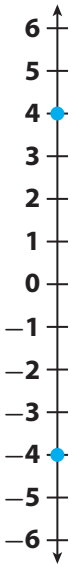
Real World

TEKS 6.2.B

Sandy kept track of the weekly low temperature in her town for several weeks. The table shows the low temperature in °F for each week.

Week	Week 1	Week 2	Week 3	Week 4
Temperature (°F)	−1	3	−4	2

A Graph the temperature from Week 3 and its opposite on a number line. What do the numbers represent?



STEP 1 Graph the value from Week 3 on the number line.

The value from Week 3 is −4.
Graph a point 4 units below 0.

STEP 2 Graph the opposite of −4.

Graph a point 4 units above 0.

The opposite of −4 is 4.

−4 represents a temperature that is 4 °F below 0 and 4 represents a temperature that is 4 °F above 0.

B The value for Week 5 is the opposite of the opposite of the value from Week 1. What was the high temperature in Week 5?

STEP 1 Graph the value from Week 1 on the number line.

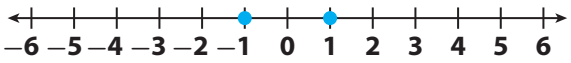
The value from Week 1 is −1.

STEP 2 Graph the opposite of −1.

The opposite of −1 is 1.

STEP 3 Graph the opposite of 1.

The opposite of 1 is −1.



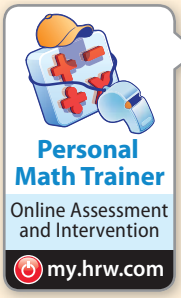
The opposite of the opposite of −1 is −1.
The high temperature in Week 5 was −1 °F.

Reflect

5. **Analyze Relationships** Explain how you can find the opposite of the opposite of any number without using a number line.

_____

My Notes

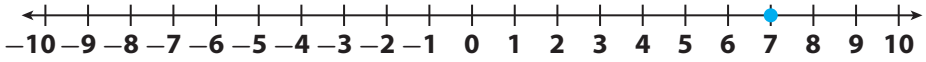


YOUR TURN

Graph the opposite of the number shown on each number line.

6.

7.



Write the opposite of each number.

8. 10 _____ **9.** –5 _____ **10.** 0 _____

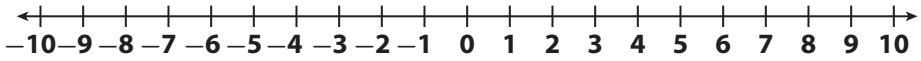
11. What is the opposite of the opposite of 6? _____

Math Talk
Mathematical Processes
Explain how you could use a number line to find the opposite of 8.

Guided Practice

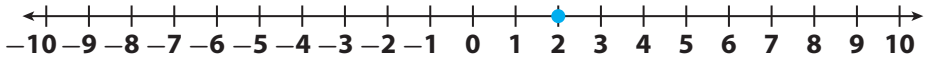
1. Graph and label the following points on the number line. (Explore Activity 1)

a. –2 **b.** 9 **c.** –8 **d.** –9 **e.** 5 **f.** 8



Graph the opposite of the number shown on each number line. (Explore Activity 2 and Example 1)

2.



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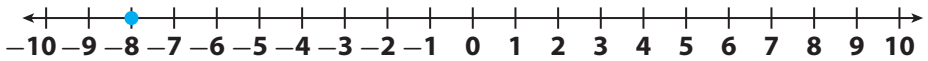

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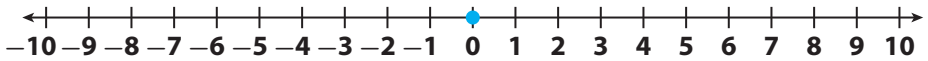


Write the opposite of each number. (Explore Activity 2 and Example 1)

5. 4 _____ **6.** –11 _____ **7.** 3 _____

8. –3 _____ **9.** 0 _____ **10.** 22 _____

ESSENTIAL QUESTION CHECK-IN

11. Given an integer, how do you find its opposite?

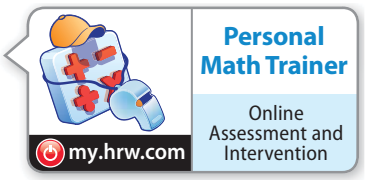
_____

_____

Name _____ Class _____ Date _____

1.1 Independent Practice

TEKS 6.2.B



12. **Chemistry** Atoms normally have an electrical charge of 0. Certain conditions, such as static, can cause atoms to have a positive or a negative charge. Atoms with a positive or negative charge are called *ions*.

Ion	A	B	C	D	E
Charge	−3	+1	−2	+3	−1

a. Which ions have a negative charge?

_____

b. Which ions have charges that are opposites?

_____

c. Which ion's charge is not the opposite of another ion's charge?

_____

Name the integer that meets the given description.

13. the opposite of −17 _____

14. 4 units left of 0 _____

15. the opposite of the opposite of 2 _____

16. 15 units right of 0 _____

17. 12 units right of 0 _____

18. the opposite of −19 _____

19. **Analyze Relationships** Several wrestlers are trying to lose weight for a competition. Their change in weight since last week is shown in the chart.

Wrestler	Tino	Victor	Ramsey	Baxter	Luis
Weight Change (in pounds)	−2	6	2	5	−5

a. Did Victor lose or gain weight since last week? _____

b. Which wrestler's weight change is the opposite of Ramsey's? _____

c. Which wrestlers have lost weight since last week? _____

d. Frankie's weight change since last week was the opposite of Victor's.

What was Frankie's weight change? _____

e. Frankie's goal last week was to gain weight. Did he meet his goal? Explain.

_____

Find the distance between the given number and its opposite on a number line.

20. 6 _____ **21.** −2 _____

22. 0 _____ **23.** −7 _____

24. **What If?** Three contestants are competing on a trivia game show. The table shows their scores before the final question.

Contestant	Score Before Final Question
Timothy	−25
Shawna	18
Kaylynn	−14

a. How many points must Shawna earn for her score to be the opposite of Timothy's score before the final question? _____

b. Which person's score is closest to 0? _____

c. Who do you think is winning the game before the final question? Explain.

_____

H.O.T. FOCUS ON HIGHER ORDER THINKING

25. **Communicate Mathematical Ideas** Which number is farther from 0 on a number line: −9 or 6? Explain your reasoning.

_____

_____

26. **Analyze Relationships** A number is k units to the left of 0 on the number line. Describe the location of its opposite.

_____

_____

27. **Critique Reasoning** Roberto says that the opposite of a certain integer is −5. Cindy concludes that the opposite of an integer is always negative. Explain Cindy's error.

_____

_____

_____

28. **Multiple Representations** Explain how to use a number line to find the opposites of the integers 3 units away from −7.

_____

_____

_____

Work Area