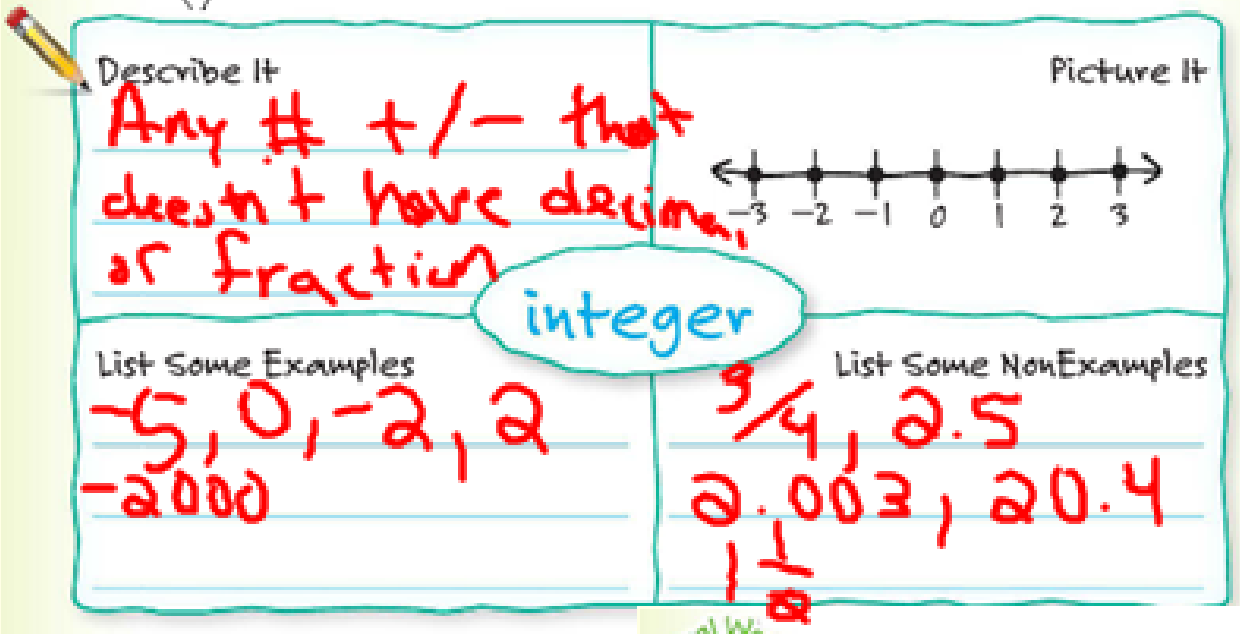
Vocabulary Start-Up

Numbers like 5 and −8 are called integers. An **integer** is any number from the set {..., −4, −3, −2, −1, 0, 1, 2, 3, 4, ...}, where ... means *continues without end.*

Complete the graphic organizer.



Real-World Link

- The bottom of a snowboarding halfpipe is 5 meters below the top. Circle the integer you would you use to represent this position?

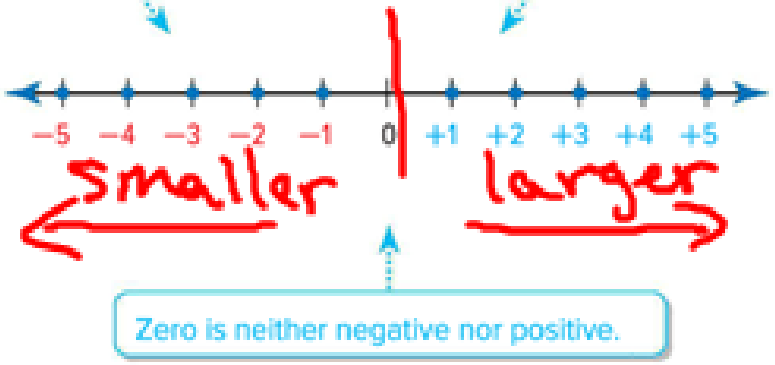
  5 or −5

- Describe another situation that uses negative integers. _____

Identify and Graph Integers

Negative integers are integers less than zero. They are written with a − sign.

Positive integers are integers greater than zero. They can be written with a + sign.



Zero is neither negative nor positive.

Integers can be graphed on a number line. To **graph** an integer on the number line, draw a dot on the line at its location.

Examples

Tutor

Write an integer for each situation.

1. **an average temperature of 5 degrees below normal**

Because it represents *below* normal, the integer is −5.

2. **an average rainfall of 5 inches above normal**

Because it represents *above* normal, the integer is +5 or 5.

Got it? Do these problems to find out.

Write an integer for each situation.

a. 6 degrees above normal

6

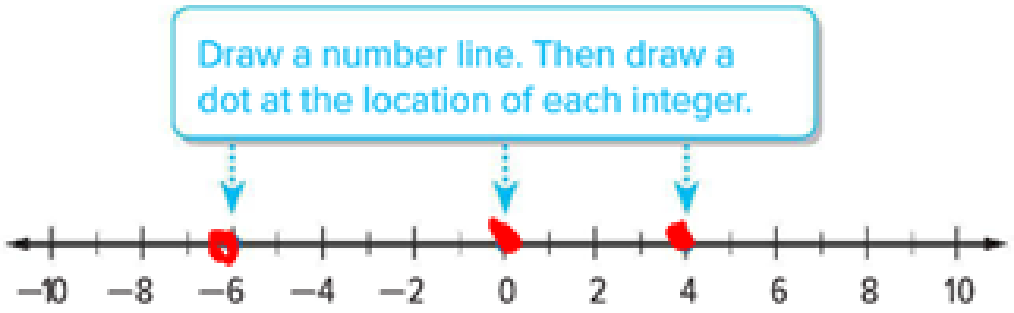
b. 2 inches below normal

−2

Example

Tutor

3. Graph the set of integers $\{4, -6, 0\}$ on a number line.



Got it? Do these problems to find out.

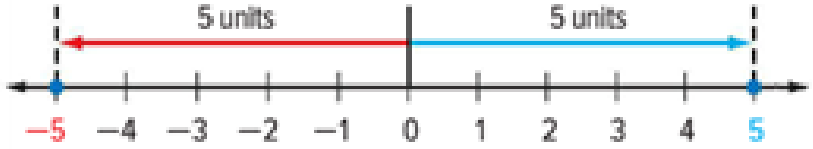
Graph each set of integers on a number line.

c. $\{-2, 8, -7\}$

d. $\{-4, 10, -3, 7\}$

Absolute Value

Words The absolute value of a number is the distance between the number and zero on a number line.



Examples $|-5| = 5$ $|5| = 5$

On the number line in the Key Concept box, notice that −5 and 5 are each 5 units from 0, even though they are on opposite sides of 0. Numbers that are the same distance from zero on a number line have the same **absolute value**.

Examples

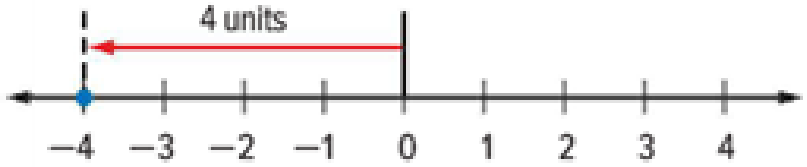
Tutor

Evaluate each expression.

4. $|-4|$ = 4

The graph of -4 is 4 units from 0.

So, $|-4| = 4$.



5. $|-5| - |2|$

$|-5| - |2| = 5 - 2$ $|-5| = 5, |2| = 2$

So, $|-5| - |2| = 3$.

$|-5| - |2|$

$5 - 2$

3

Got it? Do these problems to find out.

e. $|8|$ = 8

f. $2 + |-3|$

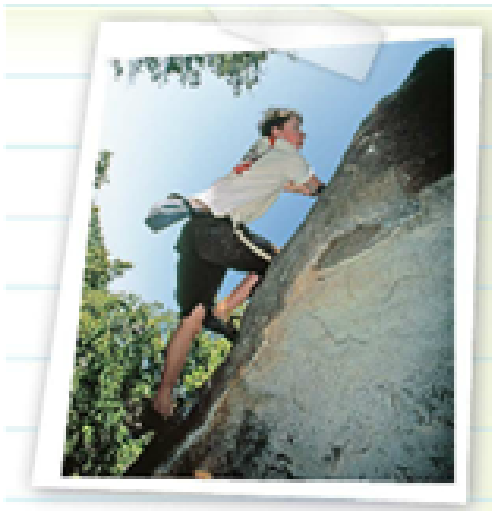
$2 + 3$

5

g. $|-6| - 5$

$6 - 5$

1



Example

6. **Nick climbs 30 feet up a rock wall and then climbs 22 feet down to a landing area. The number of feet Nick climbs can be represented using the expression $|30| + |-22|$. How many feet does Nick climb?**

$|30| + |-22| = 30 + |-22|$ The absolute value of 30 is 30.

$= 30 + 22$ or 52 The absolute value of -22 is 22. Simplify.

So, Nick climbs 52 feet.

Guided Practice

Write an integer for each situation. (Examples 1 and 2)

1. a deposit of $16 _____

2. a loss of 11 yards _____

3. 6°F below zero _____

Show your work.

Evaluate each expression. (Examples 4–6)

4. $|-9| =$ _____

5. $|18| - |-10| =$ _____

6. $|-11| - |-6| =$ _____

7. Graph the set of integers {11, −5, −8} on a number line. (Example 3)

8. **Building on the Essential Question** Why is the absolute value of a nonzero number positive? Explain your reasoning. _____

Got it? Extra Practice

1) $|15| = 15$

2) $|-9| = 9$

3) $|-8| \div 2 + |-5|$

$8 \div 2 + 5$

$4 + 5$

9

4) $|7| \cdot |-3| - 11$

$7 \cdot 3 - 11$

$21 - 11$

10

4, -3, 5, -9, -8, 1

least to greatest

-9, -8, -3, 1, 4, 5

Homework - Unit 1 Lesson 1
Worksheet #1-15