


1-2

Adding and Subtracting Integers

What You'll Learn

To add and subtract integers and to solve problems involving integers

 **New Vocabulary** additive inverses

1-2a

Activity Lab

Modeling Integer Addition and Subtraction

You can use models to add and subtract integers. Use chips of two different colors. Let one color represent positive integers and the other color represent negative integers.

Please get a packet of algebra tiles from the counter. Take out the smallest tiles, and turn them all to the yellow side. All the remaining tiles should go back in the bag.

ACTIVITY

1. Find $5 + 2$.

Show 5 "+" chips.
Then add 2 "+" chips.



There are 7 "+" chips.
So $5 + 2 = 7$.



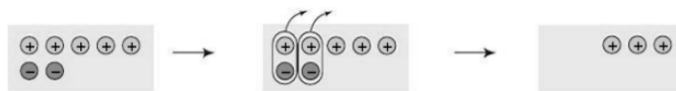
2. Find



To add integers with different signs, use zero pairs. These chips \oplus \ominus are a *zero pair* because $\oplus \ominus = 0$. Removing a zero pair does not change the sum.

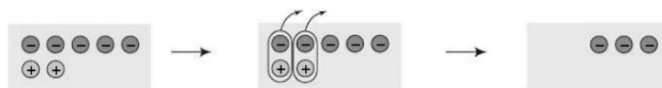
3. Find $5 + (-2)$.

Show 5 "+" chips. Then add 2 "-" chips. Pair the "+" and "-" chips. Remove the pairs. There are 3 "+" chips left. So $5 + (-2) = 3$.



4. Find $-5 + 2$.

Show 5 "-" chips. Then add 2 "+" chips. Pair the "+" and "-" chips. Remove the pairs. There are 3 "-" chips left. So $-5 + 2 = -3$.

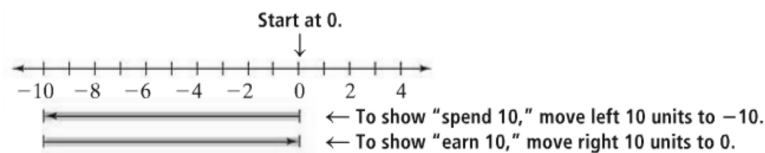


The algebra tiles help us visualize the process of adding and subtracting integers, however, they work well only for small numbers.

Replace your tiles in the bags and put them back on the counter.

We will find another tool to help us with integer addition and subtraction.

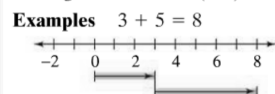
Suppose you have no money. You borrow and spend \$10, and then you earn \$10 babysitting to pay back the money you borrowed. You can add integers on a number line to see how much money you have.



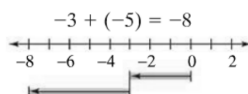
The number line shows that the sum of -10 and 10 is 0 . You are at zero where you started. Two numbers whose sum is 0 are **additive inverses**.

KEY CONCEPTS Adding Integers

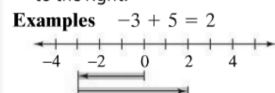
Start at zero. Move to the first integer. Find the absolute value of the second integer and move that distance. If the second integer is positive, move in the positive direction (right). If negative, move in the negative direction (left).



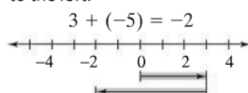
Move to 3. $|5| = 5$. Move 5 to the right.



Move to -3 . $|-5| = 5$. Move 5 to the left.



Move to -3 . $|5| = 5$. Move 5 to the right.



Move to 3. $|-5| = 5$. Move 5 to the left.

Vocabulary Tip

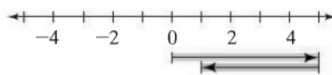
The *absolute value* of a number is its distance from zero on a number line. The symbol for absolute value is a vertical bar on each side of the number.

$$|2| = 2 \text{ and } |-2| = 2$$

EXAMPLE**Adding Integers With a Number Line**

1 Use a number line to find each sum.

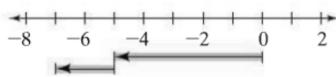
a. $5 + (-4)$



← Move to 5. $| -4 | = 4$.
Move 4 to the left.

The sum is 1.

b. $-5 + (-2)$

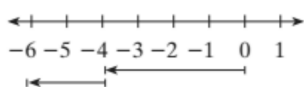


← Move to -5 . $| -2 | = 2$.
Move 2 to the left.

The sum is -7 .

Example

1 **Adding Integers With a Number Line** Use a number line to find the sum $-4 + (-2)$.

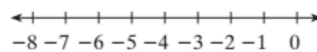


Start at Move 4 units
Then move another 2 units

The sum is

Quick Check

1. Use a number line to find each sum.



a. $-8 + 1$

b. $-1 + (-7)$

c. $-6 + 6$

You can also add integers by using the absolute value of an integer.

EXAMPLE Adding Integers

2 Find each sum.

a. $-18 + (-16) = -34$ ← Both integers are negative. The sum is negative.

b. $-23 + 8$

$|-23| = 23$ and $|8| = 8$ ← Find the absolute value of each integer.

$23 - 8 = 15$ ← Subtract the lesser absolute value from the greater.

$-23 + 8 = -15$ ← The sum has the same sign as the integer with the greater absolute value.



Examples

2 Adding Integers Find $24 + (-6)$.

$|24| = \boxed{}$ and $|-6| = \boxed{}$ ← Find the absolute value of each integer.

$24 - \boxed{} = \boxed{}$ ← Subtract $\boxed{}$ from 24 because $|-6| \boxed{} |24|$.

$24 + (-6) = \boxed{}$ ← The sum has the same sign as $\boxed{}$.

Quick Check

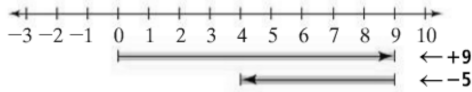
2. Find each sum.

a. $-97 + (-65)$

b. $21 + (-39)$

c. $22 + (-22)$

You can subtract integers, too. The number line shows that $9 - 5 = 4$ and $9 + (-5) = 4$. To subtract 5, add its opposite, -5 .



Subtract 5. $9 - 5 = 4$
 Add the opposite of 5. $9 + (-5) = 4$
 The answer is 4.

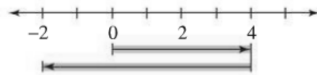
This result suggests a method for subtracting integers. **Put in notebook:**

KEY CONCEPTS Subtracting Integers

To subtract an integer, add its additive inverse, which is its opposite.

EXAMPLES Subtracting Integers

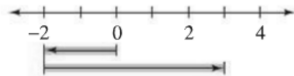
3 Find $4 - 6$.



Start at 0. Move to 4.
 Then add the opposite of 6,
 which is -6 .

$4 - 6 = 4 + (-6) = -2$

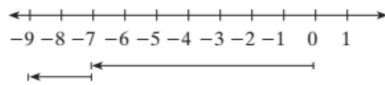
4 Find $-2 - (-5)$.



Start at 0. Move to -2 .
 Then add the opposite of -5 ,
 which is 5.

$-2 - (-5) = -2 + 5 = 3$

5 Subtracting Integers Find $-7 - 2$.



Start at . Move 7 units left.
 Then the opposite of 2,
 which is .

$-7 - 2 = -7$ $(-2) =$

- 4 **Application: Weather** Recorded temperatures at Amundsen-Scott Station in Antarctica have ranged from a low of -89°F to a high of -13°F . Find the difference in temperatures. Subtract to find the difference.

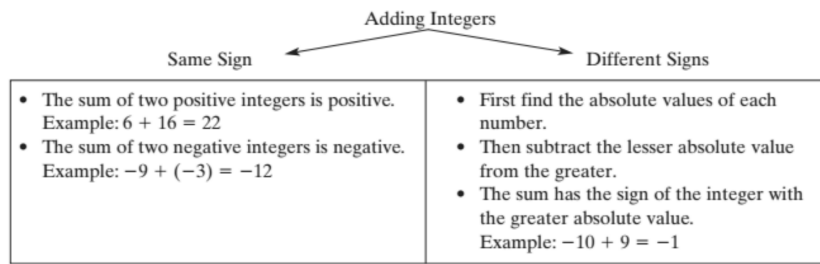
$$\begin{aligned} -13 - (-89) &= -13 + \boxed{} && \leftarrow \text{Add the } \boxed{} \text{ of } -89, \text{ which is } \boxed{}. \\ &= \boxed{} && \leftarrow \text{Simplify.} \end{aligned}$$

The difference in temperatures is $\boxed{}$.

3. Find $-6 - 1$.

4. During the biggest drop of the Mean Streak roller coaster in Ohio, your altitude changes by -155 ft. The Texas GiantTM in Texas has a -137 ft change. How much farther do you drop on the Mean Streak?

Use these rules to add and subtract integers.



Subtracting Integers

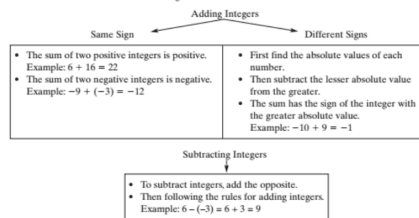
- To subtract integers, add the opposite.
- Then following the rules for adding integers.
Example: $6 - (-3) = 6 + 3 = 9$

You have an assignment worksheet, and time to begin working on it now.

Reteaching 1-2

Adding and Subtracting Integers

Use these rules to add and subtract integers.



Find each sum.

- | | | |
|-----------------------|----------------------|----------------------|
| 1. $8 + (-2)$ _____ | 2. $-9 + 4$ _____ | 3. $3 + (-2)$ _____ |
| 4. $-1 + 11$ _____ | 5. $12 + 13$ _____ | 6. $-9 + 5$ _____ |
| 7. $7 + 2$ _____ | 8. $-1 + (-7)$ _____ | 9. $-3 + 0$ _____ |
| 10. $-1 + (-1)$ _____ | 11. $6 + 5$ _____ | 12. $3 - (-2)$ _____ |

Complete.

13. $-3 - 4$ Change to addition: $-3 +$ _____ $=$ _____
14. $5 - 2$ Change to addition: $5 +$ _____ $=$ _____
15. $-6 - (-10)$ Change to addition: $-6 +$ _____ $=$ _____

Find each difference.

- | | | |
|-----------------------|-----------------------|-----------------------|
| 16. $4 - 5$ _____ | 17. $-5 - 4$ _____ | 18. $-8 - (-7)$ _____ |
| 19. $19 - (-6)$ _____ | 20. $-10 - 12$ _____ | 21. $-12 - 10$ _____ |
| 22. $-4 - (-5)$ _____ | 23. $-2 - (-3)$ _____ | 24. $9 - (-7)$ _____ |
| 25. $0 - 3$ _____ | 26. $6 - 8$ _____ | 27. $0 - (-10)$ _____ |