

**BUILD YOUR VOCABULARY**

This is an alphabetical list of new vocabulary terms you will learn in Chapter 2. As you complete the study notes for the chapter, you will see Build Your Vocabulary reminders to complete each term's definition or description on these pages. Remember to add the textbook page number in the second column for reference when you study.

Vocabulary Term	Found on Page	Definition	Description or Example
absolute value			
additive inverse			
average			
coordinate			
inequality			

Vocabulary Term	Found on Page	Definition	Description or Example
integer			
mean			
negative number			
opposites			
quadrants			

## MAIN IDEAS

- Compare and order integers.
- Find the absolute value of an expression.

## WRITE IT

List 5 words or phrases that indicate positive or negative numbers.

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## BUILD YOUR VOCABULARY (pages 32–33)

A **negative number** is a number less than zero.

Negative numbers like  $-8$ , positive numbers like  $+6$ , and

are members of the set of **integers**.

The  that corresponds to a  is called the **coordinate** of that point.

Any mathematical sentence containing  or  is called an **inequality**.

## EXAMPLE Write Integers for Real-World Situations

1 Write an integer for each situation.

a. 32 feet underground

The integer is .

b. 8 weeks after birth

The integer is .

c. a loss of 6 pounds

The integer is .

**Check Your Progress** Write an integer for each situation.

a. a loss of 12 yards

b. 15 feet above sea level

c. the temperature decreased 4 degrees

**EXAMPLE** Compare Two Integers

- 2 Use the integers graphed on the number line below.



- a. Write two inequalities involving 7 and  $-4$ .

Since 7 is to the  of  $-4$ ,  $7$    $-4$ .

Since  $-4$  is to the  of 7,  $-4$   7.

- b. Replace the  $\bullet$  with  $<$ ,  $>$ , or  $=$  in  $-2 \bullet 3$  to make a true sentence.

3 is  since it lies to the  of  $-2$ .

So,  $-2$   3.

**Check Your Progress**

Use the integers graphed on the number line below.



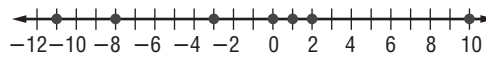
- a. Write two inequalities involving  $-4$  and 1.

- b. Replace the  $\bullet$  with  $<$ ,  $>$ , or  $=$  in  $6 \bullet -7$  to make a true sentence.

**EXAMPLE** Order Integers

- 3 **WEATHER** The high temperatures for the first seven days of January were  $-8^\circ$ ,  $10^\circ$ ,  $2^\circ$ ,  $-3^\circ$ ,  $-11^\circ$ ,  $0^\circ$ , and  $1^\circ$ . Order the temperatures from least to greatest.

Graph each integer on a number line.



The order from least to greatest is

## KEY CONCEPT

**Absolute Value** The absolute value of a number is the distance the number is from zero on the number line. The absolute value of a number is always greater than or equal to zero.

**Check Your Progress FOOTBALL** The yards gained during the first six plays of the football game were 5,  $-3$ , 12,  $-9$ , 6 and  $-1$ . Order the yards from least to greatest.

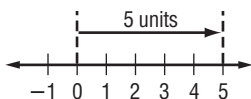
## BUILD YOUR VOCABULARY (page 32)

Two numbers have the same **absolute value** if they are on  sides of zero, and are the same  from zero.

## EXAMPLE Expressions with Absolute Value

4 Evaluate each expression.

a.  $|5|$



The graph of 5 is 5 units from 0.

$$|5| = \boxed{\phantom{00}}$$

b.  $|-8| + |-1|$

$$\begin{aligned} |-8| + |-1| &= \boxed{\phantom{00}} & |-8| &= \boxed{\phantom{00}}, & |-1| &= \boxed{\phantom{00}} \\ &= \boxed{\phantom{00}} & & & & \text{Simplify.} \end{aligned}$$

**Check Your Progress** Evaluate each expression.

a.  $|-9|$

b.  $|-3| + |2|$

## EXAMPLE Algebraic Expressions with Absolute Value

5 ALGEBRA Evaluate the expression  $|x| - 8$  if  $x = -2$ .

$$\begin{aligned} |x| - 8 &= \boxed{\phantom{00}} - 8 & \text{Replace } x \text{ with } \boxed{\phantom{00}}. \\ &= \boxed{\phantom{00}} - 8 & \text{The absolute value of } \boxed{\phantom{00}} \text{ is } \boxed{\phantom{00}}. \\ &= \boxed{\phantom{00}} & \text{Simplify.} \end{aligned}$$

**Check Your Progress** ALGEBRA Evaluate the expression  $5 - |x|$  if  $x = 9$ .

## HOMEWORK ASSIGNMENT

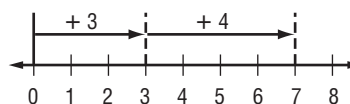
Page(s): \_\_\_\_\_

Exercises: \_\_\_\_\_

## MAIN IDEAS

- Add two integers.
- Add more than two integers.

## EXAMPLE Add Integers on a Number Line

1 Find  $3 + 4$ .Start at .Move  units to the .From there, move  more units to the .

$3 + 4 = \text{input}$

Check Your Progress Find  $-2 + -5$ .

## KEY CONCEPT

**Adding Integers with the Same Sign** To add integers with the same sign, add their absolute values. Give the result the same sign as the integers.

## EXAMPLE Add Integers with the Same Sign

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

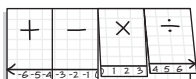
$-5 + (-4) = \text{input}$  Add  and .

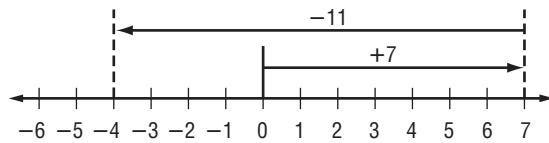
Both numbers are .so the sum is .Check Your Progress Find  $-3 + -8$ .

## FOLDABLES™

## ORGANIZE IT

Under the "+" tab, write a sum of integers with different signs, and explain how to add them on a number line.



**EXAMPLE** Add Integers on a Number Line**3** Find  $7 + (-11)$ .Start at .Move  units to the .From there, move  units to the .

$7 + (-11) =$

**Check Your Progress** Find each sum.

a.  $-5 + 8$

b.  $3 + (-6)$

**EXAMPLE** Add Integers with Different Signs**4** a. Find  $-9 + 10$ .

$-9 + 10 =$

To find  $-9 + 10$ , subtract  from . The sum is positive because  $|10| > |-9|$ .b. Find  $8 + (-15)$ .

$8 + (-15) = -7$

To find  $8 + (-15)$ , subtract  from . The sum is negative because  $|-15| > |8|$ .**KEY CONCEPT**

**Adding Integers with Different Signs** To add integers with different signs, subtract their absolute values. Give the result the same sign as the integer with the greater absolute value.

**Check Your Progress** Find each sum.

a.  $-6 + 11$

b.  $4 + (-7)$

**BUILD YOUR VOCABULARY** (pages 32–33)

Two numbers with same absolute value but different

are called **opposites**.

An integer and its  are called **additive inverses**.

**EXAMPLE**

- 5 WEATHER** On February 1, the temperature at dawn was  $-22^{\circ}\text{F}$ . By noon, it has risen 19 degrees. What was the temperature at noon?

**Words**  
▼  
**Variable**  
▼  
**Equation**

temperature at dawn plus increase by noon equals temperature at noon

Let  = .

+  =

$$-22 + 19 = \text{$$

To find the sum, subtract  from

. The sum is negative because

$$\text{} < \text{$$

The temperature at noon was .

**Check Your Progress**

**HIKING** Dave started his hike at 32 feet below sea level. During the hike he gained an altitude of 29 feet. At what altitude did Dave complete his hike?



**EXAMPLE** Add Three or More Integers**6** a. Find  $-8 + (-4) + 8$ .

$$\begin{aligned}
 -8 + (-4) + 8 &= -8 + \boxed{\phantom{00}} && \text{Commutative Property} \\
 &= \boxed{\phantom{00}} + -4 && \text{Additive Inverse Property} \\
 &= \boxed{\phantom{00}} && \text{Identity Property of Addition}
 \end{aligned}$$

**b.** Find  $6 + (-3) + (-9) + 2$ .

$$\begin{aligned}
 6 + (-3) + (-9) + 2 & \\
 = 6 + \boxed{\phantom{0000}} && \text{Commutative Property} \\
 = [6 + 2] + \boxed{\phantom{0000}} && \text{Associative Property} \\
 = 8 + \boxed{\phantom{00}} \text{ or } \boxed{\phantom{00}} && \text{Simplify.}
 \end{aligned}$$

**Check Your Progress** Find each sum.**a.**  $3 + (-9) + (-3)$ 

**b.**  $-2 + 11 + (-4) + 5$ 

**KEY CONCEPT**

**Additive Inverse Property**  
The sum of any number and its additive inverse is zero.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## Subtracting Integers

## MAIN IDEAS

- Subtract integers.
- Evaluate expressions containing variables.

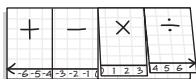
## KEY CONCEPT

**Subtracting Integers** To subtract an integer, add its additive inverse.

## FOLDABLES™

## ORGANIZE IT

Write two examples of subtracting a negative number from a positive number under the “-” tab.



## EXAMPLE Subtract a Positive Integer

1 Find each difference.

a.  $9 - 14$

$$9 - 14 = 9 + \boxed{\phantom{00}}$$

$$= \boxed{\phantom{00}}$$

To subtract 14, add  $\boxed{\phantom{00}}$ .

Simplify.

b.  $-10 - 8$

$$-10 - 8 = -10 + \boxed{\phantom{00}}$$

$$= \boxed{\phantom{00}}$$

To subtract 8, add  $\boxed{\phantom{00}}$ .

Simplify.

## Check Your Progress Find each difference.

a.  $6 - 8$

b.  $-9 - 13$

## EXAMPLE Subtract a Negative Integer

2 Find each difference.

a.  $15 - (-4)$

$$15 - (-4) = 15 + \boxed{\phantom{00}}$$

$$= \boxed{\phantom{00}}$$

To subtract  $-4$ , add  $\boxed{\phantom{00}}$ .

Simplify.

b.  $-11 - (-7)$

$$-11 - (-7) = -11 + \boxed{\phantom{00}}$$

$$= \boxed{\phantom{00}}$$

To subtract  $-7$ , add  $\boxed{\phantom{00}}$ .

Simplify.

## Check Your Progress Find each difference.

a.  $8 - (-2)$

b.  $-12 - (-5)$

**EXAMPLE** Evaluate Algebraic Expressions

- 3** a. Evaluate  $m - (-2)$  if  $m = 4$ .

$$m - (-2) = \boxed{\phantom{00}} - (-2) \quad \text{Replace } m \text{ with } \boxed{\phantom{00}}.$$

$$= \boxed{\phantom{00}} \quad \text{To subtract } -2, \text{ add } \boxed{\phantom{00}}.$$

$$= \boxed{\phantom{00}} \quad \text{Add } \boxed{\phantom{00}} \text{ and } \boxed{\phantom{00}}.$$

- b. Evaluate  $x - y$  if  $x = -14$  and  $y = -2$ .

$$x - y = \boxed{\phantom{00}} - (\boxed{\phantom{00}}) \quad \text{Replace } x \text{ with } \boxed{\phantom{00}} \text{ and } y \text{ with } \boxed{\phantom{00}}.$$

$$= \boxed{\phantom{00}} \quad \text{To subtract } -2, \text{ add } \boxed{\phantom{00}}.$$

$$= \boxed{\phantom{00}} \quad \text{Add } \boxed{\phantom{00}} \text{ and } \boxed{\phantom{00}}.$$

**Check Your Progress**

- a. Evaluate  $p - (-6)$  if  $p = -4$ .

- b. Evaluate  $m - n$  if  $m = -9$  and  $n = -3$ .

**HOMEWORK ASSIGNMENT**

Page(s):

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# Multiplying Integers

## MAIN IDEAS

- Multiply integers.
- Simplify algebraic expressions.

## KEY CONCEPT

### Multiplying Integers

The product of two integers with different signs is negative.

The product of two integers with the same sign is positive.

## EXAMPLE Multiplying Integers with Different Signs

### 1 Find $8(-9)$ .

$$8(-9) = \boxed{\phantom{00}}$$

The factors have different signs.

The product is  $\boxed{\phantom{00}}$ .

## EXAMPLE Multiplying Integers with the Same Sign

### 2 Find $-4(-16)$ .

$$-4(-16) = \boxed{\phantom{00}}$$

The two factors have the same sign.

The product is  $\boxed{\phantom{00}}$ .

## Check Your Progress

Find each product.

a.  $-4(12)$

b.  $-3(-8)$

## EXAMPLE

### 3 TEST EXAMPLE A student missed only four problems on a test, each worth 20 points. What integer represents the total number of points earned for those questions?

A -5

B -20

C 24

D -80

$$4(-20) = \boxed{\phantom{00}}$$

The product is  $\boxed{\phantom{00}}$ .

The answer is  $\boxed{\phantom{00}}$ .

## Check Your Progress

TEST EXAMPLE A football team loses 3 yards on each of 3 consecutive plays. What integer represents the total loss?

A -9

C 6

B -6

D 9

## FOLDABLES™

### ORGANIZE IT

In your own words, describe how to multiply integers under the "x" tab. Give examples of all cases.



**EXAMPLE** Simplify and Evaluate Algebraic Expressions**4** a. Simplify  $8a(-5b)$ .

$$8a(-5b) = (8)(a)(-5)(b)$$

$$= (8 \cdot -5)(ab) \quad \text{Commutative Property of Multiplication}$$

$$= \boxed{\phantom{000}} \quad 8 \cdot -5 = \boxed{\phantom{00}},$$

$$a \cdot b = \boxed{\phantom{00}}$$

**b. Evaluate  $-3xy$  if  $x = -4$  and  $y = 9$ .**

$$-3xy = -3 \boxed{\phantom{000}} \quad x = -4 \text{ and } y = 9.$$

$$= \boxed{\phantom{000}} (9) \quad \text{Associative Property of Multiplication}$$

$$= \boxed{\phantom{00}} (9) \quad \text{The product of } \boxed{\phantom{00}} \text{ and } \boxed{\phantom{00}} \text{ is positive.}$$

$$= \boxed{\phantom{00}} \quad \text{The product of } \boxed{\phantom{00}} \text{ and } \boxed{\phantom{00}} \text{ is positive.}$$

**WRITE IT**

What is the name of the property that allows you to regroup the numbers and the variables being multiplied?

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**Check Your Progress****a. Simplify  $5m(-7n)$ .****b. Evaluate  $-9ab$  if  $a = -3$  and  $b = -6$ .****HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

# Dividing Integers

## MAIN IDEAS

- Divide integers.
- Find the average of a set of data.

## KEY CONCEPTS

**Dividing Integers with the Same Sign** The quotient of two integers with the same sign is positive.

**Dividing Integers with Different Signs** The quotient of two integers with different signs is negative.

### EXAMPLE Divide Integers with the Same Sign

- 1 a. Find  $-28 \div (-4)$ .

$$-28 \div (-4) = \boxed{\phantom{00}}$$

The dividend and the divisor have the same sign. The quotient is

- b. Find  $\frac{96}{8}$ .

$$\frac{96}{8} = 96 \div 8$$

$$= \boxed{\phantom{00}}$$

The dividend and the divisor have the same sign.

The quotient is .

### Check Your Progress

Find each quotient.

- a.  $35 \div 7$

- b.  $\frac{-64}{-4}$

### EXAMPLE Divide Integers with Different Signs

- 2 a. Find  $54 \div (-3)$ .

$$54 \div (-3) = \boxed{\phantom{00}}$$

The signs are different. The quotient is .

- b. Find  $\frac{-42}{6}$ .

$$\frac{-42}{6} = -42 \div 6$$

$$= \boxed{\phantom{00}}$$

The signs are different. The quotient is .

Simplify.

### Check Your Progress

Find each quotient.

- a.  $72 \div (-8)$

- b.  $\frac{-36}{4}$

**EXAMPLE** Evaluate Algebraic Expressions

- 3 Evaluate  $6x \div y$  if  $x = -4$  and  $y = -8$ .

$$\begin{aligned}
 6x \div y &= 6 \boxed{\phantom{00}} \div \boxed{\phantom{00}} & x = -4 \text{ and } y = -8 \\
 &= \boxed{\phantom{00}} \div (-8) & 6(-4) = \boxed{\phantom{00}} \\
 &= \boxed{\phantom{00}} & \text{The quotient is } \boxed{\phantom{00}}.
 \end{aligned}$$

**Check Your Progress** Evaluate  $-4m \div n$  if  $m = -9$  and  $n = -3$ .

**BUILD YOUR VOCABULARY** (pages 32–33)

To find the average, or mean, of a set of numbers, find the  of the numbers and then  by the number in the set.

**FOLDABLES™****ORGANIZE IT**

Describe how to find the average of a set of numbers in your own words under the “ $\div$ ” tab.

**EXAMPLE** Find the Mean

- 4 a. Ian had exam scores of 89, 98, 96, 97, and 95. Find the average (mean) of his scores.

$$\frac{89 + 98 + 96 + 97 + 95}{\boxed{\phantom{00}}}$$

Find the sum of the scores. Then divide by the number of scores.

$$= \boxed{\phantom{00}} \text{ or } \boxed{\phantom{00}}$$

Simplify.

**Check Your Progress** Kyle had test scores of 89, 82, 85, 93, and 96. Find the average (mean) of his test scores.

**HOMEWORK ASSIGNMENT**

Page(s):

Exercises:

## MAIN IDEAS

- Graph points on a coordinate plane.
- Graph algebraic relationships.

## REMEMBER IT



The coordinates in an ordered pair  $(x, y)$  are listed in alphabetical order.

## EXAMPLE Write Ordered Pairs

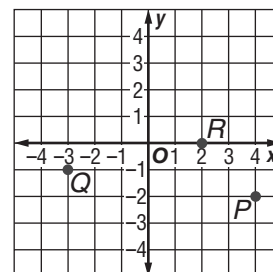
1 Write the ordered pair that names each point.

a.  $P$

The  $x$ -coordinate is .

The  $y$ -coordinate is .

The ordered pair is .



b.  $Q$

The  $x$ -coordinate is .

The  $y$ -coordinate is .

The ordered pair is .

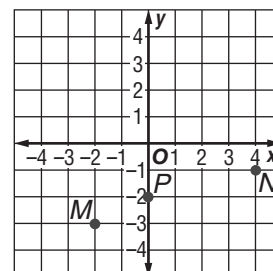
## Check Your Progress

Write the ordered pair that names each point.

a.  $M$

b.  $N$

c.  $P$



## BUILD YOUR VOCABULARY (pages 32–33)

The  $x$ -axis and the  $y$ -axis separate the coordinate plane into  regions, called **quadrants**.



**REVIEW IT**

Give a definition for the origin of a coordinate system. (Lesson 1-5)

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**EXAMPLE** Graph Points and Name Quadrant

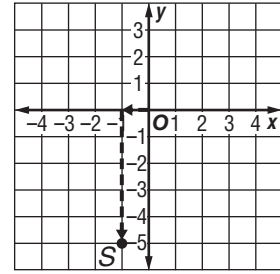
**2** Graph and label each point on a coordinate plane. Then name the quadrant in which each point lies.

**a.**  $S(-1, -5)$

Start at the origin.

Move  unit .

Then move  units   
and draw a dot. Quadrant .

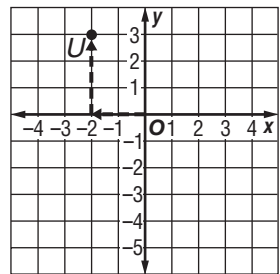


**b.**  $U(-2, 3)$

Start at the origin.

Move  units .

Then move  units   
and draw a dot. Quadrant .



**c.**  $T(0, -3)$

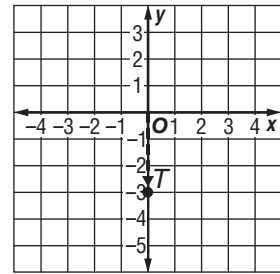
Start at the origin.

Since the  $x$ -coordinate is 0,

the point lies on the .

Move 3 units down, and

draw a dot. Point  $T$  is not in any quadrant.

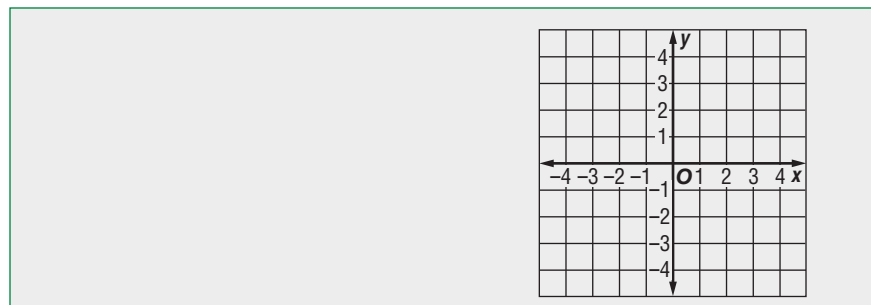


**Check Your Progress** Graph and label each point on a coordinate plane. Name the quadrant in which each point lies.

**a.**  $A(3, -4)$

**b.**  $B(-2, 1)$

**c.**  $C(-4, 0)$



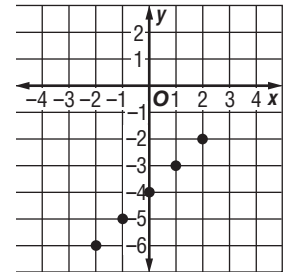
**EXAMPLE** Graph an Algebraic Relationship

- 3 The difference between two integers is 4. If  $x$  represents the first integer and  $y$  is subtracted from it, make a table of possible values for  $x$  or  $y$ . Then graph the ordered pairs and describe the graph.

First, make a table. Choose values for  $x$  and  $y$  that have a difference of 4.

$x - y = 4$		
$x$	$y$	$(x, y)$
2	<input type="text"/>	<input type="text"/>
1	<input type="text"/>	<input type="text"/>
0	<input type="text"/>	<input type="text"/>
-1	<input type="text"/>	<input type="text"/>
-2	<input type="text"/>	<input type="text"/>

Then graph the ordered pairs on a coordinate plane.



The points on the graph are in a line that slants upward to the right. The line crosses the  $y$ -axis at  $-4$ .


- Check Your Progress** The sum of two integers is 3. If  $x$  is the first integer and  $y$  represents the second number, make a table of possible values for  $x$  and  $y$ . Graph the ordered pairs and describe the graph.

**HOMEWORK ASSIGNMENT**

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Exercises: \_\_\_\_\_

## STUDY GUIDE

	VOCABULARY PUZZLEMAKER	<b>BUILD YOUR VOCABULARY</b>
Use your <b>Chapter 2 Foldable</b> to help you study for your chapter test.	To make a crossword puzzle, word search, or jumble puzzle of the vocabulary words in Chapter 2, go to: <a href="http://glencoe.com">glencoe.com</a>	You can use your completed <b>Vocabulary Builder</b> (pages 32–33) to help you solve the puzzle.

## 2-1

## Integers and Absolute Value

1. Order the integers  $\{21, -1, 9, 7, 0, -4, -11\}$  from least to greatest.

Evaluate each expression if  $r = 3$ ,  $s = -2$ , and  $t = -7$ .

2.  $|t| - 6$

3.  $12 - |s - 5|$

4.  $|s + t| - r$

5.  $|rt - 1| \div s$

## 2-2

## Adding Integers

Find each sum.

6.  $-52 + 9$

7.  $7 + (-31) + 4$

8.  $(-8) + 22 + (-15) + 5$

9.  $6 + (-10) + (-12) + 4$

## 2-3

## Subtracting Integers

Find each difference.

10.  $-17 - 26$

11.  $35 - (-14)$

12.  $42 - 19$

13.  $11 - (-18)$

Evaluate each expression if  $p = -6$ ,  $q = 9$ , and  $r = -2$ .

14.  $q - 16$

15.  $r - 4$

16.  $p - q - r$

17.  $q - r - p$

2-4

**Multiplying Integers**

Find each product.

18.  $-4(-16)$

19.  $3(-4)(-11)(2)$

Simplify each expression.

20.  $5b \cdot (-7c)$

21.  $2p(-7q)(-3)$

2-5

**Dividing Integers**

Find each quotient.

22.  $72 \div -9$

23.  $-28 \div 4$

24.  $\frac{-49}{-7}$

25.  $\frac{-144}{18}$

26. Find the average (mean) of 9, -6, 11, 7, 2, and -5.

2-6

**The Coordinate System**

Name the ordered pair for each point graphed on the coordinate plane.

27. A

28. B

29. C

