Get out your homework from Friday and have it ready to check!
Warm Up on the problems below. **We will have a quiz on Wednesday!**

Classwork - Dividing Integers

Warm Up! Solve the following problems.

A) $4(-9) =$ -36 B) $-6(6) =$ -36 C) $-10(-3) =$ 30

D) $(-2)^3 =$ -8 E) $8(-3)(5) =$ -120 F) $(-4)(3)(-9) =$ 108

$(-2)(-2)(-2)$ $-24(5)$ $-12(-9)$

Multiply.

1. $4(-7) = -28$

2. $-14(5) = -70$

3. $9(-12) = -108$

4. $-6(-8) = 48$

5. $25(-3) = -75$

6. $-11(-13) = 143$

7. $-55(0) = 0$

8. $(-7)(-7) = 49$

9. $78(-1) = -78$

10. $(-3)^3 = -27$
$(-3)(-3)(-3)$

11. $(-1)^4 = 1$

12. $(-8)^2 = 64$

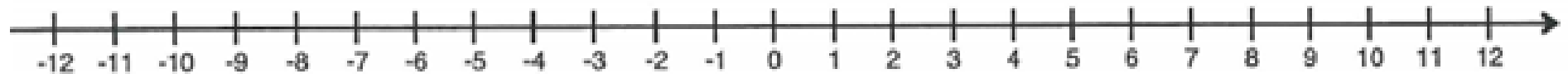13. $-7(4)(8) = -224$

14. $(-5)(4)(-1) = 20$

15. $-5(-1)^3 = 5$
$(-5)(-1)(-1)(-1)$

Use the order of operations and number line below to solve problems 16 – 18.

16. $-4(8) - (-5)$

$-32 - (-5)$

(-27)

17. $-4 + (-5)(-1)$

$-4 + 5$

(1)

18. $(-3)^2 + (-6)$

$9 + (-6)$

(3)

$$\xleftarrow{\quad}\begin{array}{cccccccccccccccccccccccccc} + & + \\ -12 & -11 & -10 & -9 & -8 & -7 & -6 & -5 & -4 & -3 & -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 \end{array}\xrightarrow{\quad}$$

19. **RECREATION** Hiking up a mountain, you notice that the air temperature drops 10°C for every 1,000 meters increase in elevation. Write a multiplication expression to represent the decrease in temperature if you hike up the mountain 3,000 meters. Then evaluate the expression and explain its meaning.

$3(-10) = -30$ The change in temperature is $-30°C$

Real-World Link

Sharks A Great White Shark has 3,000 teeth! It gains and loses teeth often in its lifetime. Suppose a Great White loses 3 teeth each day for 5 days without gaining any. The shark has lost 15 teeth in all.

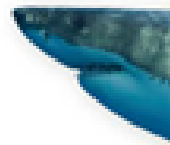1. Write a multiplication sentence for this situation.

   _____

2. Division is related to multiplication. Write two division sentences related to the multiplication sentence you wrote for Exercise 1.

   _____

   _____

Work with a partner to complete the table. The first one is done for you.
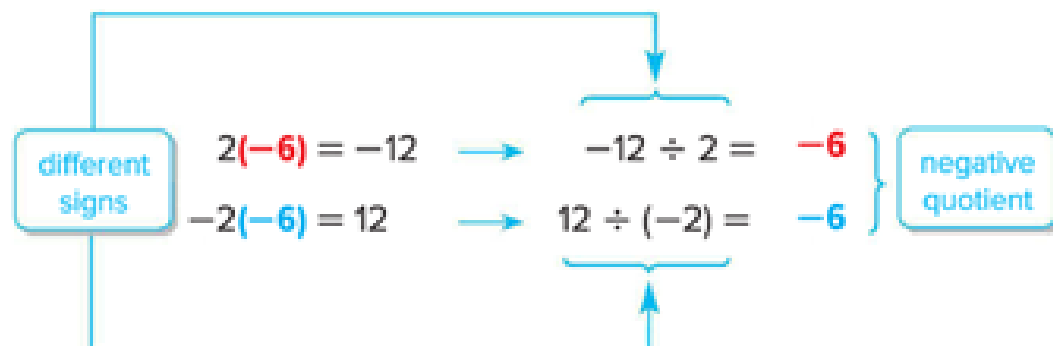
	Multiplication Sentence	Division Sentences	Same Signs or Different Signs?	Quotient	Positive or Negative?
	$2 \times 6 = 12$	$12 \div 6 = 2$	Same signs	2	Positive
		$12 \div 2 = 6$	Same signs	6	Positive
3.	$2 \times (-4) = -8$	$-8 \div 2 = -4$	different	-4	negative
		$-8 \div -4 = 2$	Same	2	positive
4.	$-3 \times 5 = -15$				
5.	$-2 \times (-5) = 10$				

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Divide Integers with Different Signs

Words The quotient of two integers with different signs is negative.

Examples $33 \div (-11) = -3$ $-64 \div 8 = -8$

You can divide integers provided that the divisor is not zero. Since multiplication and division sentences are related, you can use them to find the quotient of integers with different signs.

different signs

$2(-6) = -12 \longrightarrow -12 \div 2 = -6$

$-2(-6) = 12 \longrightarrow 12 \div (-2) = -6$

negative quotient

Examples

Tutor

1. **Find $80 \div (-10)$.**   The integers have different signs.

$80 \div (-10) = -8$ The quotient is negative.

2. **Find $\dfrac{-55}{11}$.**   The integers have different signs.

$\dfrac{-55}{11} = -5$ The quotient is negative.

3. Use the table to find the constant rate of change in centimeters per hour.

The height of the candle decreases by 2 centimeters each hour.

Time (h)	Height (cm)
1	10
2	8
3	6
4	4

+1 −2
+1 −2
+1 −2

$$\frac{\text{change in height}}{\text{change in hours}} = \frac{-2}{1}$$

So, the constant rate of change is −2 centimeters per hour.

Got it? Do these problems to find out.

a. $20 \div (-4)$

-5

b. $\frac{-81}{9}$
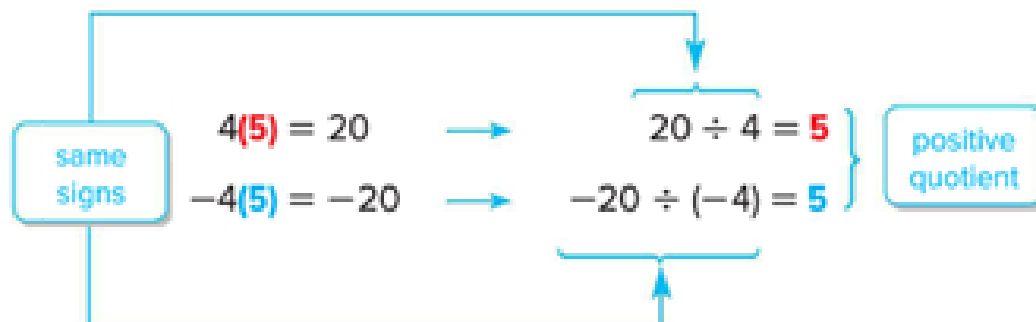
-9

c. $-45 \div 9$

-5

Divide Integers with the Same Signs

Words   The quotient of two integers with the same sign is positive.

Examples $15 \div 5 = 3$ $-64 \div (-8) = 8$

You can also use multiplication and division sentences to find the quotient of integers with the same sign.

same signs

$4(5) = 20 \longrightarrow 20 \div 4 = 5$

$-4(5) = -20 \longrightarrow -20 \div (-4) = 5$

positive quotient

Examples

Tutor

4. Find $-14 \div (-7)$.   The integers have the same sign.

$-14 \div (-7) = 2$ The quotient is positive.

5. Find $\dfrac{-27}{-3}$.   The integers have the same sign.

$\dfrac{-27}{-3} = 9$ The quotient is positive.

Examples

4. Find $-14 \div (-7)$.   The integers have the same sign.

$-14 \div (-7) = 2$ The quotient is positive.

5. Find $\frac{-27}{-3}$.   The integers have the same sign.

$\frac{-27}{-3} = 9$ The quotient is positive.

6. Evaluate $-16 \div x$ if $x = -4$.

$-16 \div x = -16 \div (-4)$ Replace x with -4.

$= 4$ Divide. The quotient is positive.

Got it? Do these problems to find out.

d. $-24 \div (-4)$ e. $-9 \div (-3)$ f. $\frac{-28}{-7}$

g. Evaluate $a \div b$ if $a = -33$ and $b = -3$.

$-33 \div (-3)$

d) 6

e) 3

f) 4

g) 11

7. **STEM** One year, the estimated Australian koala population was 1,000,000. After 10 years, there were about 100,000 koalas. Find the average change in the koala population per year. Then explain its meaning.

$$\frac{N - P}{10} = \frac{100,000 - 1,000,000}{10}$$

N is the new population, 100,000. *P* is the previous population, 1,000,000.

$$= \frac{-900,000}{10} \text{ or } -90,000$$

Divide.

The koala population has changed by −90,000 per year.

$$5 \overline{)56.}$$

$$\frac{11 \cdot 2}{}$$

Got it? Do this problem to find out.

h. **STEM** The average temperature in January for North Pole, Alaska, is −24°C. Use the expression $\frac{9C + 160}{5}$ to find this temperature in degrees Fahrenheit. Round to the nearest degree. Then explain its meaning.

$$\frac{9(-24) + 160}{5} = \frac{-216 + 160}{5} = \frac{-56}{5} \approx \frac{-55}{5} = \boxed{-11°F}$$

Guided Practice

Check ✓

Divide. (Examples 1, 2 , 4, and 5)

1. $-16 \div 2 =$ -8

2. $\frac{42}{-7} =$ -6

3. $-30 \div (-5) =$ 6

Evaluate each expression if $x = 8$ and $y = -5$. (Example 6)

4. $15 \div y$ -3

$$15 \div (-5)$$

5. $xy \div (-10)$ 4

$$(8)(-5) \div (-10)$$
$$-40 \div (-10)$$
$$4$$

6. $(x + y) \div (-3)$ -1

$$(8 + (-5)) \div (-3)$$
$$3 \div (-3)$$
$$-1$$