2-4 Multiplying and Dividing Integers

Learn to multiply and divide integers.

You can think of multiplication as repeated addition.

$3 \cdot 2 = 2 + 2 + 2 = 6$ and

$3 \cdot (-2) = (-2) + (-2) + (-2) = -6$

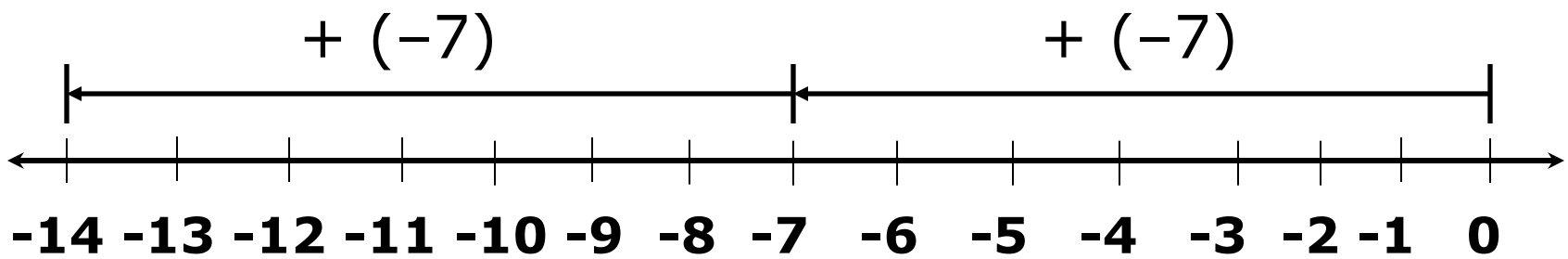
Additional Example 1A: Multiplying Integers Using Repeated Addition

Use a number line to find each product.

$-7 \cdot 2$

$-7 \cdot 2 = 2 \cdot (-7)$

Use the Commutative Property.



Think: Add -7 two times.

$-7 \cdot 2 = -14$

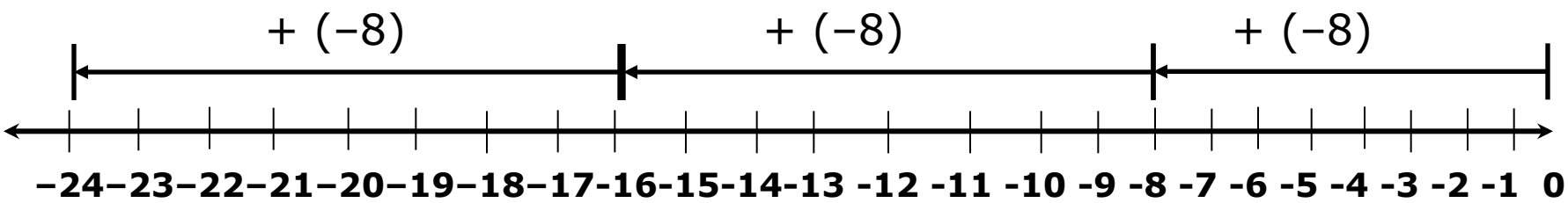
Additional Example 1B: Multiplying Integers Using Repeated Addition

Use a number line to find each product.

$-8 \cdot 3$

$-8 \cdot 3 = 3 \cdot (-8)$

Use the Commutative Property.



Think: Add –8 three times.

$-8 \cdot 3 = -24$

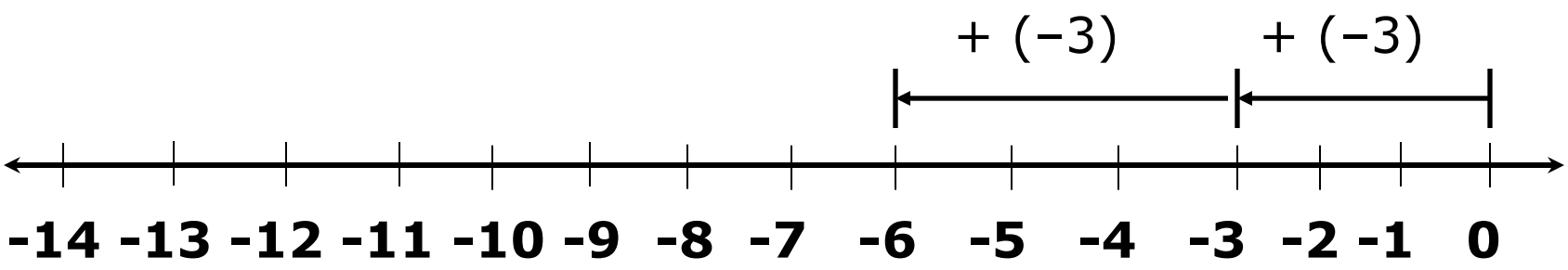
Check It Out: Example 1A

Use a number line to find each product.

$-3 \cdot 2$

$-3 \cdot 2 = 2 \cdot (-3)$

Use the Commutative Property.



Think: Add -3 two times.

$-3 \cdot 2 = -6$

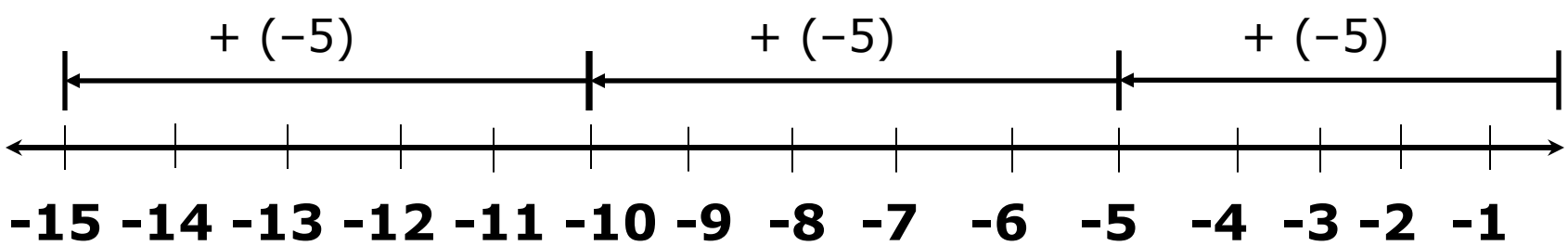
Check It Out: Example 1B

Use a number line to find each product.

$-5 \cdot 3$

$-5 \cdot 3 = 3 \cdot (-5)$

Use the Commutative Property.



Think: Add –5 three times.

$-5 \cdot 3 = -15$

Remember!

Multiplication and division are inverse operations. They "undo" each other. Notice how these operations undo each other in the patterns shown.

2-4 Multiplying and Dividing Integers

The patterns below suggest that when the signs of integers are different, their product or quotient is *negative*. The patterns also suggest that the product or quotient of two negative integers is *positive.*

$$-3 \cdot 2 = -6$$
$$-3 \cdot 1 = -3$$
$$-3 \cdot 0 = 0$$
$$-3 \cdot (-1) = 3$$
$$-3 \cdot (-2) = 6$$

$$-6 \div (-3) = 2$$
$$-3 \div (-3) = 1$$
$$0 \div (-3) = 0$$
$$3 \div (-3) = -1$$
$$6 \div (-3) = -2$$

MULTIPLYING AND DIVIDING TWO INTEGERS

If the signs are:		Your answer will be:
the same	→	positive
different	→	negative

Additional Example 2: Multiplying Integers

Find each product.

A. $-6 \cdot (-5)$

$-6 \cdot (-5)$

30

Both signs are negative, so the product is positive.

B. $-4 \cdot 7$

$-4 \cdot 7$

-28

The signs are different, so the product is negative.

Check It Out: Example 2

Find each product.

A. $-2 \cdot (-8)$

$-2 \cdot (-8)$

16

Both signs are negative, so the product is positive.

B. $-3 \cdot 5$

$-3 \cdot 5$

-15

The signs are different, so the product is negative.

Additional Example 3: Dividing Integers

Find each quotient.

A. 35 ÷ (–5)

35 ÷ (–5) *Think: 35 ÷ 5 = 7.*

–7 *The signs are different, so the quotient is negative.*

B. –32 ÷ (–8)

–32 ÷ (–8) *Think: 32 ÷ 8 = 4.*

4 *The signs are the same, so the quotient is positive.*

Additional Example 3: Dividing Integers

Find the quotient.

C. –48 ÷ 6

–48 ÷ 6

Think: 48 ÷ 6 = 8.

–8

The signs are different, so the quotient is negative.

Check It Out: Example 3

Find each quotient.

A. –12 ÷ 3

–12 ÷ 3 *Think: 12 ÷ 3 = 4.*

–4 *The signs are different, so the quotient is negative.*

B. 45 ÷ (–9)

45 ÷ (–9) *Think: 45 ÷ 9 = 5.*

–5 *The signs are different, so the quotient is negative.*

Check It Out: Example 3

Find the quotient.

C. –25 ÷ (–5)

–25 ÷ –5

Think: 25 ÷ 5 = 5.

5

The signs are the same, so the quotient is positive.

Zero divided by any number is zero, but you cannot find an answer for division by zero. For example $-6 \div 0 \neq 0$, because $0 \cdot 0 \neq -6$. We say that division by zero is undefined.

Additional Example 4: Averaging Integers

Mrs. Johnson kept track of a stock she was considering buying. She recorded the price change each day. What was the average change per day?

Day	Mon	Tue	Wed	Thu	Fri
Price Change ($)	–$1	$3	$2	–$5	$6

$(-1) + 3 + 2 + (-5) + 6 = 5$

Find the sum of the changes in price.

$5 \div 5 = 1$

Divide to find the average.

The average change was $1 per day.

Check It Out: Example 4

Mr. Reid kept track of his blood sugar daily. He recorded the change each day. What was the average change per day?

Day	Mon	Tue	Wed	Thu	Fri
Unit Change	–8	2	4	–9	6

$(-8) + 2 + 4 + (-9) + 6 = -5$

Find the sum of the changes in blood sugar.

$-5 \div 5 = -1$

Divide to find the average.

The average change per day was –1 unit.