Warm Up

Problem of the Day

Lesson Presentation

Warm Up

Evaluate each expression.

1. 17 · 5   **2.** 8 · 34   272

85

3. 4 · 86   **4.** 20 · 850   17,000

344

5. 275 ÷ 5   **6.** 112 ÷ 4   28

55

Problem of the Day

A teacher assigns 5 points for a correct answer, and –2 points for an incorrect answer, and 0 points for leaving the questioned unanswered. What is the score for a student who had 22 correct answers, 15 incorrect answers, and 7 unanswered questions?

80

Learn to multiply and divide integers.

You can think of multiplication as repeated addition.

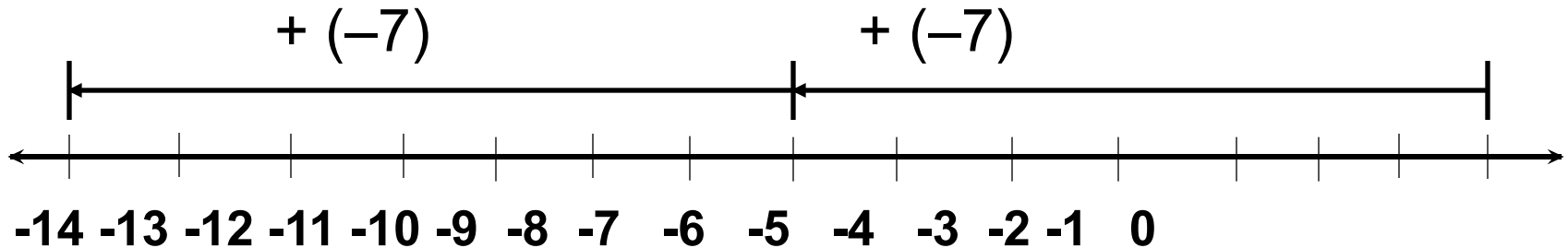3 · 2 = 2 + 2 + 2 = 6 and

3 · (–2) = (–2) + (–2) + (–2) = –6

Additional Example 1A: Multiplying Integers Using Repeated Addition

Use a number line to find each product.

−7 · 2

−7 · 2 = 2 · (-7)   *Use the Commutative Property.*

+ (−7)   + (−7)

-14 -13 -12 -11 -10 -9 -8 -7   -6   -5   -4   -3 -2 -1   0

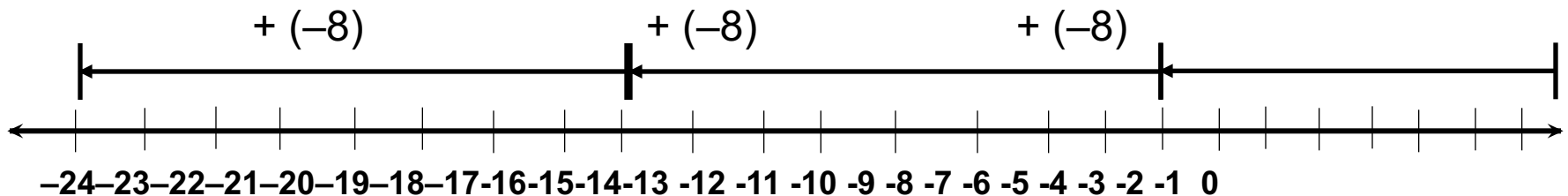*Think: Add -7 two times.*

−7 · 2 = −14

Additional Example 1B: Multiplying Integers Using Repeated Addition

Use a number line to find each product.

–8 · 3

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

Use the Commutative Property.

+ (–8)   + (–8)   + (–8)

–24 –23 –22 –21 –20 –19 –18 –17 –16 –15 –14 –13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0

Think: Add –8 three times.

$$-8 \cdot 3 = -24$$

Check It Out: Example 1A

Use a number line to find each product.

–3 · 2

–3 · 2 = 2 · (-3)

Use the Commutative Property.

+ (–3)   + (–3)

-14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0
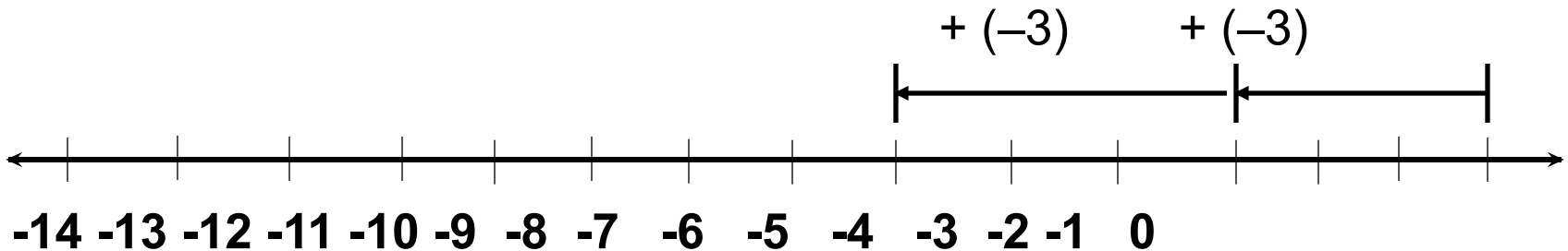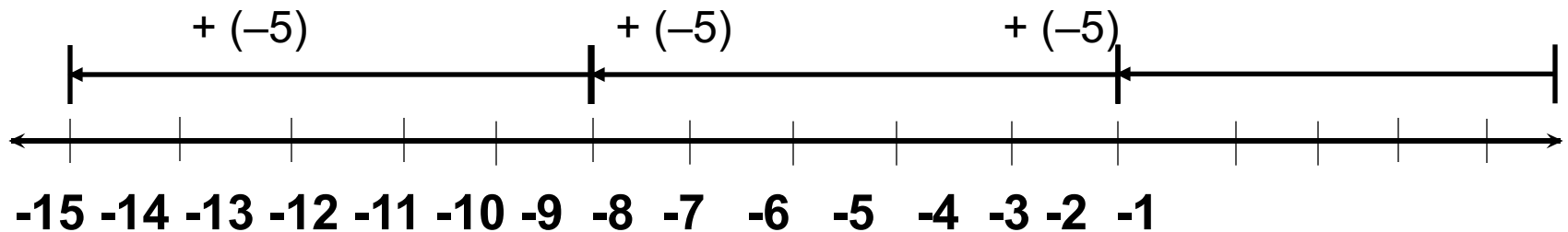
Think: Add -3 two times.

–3 · 2 = –6

Check It Out: Example 1B

Use a number line to find each product.

−5 · 3

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

Use the Commutative Property.

+ (−5)   + (−5)   + (−5)

-15 -14 -13 -12 -11 -10 -9 -8 -7   -6   -5   -4 -3 -2 -1

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.

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 INTEGERS	
If the signs are:	**Your answer will be:**
the same $\longrightarrow$	positive
different $\longrightarrow$	negative

Additional Example 2: Multiplying Integers

Find each product.

A. –6 · (–5)

–6 · (–5)   *Both signs are negative, so the product is positive.*

30

B. –4 · 7

–4 · 7   *The signs are different, so the product is negative.*

-28

Check It Out: Example 2

Find each product.

A. –2 · (–8)

–2 · (–8)   *Both signs are negative, so the product is positive.*

16

B. –3 · 5

–3 · 5   *The signs are different, so the product is negative.*

–15

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

$$-12 \div 3$$ *Think: 12 ÷ 3 = 4.*

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

B. 45 ÷ (–9)

$$45 \div (-9)$$ *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)

$$-25 \div -5$$

$$5$$

Think: 25 ÷ 5 = 5.

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

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 ÷ 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 ÷ 5 = –1

Divide to find the average.

The average change per day was –1 unit.

Lesson Quiz: Part I

Use a number line to find the product.

1. −8 · 2   −16
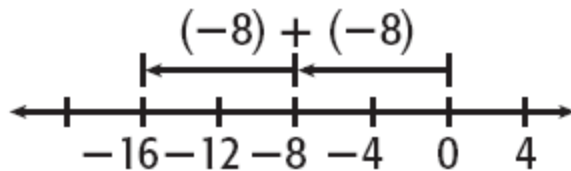
Find each product or quotient.

2. −3 · 5 · (−2)   30

3. −75 ÷ 5   −15

4. −110 ÷ (−2)   55

Lesson Quiz: Part II

5. The temperature at Bar Harbor, Maine, was –3°F. It then dropped during the night to be 4 times as cold. What was the temperature then?

–12°F