Name: _____ **Date:** _____

Lesson 4-2: Multiplying Positive Integers on the Quadrant Mat

Positive factors go on the top and right parts of the Factor Track.

Example: Use the Factor Track and Quadrant Mat. Model 2 × 4.

Step 1.

Model the factors on the Factor Track. The plus signs show you where to put the two factors.

Step 2.

Solve. Build the product rectangle on the mat. Remove the Factor Track when you are finished.

Step 3.

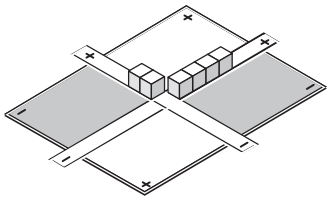
Read the mat. Notice the plus sign in this part of the mat. This means the product is positive.

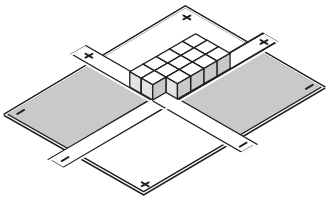
Product: 8

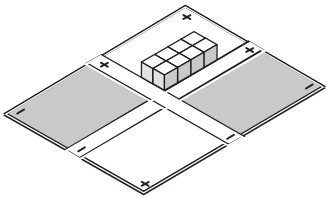
Step 4.

Record.

2 × 4 = 8







Try It

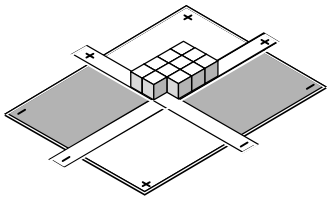
1. Which two parts of the Factor Track are used for positive factors? _____

2. If you multiply two positive numbers, where will the product rectangle be? _____

Practice

The drawings show Step 2 for each problem. Complete each problem.

3.



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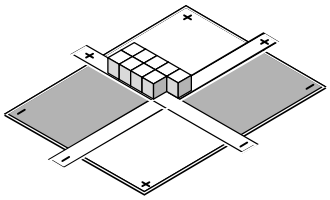
4.



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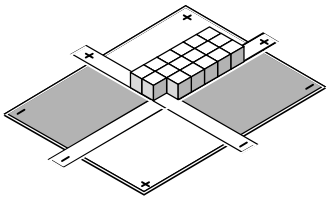

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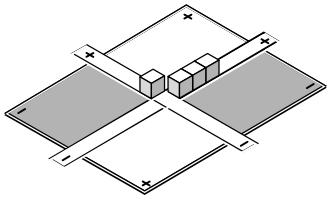
The drawings show Step 1 for each problem. Complete each problem.

6.



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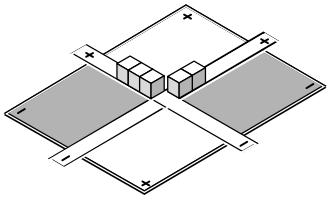

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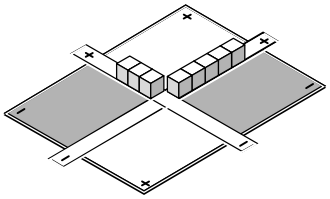

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Lesson 4-3: Multiplying Positive and Negative Integers

The product of a positive factor and a negative factor is negative.

Example: $3 \times {}^{-}4 =$

Step 1.

A positive factor goes on the top or right. A negative factor goes on the left or bottom.

Step 2.

Solve. Build the product rectangle. Remove the Factor Track when finished.

Step 3.

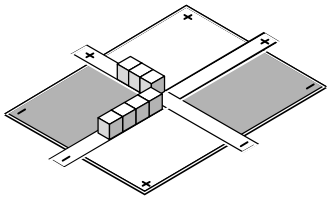
Read the mat. Notice the minus sign in this part of the mat.

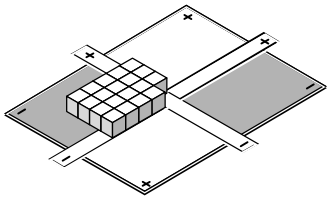
Product: $^{-}12$

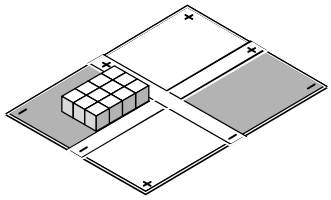
Step 4.

Record.

$3 \times {}^{-}4 = {}^{-}12$







Try It

1. Show another way to solve $3 \times {}^{-}4$. Build the positive factor horizontally. Build the negative factor vertically.
Where is the product rectangle? _____

_____

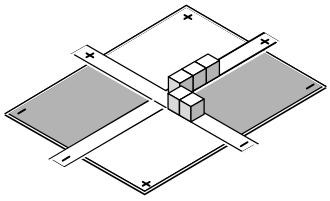
_____

2. A student put the factor 3 on the top of the Factor Track and the factor $^{-}4$ on the bottom of the track.
Why won't this work? _____

Practice

The drawings show Step 1 for each problem. Complete each problem. Record.

3.



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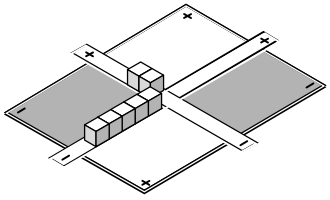
4.



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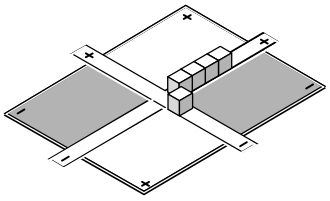
5.



_____

Model each product.

6. $^{-}2 \times 4 =$ _____

7. $3 \times {}^{-}3 =$ _____

8. $^{-}4 \times 5 =$ _____

9. $2 \times {}^{-}5 =$ _____

10. $^{-}1 \times 3 =$ _____

11. $1 \times {}^{-}2 =$ _____

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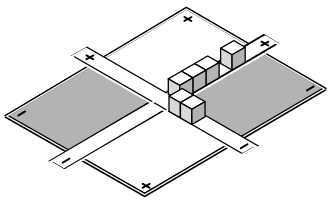
Lesson 4-5: Modeling the Distributive Property of Multiplication

The Distributive Property relates a product to a sum.

Example: Show that the product $-2 \times (3 + 1)$ equals a sum.

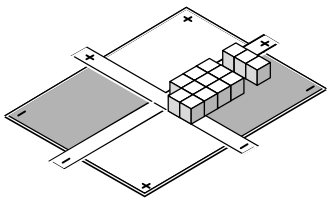
Step 1.

Model the factors. The second factor is a sum.



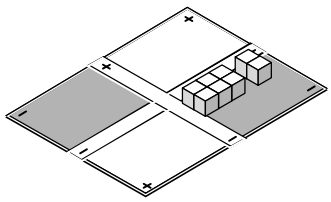
Step 2.

Build the two product rectangles. Remove the Factor Track.



Step 3.

Read the mat. Notice that two products are shown. Products: 6 and 2



Step 4.

Record.

$-2 \times (3 + 1)$
$= (-2 \times 3) + (-2 \times 1)$

Try It

1. How is the sum 3 + 1 shown on the Factor Track? _____

2. Do you think it would be good to remove the Factor Track after Step 2? Why or why not? _____

_____

3. Model the product $-2 \times (3 + 1)$ in a different way. Start by showing -2 on the left side of the Factor Track. Then put the factor 3 + 1 on the top part of the track.

Practice

Model the factors. Then complete the sums.

4. $2 \times (6 + 1) = (2 \times \_\_\_) + (2 \times \_\_\_)$

5. $-4 \times (3 + 2) = (-4 \times \_\_\_) + (-4 \times \_\_\_)$

6. $-3 \times (1 + 3) = (-3 \times \_\_\_) + (-3 \times \_\_\_)$

7. $1 \times (5 + 2) = (1 \times \_\_\_) + (1 \times \_\_\_)$

8. $6 \times (2 + 4) = (6 \times \_\_\_) + (6 \times \_\_\_)$

9. $-2 \times (3 + 4) = (-2 \times \_\_\_) + (-2 \times \_\_\_)$

10. $3 \times (4 + 2) =$ _____ + _____

11. $-1 \times (5 + 3) =$ _____ + _____

12. $-5 \times (1 + 3) =$ _____ + _____

13. $3 \times (2 + 6) =$ _____ + _____

14. $2 \times (4 + 1) =$ _____ + _____

15. $-3 \times (3 + 2) =$ _____ + _____

Critical Thinking

16. Use a model to show that the Distributive Property holds for $-3 \times (-2 + 4)$.

_____

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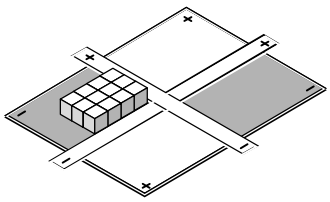
Lesson 4-7: Factoring Integers

Building different rectangles can help you find factors of integers.

Example: Find factors of −12.

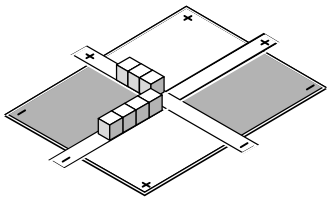
Step 1.

Use 12 unit blocks to build a rectangle on a negative section of the mat.



Step 2.

Put the factors on the Factor Track. Then remove the rectangle.



$-12 = -4 \times 3$

−4 and 3 are two factors.

Step 3.

Repeat Steps 1 and 2 to find another pair of factors. Read the mat to record each pair.

−4 and 3	4 and −3
6 and −2	−6 and 2
1 and −12	−1 and 12

Step 4.

Record all the factors you find.

The factors of −12 are 1, 2, 3, 4, 6, 12, −1, −2, −3, −4, −6, and −12.

Try It

1. In Step 1, why is the rectangle built on a negative part of the Quadrant Mat? _____

_____

2. What rectangle would you build to show that −6 and 2 are factors of −12? _____

_____

Practice

Find all the factors of each number. Build rectangles on the Quadrant Mat to help.

3. −6 _____

4. 8 _____

5. 10 _____

6. −3 _____

7. −13 _____

8. 15 _____

9. −16 _____

10. −20 _____

Critical Thinking

11. Show that any non-zero integer has at least four factors. _____

_____

12. Does every non-zero integer have a factor of −1? Why or why not? _____

_____

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