GETTING READY FOR GRADE 7

GR4.1 Algebraic Expressions

Engage

ESSENTIAL QUESTION

How can you model factoring expressions? I can arrange algebra tiles to form a rectangle and multiply the length by the width.

Motivate the Lesson

Ask: An algebraic expression contains a variable. Sometimes an algebraic expression can be written differently by factoring. What does it mean to factor an algebraic expression? Begin the Explore Activity to find out.

Explore

EXPLORE ACTIVITY Questioning Strategies

- What are the dimensions of each tile? The *x*-tile is *x* units long and 1 unit wide. The 1-tiles are 1 unit long and 1 unit wide.
- What do the dimensions of the rectangle represent? the factors

Explain

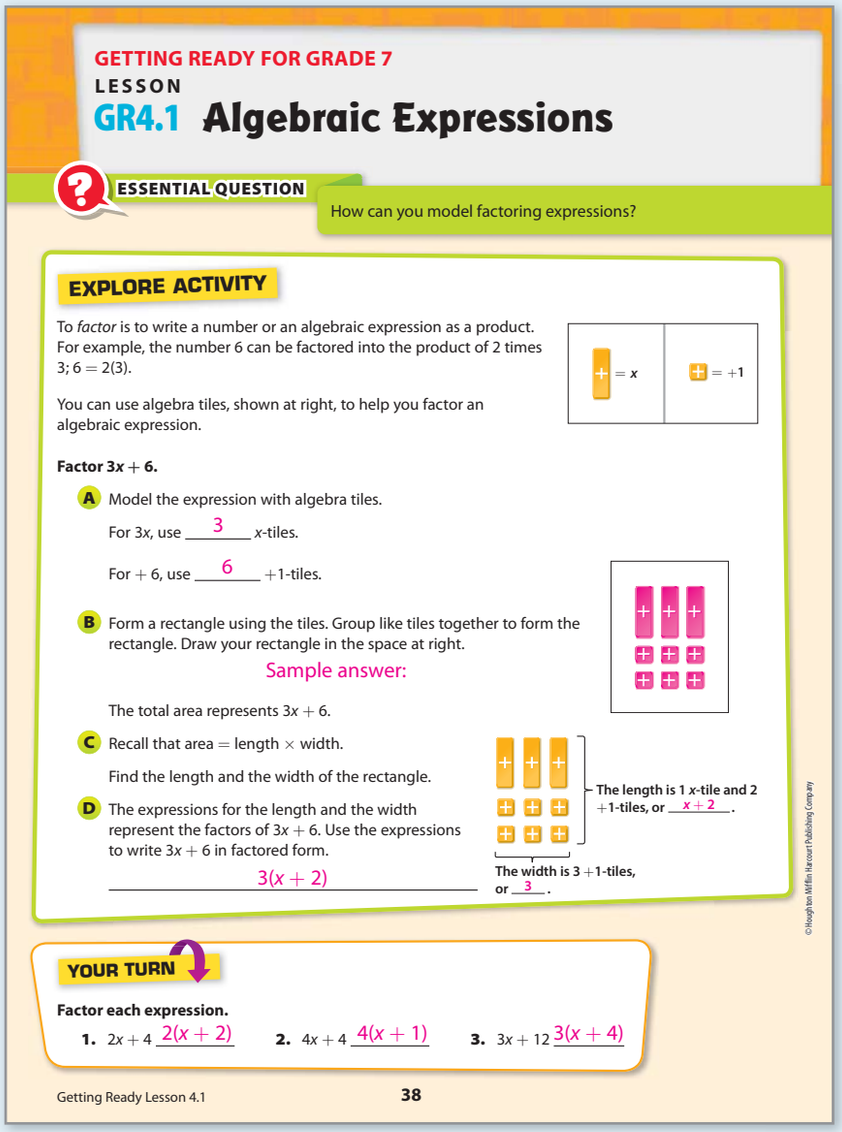
YOUR TURN

Focus on Modeling Mathematical Processes and Practices

Have students use algebra tiles to model each exercise. Point out that as the coefficients and constants get larger, modeling becomes more cumbersome. Remind students to write the numerical factor to the left of the algebraic factor and that the parentheses indicate multiplication.

Avoid Common Errors

Exercise 2 Some students may factor the expression as $4(x + 1)$ while others may write $2(2x + 2)$. Explain that the correct answer is found by placing the greatest common factor outside the parentheses.



GETTING READY FOR GRADE 7
LESSON
GR4.1 Algebraic Expressions

ESSENTIAL QUESTION
How can you model factoring expressions?

EXPLORE ACTIVITY

To *factor* is to write a number or an algebraic expression as a product. For example, the number 6 can be factored into the product of 2 times 3; $6 = 2(3)$.

You can use algebra tiles, shown at right, to help you factor an algebraic expression.

+ = x + = +1

Factor $3x + 6$.

A Model the expression with algebra tiles.

For $3x$, use 3 *x*-tiles.

For $+6$, use 6 $+1$-tiles.

B Form a rectangle using the tiles. Group like tiles together to form the rectangle. Draw your rectangle in the space at right.

Sample answer:

The total area represents $3x + 6$.

C Recall that area = length × width.

Find the length and the width of the rectangle.

D The expressions for the length and the width represent the factors of $3x + 6$. Use the expressions to write $3x + 6$ in factored form.

$3(x + 2)$

The length is 1 *x*-tile and 2 $+1$-tiles, or $x + 2$.

The width is 3 $+1$-tiles, or 3.

YOUR TURN

Factor each expression.

1. $2x + 4$ $2(x + 2)$
2. $4x + 4$ $4(x + 1)$
3. $3x + 12$ $3(x + 4)$

ADDITIONAL PRACTICE

Factor each expression.

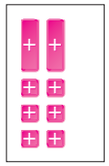
1. $2x + 8$ $2(x + 4)$
2. $3x + 3$ $3(x + 1)$
3. $4x + 16$ $4(x + 4)$
4. $6x + 6$ $6(x + 1)$
5. $2x + 6$ $2(x + 3)$
6. $7x + 14$ $7(x + 2)$
7. $4x + 20$ $4(x + 5)$
8. $3x + 18$ $3(x + 6)$
9. $5x + 15$ $5(x + 3)$
10. $8x + 16$ $8(x + 2)$

Guided Practice

1. Factor $2x + 6$.

How many tiles do you need?

2 x-tiles and 6 +1-tiles



Arrange the tiles into a rectangle. Draw your rectangle in the space at right. Sample answer:

What is the length of the rectangle? 1 x-tile and 3 +1-tiles, or $x + 3$

What is the width of the rectangle? 2 +1-tiles, or 2

Write $2x + 6$ in factored form. $2(x + 3)$

ESSENTIAL QUESTION CHECK-IN

2. How can algebra tiles help you factor an algebraic expression?

Sample answer: Model the expression using the tiles. Then form the tiles into a rectangle. The length and width of the rectangle represent the factors of the expression.

Independent Practice

Factor each expression.

3. $2x + 2$ $2(x + 1)$

4. $3x + 9$ $3(x + 3)$

5. $4x + 8$ $4(x + 2)$

6. $5x + 10$ $5(x + 2)$

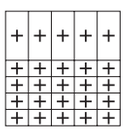
7. $4x + 12$ $4(x + 3)$

8. $3x + 15$ $3(x + 5)$

9. The area of a square can be represented by the expression $2x + 10$. What are two factors that could represent its length and width?

Sample answer: 2 and $x + 5$

10. Candace drew the diagram shown at the right to factor an expression. If the shapes represent algebra tiles, what expression did she factor? What are its factors? Explain.



$5x + 20$; $5(x + 4)$; In algebra tiles, rectangles represent x and squares represent +1. So the length is $x + 4$ and the width is 5.

Elaborate

Talk About It

Summarize the Lesson

Ask: How does modeling an expression with algebra tiles help you factor the expression? By making a rectangle with the algebra tiles, the length and width of the rectangle are the factors of the expression.

GUIDED PRACTICE

Engage with the Whiteboard

Ask student volunteers to draw tiles to represent their rectangles. Have them explain how they identified the length and width from their models.

Avoid Common Errors

Exercise 1 Remind students to check that they have factored correctly by using the distributive property to find the product of the factors. The product must be equal to the original expression.

Evaluate

LESSON QUIZ

Factor each expression.

1. $3x + 12$ $3(x + 4)$

2. $2x + 10$ $2(x + 5)$

3. $4x + 12$ $4(x + 3)$

4. $5x + 5$ $5(x + 1)$

5. $6x + 12$ $6(x + 2)$

H.O.T. FOCUS ON HIGHER ORDER THINKING

1. **Analyze Relationships** An algebra tile that represents −1 is similar to the algebra tile that represents +1, except that is has the minus sign "−" on the tile rather than the plus sign. How would you use algebra tiles to represent and factor $2x - 2$? Use two x-tiles and two −1-tiles. Make a rectangle. The factors are 2 and $x - 1$. **DOK 3; MP.4**

2. **Analyze Relationships** Is the expression $4(2x + 2)$ fully factored? How do you know? What is the fully factored expression? No, because $2x + 2$ can be factored again; $8(x + 1)$ **DOK 3; MP.7**

3. **Critical Thinking** Wanda models a rectangle with a length of $2x + 6$ and a width of 3. What is the area of the rectangle? What are the factors of the expression that represents the area? Explain. Area is $(2x + 6)(3) = 6x + 18$ and $6x + 18 = 6(x + 3)$. **DOK 3; MP.4**

4. **Multiple Representations** Xavier uses four x-tiles and six +1-tiles to make a rectangle. What algebraic expression does the rectangle represent? What are the factors of the expression? $4x + 6$; $2(2x + 3)$ **DOK 2; MP.4**