

Using Algebra Tiles to Provide a Concrete Model for Factoring

Jim Rahn
www.jamesrahn.com
James.rahn@verizon.net

Multiplication Using the Area Model

Draw a rectangle that measures 3 by 8 using the grid at the top of the page.

What is the area of the rectangle?

Separate the rectangle into two parts by drawing a vertical line so that one rectangle has an area of 9.

Distributive Property Template

$(3 \times \underline{\quad}) + (3 \times \underline{\quad}) = 3(3 + \underline{\quad})$

Write the dimensions of both sections and find the area of each.

Complete the following statement:

Draw a rectangle that measures 5 by 9 using the grid at the top of the page.

What is the area of the rectangle?

Separate the rectangle into two parts by drawing a vertical line so that one part is 5 by 3

Distributive Property Template

$(5 \times \underline{\quad}) + (5 \times \underline{\quad}) = 5(3 + \underline{\quad})$

Write the dimensions of both sections and find the area of each.

Complete the following statement:

Draw a rectangle that measures 6 by 10 using the grid at the top of the page.

What is the area of the rectangle?

Separate the rectangle into two parts to illustrate 6×4 and 6×6 .

Distributive Property Template

$(6 \times 4) + (6 \times 6) = \underline{\quad}(\underline{\quad} + \underline{\quad})$

Complete the following statement:

Use the partial rectangle at the bottom of the page to draw a rectangle that is 12×15 .

What is the area of the rectangle?

Separate the rectangle into two parts to illustrate 12×4 and 12×11

Distributive Property Template

$(12 \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad}) = 12(\underline{\quad} + \underline{\quad})$

Complete the following statement:

Use the partial rectangle at the bottom of the page to draw a rectangle that is 13 x 18.

Separate the 18 side into two parts 10 and 8 using a vertical line.

Separate the 13 side into two parts 10 and 3 by using a horizontal line.

Distributive Property Template

$$(18 \times 13) = (\underline{\quad} + \underline{\quad}) \times (\underline{\quad} + \underline{\quad}) =$$

$$(\underline{\quad} \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad})$$

18

10 8

10 13

3

Study your picture and complete the statement at the top of this page.

Multiplying with Variables

- To complete $2(x+1)$ show two groups of $(x+1)$. Form a rectangle with the pieces on the table.
- How long is your rectangle? How wide is your rectangle? Notice how the length and width of the rectangle are part of $2(x+1)$.
- What is the algebraic name for the inside of your rectangle? Draw a picture of your rectangle:

Multiplication Rectangle

- To complete $3(x+2)$ show three groups of $(x+2)$. Form a rectangle with the pieces on the table.
- How long is your rectangle? How wide is your rectangle?
- What is the algebraic name for the inside of your rectangle? Draw a picture of your rectangle:

Multiplication Rectangle

To complete $2(x^2 + x)$ what should you show on the table?

What is this equal to?

Multiplication Rectangle


To complete $3(x^2 + x + 1)$ what should you show on the table?

What is this equal to?

Multiplication Rectangle


Multiplying Binomials

- Use the multiplication rectangle to make a rectangle whose dimensions are x by $2x + 1$.
- Place an x tile on the left side and tiles that represent $2x + 1$ across the top as illustrated at the right.
- Fill in the rectangle to show its area.
- Draw a picture of your rectangle at the right. What is the algebraic name for the inside of your rectangle?



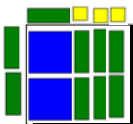
Multiplication Rectangle

- Use the multiplication rectangle to multiply $x(x + 2)$.
- Fill in the area of the rectangle.
- Draw a picture of your rectangle.
- What is the algebraic name for the inside of your rectangle?




Multiplication Rectangle

- Use the multiplication rectangle to multiply $2x(x + 3)$.
- Fill in the rectangle.
- Draw a picture of your rectangle.
- What is the algebraic name for the inside of your rectangle?



Multiplication Rectangle

- Use the multiplication rectangle to multiply $(x + 1)(2x + 1)$.
- Fill in the rectangle.
- Draw a picture of your rectangle.
- What is the algebraic name for the inside of your rectangle?



Multiplication Rectangle

Multiply

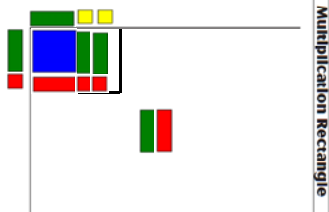
$$(2x+1)(x+3)$$

$$(x+2)(2x+3)$$

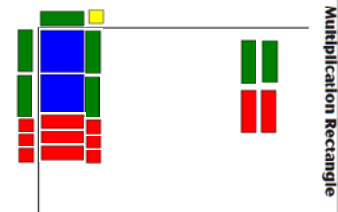
- Study the picture of the last few problems. Is there a way you can predict how many x rectangles will be in your final rectangle?
- Can you predict their location?
- Can you predict the number of blue unit squares that will be in your final rectangle?
- Can you predict their location?
- Try to predict what the rectangle will look like for $(2x+3)(x+4)$.
- Draw the picture without using the tiles.
- Write the algebraic expression for the rectangle.

- Draw the picture for the multiplication of $(3x+1)(x+2)$.
- Write the algebraic expression for the rectangle.

- Use the multiplication rectangle to multiply $(x + -1)(x + 2)$.
- Once you have set up the dimensions fill in the rectangle. Watch the colors of the tiles. This problem involves a negative sign.
- Draw a picture of your rectangle. Can you simplify the rectangle by using zero pairs? What is the algebraic name for the inside of your rectangle?



- Use the multiplication rectangle to multiply $(x + 1)(2x + -3)$.
- Once you have set up the dimensions fill in the rectangle. Watch the colors of the tiles. This problem involves a negative sign.
- Draw a picture of your rectangle. Can you simplify the rectangle by using zero pairs? What is the algebraic name for the inside of your rectangle?



- Use the multiplication rectangle to multiply $(x + -1)(2x + -1)$.
- Use the multiplication rectangle to multiply $(2x + -1)(x + 3)$.
- Use the multiplication rectangle to multiply $(x + -2)(2x + 3)$.

- Study the picture from the last few problems. Is there a way you can predict how many x rectangles will be in your final rectangle?
- Can you predict their location?
- Can you predict the number of blue unit squares that will be in your final rectangle?
- Can you predict their location?
- Try to predict what the rectangle will look like for $(2x + -3)(x + 4)$.
- Draw the picture without using the tiles. Write the algebraic expression for the rectangle.

- Draw the picture for the multiplication of $(3x + -1)(x + 2)$.
- Write the algebraic expression for the rectangle.

Factoring Polynomials

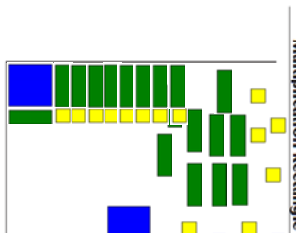
- Use the following pieces: one x^2 piece, four x pieces, and three unit pieces.
- Form a rectangle from these eight pieces.
- What polynomial is represented by the rectangle?
- Describe the polynomial represented by these eight pieces.
- Describe the dimensions of your rectangle.

- Use the following pieces: one x^2 piece, four x pieces, and four unit pieces.
- Form a rectangle from these nine pieces.
- What polynomial is represented by the rectangle?
- Describe the polynomial represented by these nine pieces.
- Describe the dimensions of your rectangle.

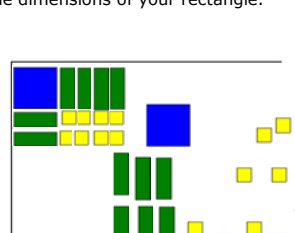
- Use the following pieces: one x^2 piece, five x pieces, and six unit pieces.
- Form a rectangle from these twelve pieces.
- What polynomial is represented by the rectangle?
- Describe the polynomial represented by these twelve pieces.
- Describe the dimensions of your rectangle.

- Use the following pieces: one x^2 piece, seven x pieces, and six unit pieces.
- Form a rectangle from these fourteen pieces.
- What polynomial is represented by the rectangle?
- Describe the polynomial represented by these fourteen pieces.
- Describe the dimensions of your rectangle.

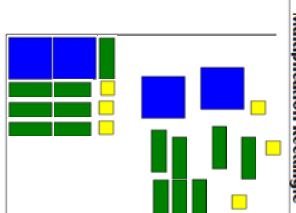
- Use the following pieces: one x^2 piece, nine x pieces, and eight unit pieces.
- Form a rectangle from these eighteen pieces.
- What polynomial is represented by the rectangle?
- Describe the polynomial represented by these eighteen pieces.
- Describe the dimensions of your rectangle.



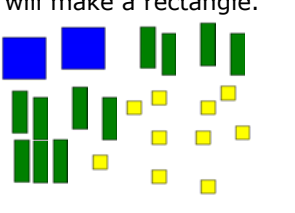
- Use the following pieces: one x^2 piece, eight unit pieces, a different number of x pieces.
- How many x pieces will you need to be able to form a rectangle from these pieces.
- What polynomial is represented by the rectangle?
- Describe the polynomial represented by these more than nine pieces.
- Describe the dimensions of your rectangle.



- Use the following pieces: two x^2 piece, seven x pieces, and three unit pieces.
- Form a rectangle from these pieces.
- What polynomial is represented by the rectangle?
- Describe the polynomial represented by these pieces.
- Describe the dimensions of your rectangle.



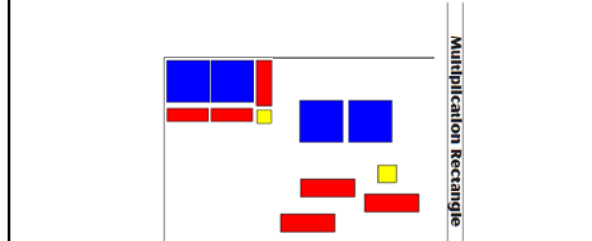
- Suppose you want to determine the two factors whose product is $2x^2 + 11x + 9$.
- Describe how you think about the arrangement of the twenty-two tiles so it will make a rectangle.



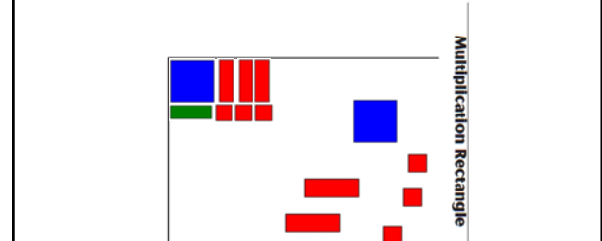
- Find the factors for $1x^2 + 5x + 4$
- Find the factors for $1x^2 + 4x + 4$
- Find the factors for $1x^2 + 5x + 6$
- Find the factors for $1x^2 + 7x + 6$

- Find the factors for $1x^2 - 5x + 4$
- Find the factors for $1x^2 - 4x + 4$
- Find the factors for $1x^2 - 5x + 6$
- Find the factors for $1x^2 - 7x + 6$

- Suppose you want to determine the two factors whose product is $2x^2 - 3x + 1$.
- Describe how you think about the arrangement of the six tiles so it will make a rectangle.



- Suppose you want to determine the two factors whose product is $1x^2 - 2x - 3$.
- Describe how you think about the arrangement of the six tiles so it will make a rectangle.



Using Algebra Tiles to Provide a Concrete Model for Factoring

Jim Rahn

www.jamesrahn.com

James.rahn@verizon.net