

Building a Deeper Understanding of Algebraic Topics with Algebra Tiles



yellow



green



blue



red



red



red

Madison High School

October 21, 2009

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LL Teach, Inc.

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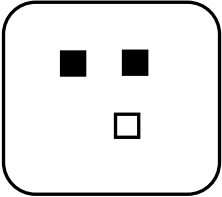
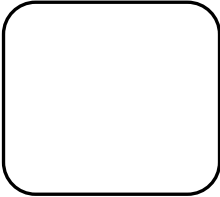
james.rahn@verizon.net

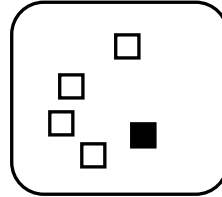
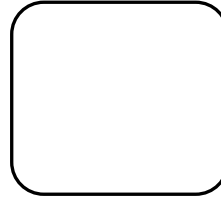
Using Models to Add Integers I

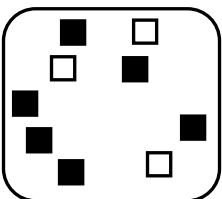
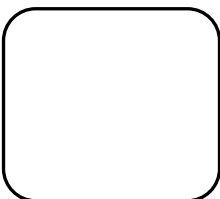
Lesson 1, Activity 1B

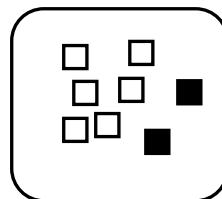
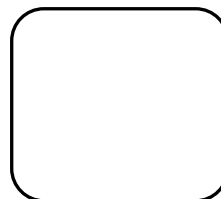
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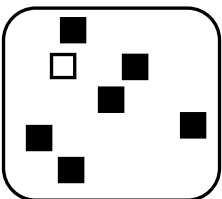
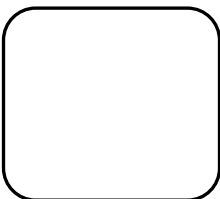
Remove the zero pairs from each group. Use the boxes on the right to show the color and number of squares that remain. (Shade the squares to show black. Do not shade the squares to show white.)

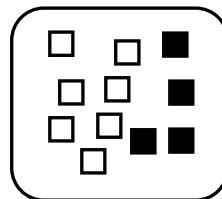
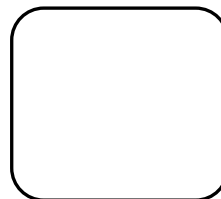
1.  

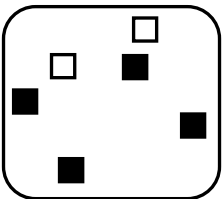
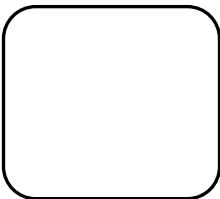
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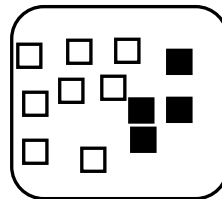
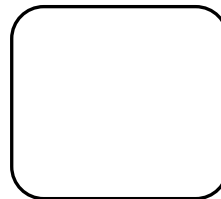
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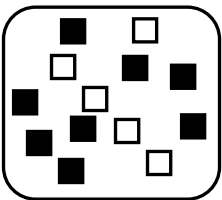
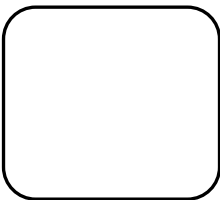
4.  

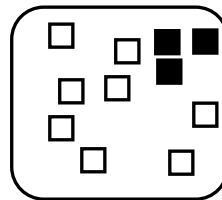
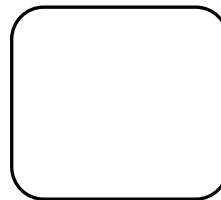
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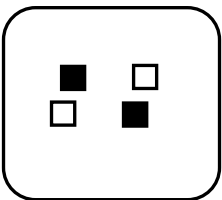
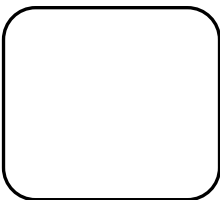
6.  

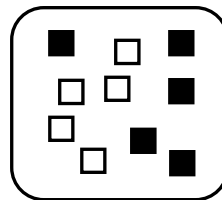
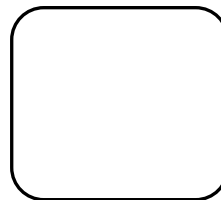
7.  

8.  

9.  

10.  

11.  

12.  

Using Models to Add Integers II

Lesson 1, Activity 1B

Name: _____ Date: _____

Combine the unit squares in Column 1 with those in Column 2 and record the answer in Column 3. Column 4 will be completed during the next activity.

	Column 1	Column 2	Column 3	Column 4
1.	□ □ □	□ □ □ □ □ □		
2.	□ □ □ □	□ □ □ □		
3.	□	□ □ □ □ □		
4.	□ □ □ □ □ □	□ □ □		
5.	■ ■	■ ■ ■ ■ ■		
6.	■ ■ ■ ■ ■	■ ■		
7.	■	■ ■ ■		
8.	■ ■ ■	■ ■ ■		
9.	■ ■ ■	□ □ □ □ □ □		
10.	■ ■ ■ ■	□ □ □ □ □ □		
11.	■	□ □ □ □ □		
12.	■ ■	□ □ □		
13.	■ ■ ■	□		
14.	■ ■ ■ ■ ■ ■	□ □ □ □		
15.	■ ■ ■	□ □		
16.	■ ■ ■ ■ ■ ■	□ □ □		
17.	■ ■ ■	□ □ □		
18.	■ ■ ■ ■	□ □ □ □		
19.	■	□		
20.	■ ■ ■ ■ ■ ■	□ □ □ □ □ □		

Subtracting Integers Using Models I

Lesson 1, Activity 1C

Name: _____ Date: _____

Make a model of the number of unit squares in Column 1. Then physically remove the number of unit squares shown in Column 2 from the set of unit squares shown in Column 1. Record the answer by sketching the number of unit squares left. Column 4 will be used in a later lesson.

	Column 1	Column 2	Column 3	Column 4
1.	□ □ □ □	□ □		
2.	□ □ □ □ □ □	□		
3.	□ □ □ □ □ □ □	□ □ □ □ □		
4.	□ □ □ □ □ □	□ □ □		
5.	□ □ □ □ □	□ □		
6.	□ □ □ □ □	□ □ □ □		
7.	□ □ □ □	□ □ □		
8.	□ □ □ □ □ □ □ □	□ □ □ □		
9.	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■		
10.	■ ■ ■ ■ ■	■ ■		
11.	■ ■ ■ ■ ■ ■ ■	■ ■		
12.	■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■		
13.	■ ■ ■	■ ■		
14.	■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■		
15.	■ ■ ■ ■ ■ ■ ■ ■	■ ■		
16.	■ ■ ■ ■	■ ■		

Subtracting Integers Using Models II

Lesson 1, Activity 1C

Name: _____ Date: _____

Make a model of the number of unit squares in Column 1. Then physically remove the number of unit squares shown in Column 2 from the set of unit squares shown in Column 1. Record the answer by sketching the number of unit squares left. Column 4 will be used in a later lesson.

	Column 1	Column 2	Column 3	Column 4
1.	□ □ □ □	■ ■		
2.	□ □ □ □ □ □	■		
3.	□ □ □	■ ■ ■ ■ ■		
4.	□ □	■ ■ ■		
5.	□ □ □ □ □ □	■ ■		
6.	□ □ □ □ □	■ ■ ■ ■		
7.	□ □ □ □ □ □ □	■ ■ ■		
8.	□	■ ■ ■ ■		
9.	■ ■ ■ ■ ■ ■ ■ ■	□ □		
10.	■ ■ ■ ■ ■	□ □		
11.	■ ■ ■ ■ ■ ■ ■	□ □		
12.	■ ■ ■ ■ ■	□ □ □ □ □		
13.	■ ■ ■ ■ ■	□ □		
14.	■ ■ ■	□ □		
15.	■ ■ ■ ■ ■ ■ ■	□ □		
16.	■ ■ ■ ■ ■	□		

Subtracting Integers Using Models III

Lesson 1, Activity 1C

Name: _____ Date: _____

Make a model of the number of unit squares in Column 1. Then physically remove the number of unit squares shown in Column 2 from the set of unit squares shown in Column 1. Record the answer by sketching the number of unit squares left. Column 4 will be used in a later lesson.

	Column 1	Column 2	Column 3	Column 4
1.	□ □ □ □	□ □ □ □ □ □		
2.	□ □ □ □ □ □	□ □ □ □ □ □ □ □		
3.	□ □ □	□ □ □ □		
4.	□ □ □ □ □ □	□ □ □ □ □ □ □ □		
5.	□ □ □ □ □	□ □ □ □ □ □ □ □ □ □		
6.	□ □ □ □ □	□ □ □ □ □ □ □ □ □ □ □ □		
7.	□ □ □ □	□ □ □ □ □ □ □ □		
8.	□ □	□ □ □ □ □ □ □ □ □ □		
9.	■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■		
10.	■ ■	■ ■ ■ ■ ■ ■		
11.	■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■		
12.	■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■		
13.	■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■		
14.	■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■		
15.	■	■ ■ ■ ■		
16.	■ ■	■ ■ ■ ■ ■ ■ ■ ■		

Using Models to Multiply Integers

Lesson 1, Activity 1D

Name: _____ Date: _____

1. $(+5)(+3) =$ _____

11. $(-3)(4) =$ _____

2. $(7)(+4) =$ _____

12. $(-5)(2) =$ _____

3. $(3)(8) =$ _____

13. $(-2)(6) =$ _____

4. $(+6)(+1) =$ _____

14. $(-4)(+1) =$ _____

5. $(+7)(2) =$ _____

15. $(-3)(+5) =$ _____

6. $(2)(-6) =$ _____

16. $(-5)(-3) =$ _____

7. $(+3)(-4) =$ _____

17. $(-7)(-3) =$ _____

8. $(6)(-4) =$ _____

18. $(-8)(-2) =$ _____

9. $(+4)(-1) =$ _____

19. $(-6)(-3) =$ _____

10. $(+8)(-2) =$ _____

20. $(-4)(-4) =$ _____

Evaluating Written Descriptions

Lesson 3, Activity 3A

Name: _____ Date: _____

Remove the kings, queens and jacks from an ordinary deck of cards. Ask each member of your group to choose a card and use the number from that card to work through the steps in Problems 1 – 4. Then answer Questions 5 and 6.

1. Choose a card to represent the original number. _____

Increase the number by 3. _____

Triple the results. _____

Decrease the result by 6. _____

Take $\frac{1}{3}$ of the result. _____

Subtract the original number. _____

The answer is: _____ 1 _____

2. Choose a card to represent the original number. _____

Multiply the number by 3, and then add the result to the original number. _____

Increase the result by 8. _____

Take $\frac{1}{4}$ of the result. _____

Subtract the original number. _____

The answer is: _____ 2 _____

3. Choose a card to represent the original number. _____

Increase the number by 2. _____

Multiply the result by 6. _____

Take $\frac{1}{3}$ of the result. _____

Subtract the original number. _____

The answer is: Four more than the original number.

4. Choose a card to represent the original number. _____

Multiply the original number by 4. _____

Add 6 to the result. _____

Take $\frac{1}{2}$ of the result. _____

Subtract 8 from the result. _____

The answer is: Five less than twice the original number.

5. How do Problems 1 and 2 differ from Problems 3 and 4?


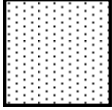


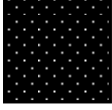

6. Use algebra tiles to model solutions to each of the problems as instructed by your teacher.



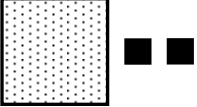

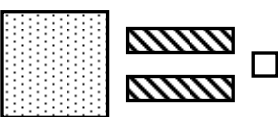
Using Symbols to Represent Algebra Tiles

Lesson 3, Activity 3A

Name: _____ Date: _____

Write the symbolic representation for Problems 1 – 5, and sketch the concrete representation for Problems 6 – 10.

 represents x .	 represents x^2 .	 represents $+1$.
 represents $-x$.	 represents $-x^2$.	 represents -1 .


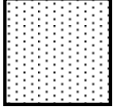


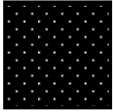

Symbolic Representation	Concrete Representation
1.	
2.	
3.	
4.	
5.	
6. $3x + 1$	
7. $-x + 4$	
8. $2x^2 - 3$	
9. $5 - x^2$	
10. $x^2 + 4x - 1$	

Simplifying Expressions with Tiles and Symbols

Lesson 3, Activity 3B

Name: _____ Date: _____

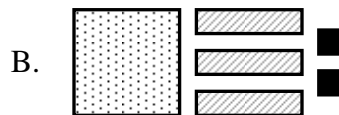
Think of modeling the expressions below with manipulatives to combine like terms. Then draw a line to match the expression on the left to the model on the right that represents that expression.

	represents x .		represents x^2 .		represents $+1$.
	represents $-x$.		represents $-x^2$.		represents -1 .

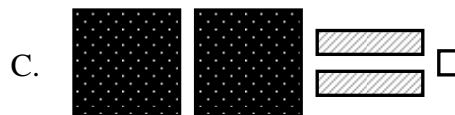
1. $3x^2 + 4x - 1 - 2x^2 - x - 1$



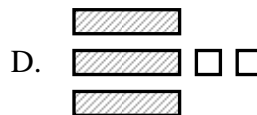
2. $4x - 1 - 2x + 5$



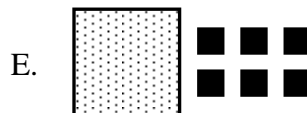
3. $3x^2 - 4x - 1 + x^2 - x + 3$



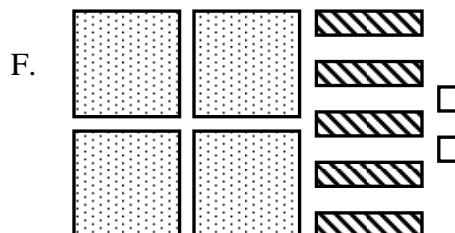
4. $3x^2 + 4x - 1 - 2x^2 - 4x - 5$



5. $3x^2 + 4x + 1 - 3x^2 - x + 1$



6. $2x^2 + x - 5 - 4x^2 + x + 6$

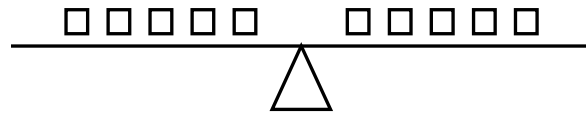


Actions with Balanced Scales I

Lesson 4, Activity 4A

Name: _____ Date: _____

Tell what would happen to the balanced scale at the right if each of the actions listed below were taken. Remember, the scale is reset after each action.



1. Two red squares were added to the right side.
2. One yellow and one red square were added to the right side.
3. Two yellow squares were removed from the left side and one yellow square was removed from the right side.
4. A red square was added to the right side of the scale and a yellow square was added to the left side.
5. One red square was added to each side of the scale.
6. Three red squares and three yellow squares were added to the left side of the scale.
7. One yellow square was removed from each side of the scale.
8. Two yellow squares were placed on the right and two red squares were placed on the left side of the scale.
9. A red square was placed on the left and a yellow square was removed from the right.
10. Two yellow squares were removed from the left and two yellow squares were added to the right side of the scale.

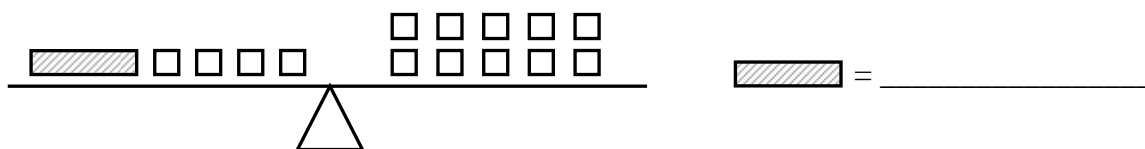
Using a Balance Scale and Manipulatives to Solve for x – Sheet I

Lesson 4, Activity 4B

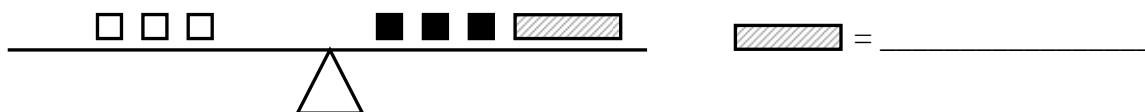
Name: _____ Date: _____

Use Algebra Tiles and the Balance Scale template to determine the answer to each of the problems below. Sketch and/or describe the answer in the blank provided.

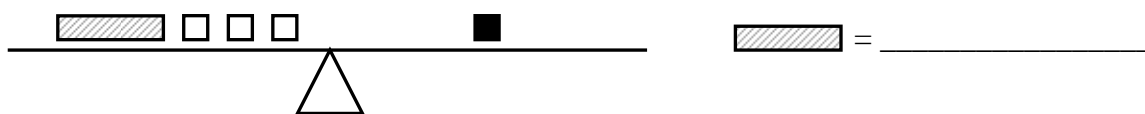
1.



2.



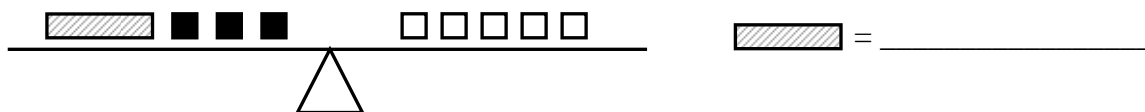
3.



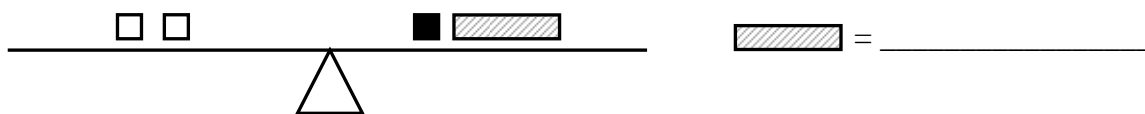
4.



5.



6.

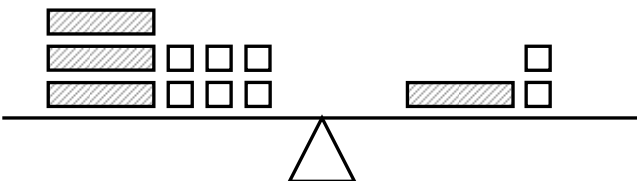



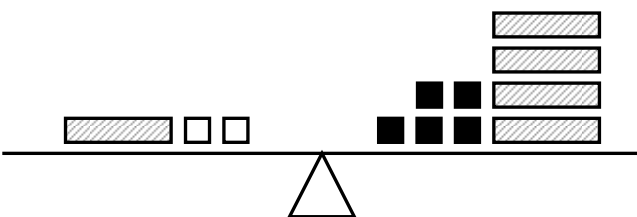

Using a Balance Scale and Manipulatives to Solve for x – Sheet VII

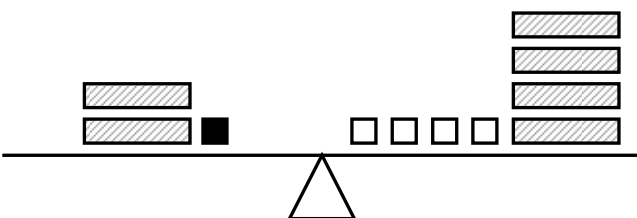

Lesson 4, Activity 4E

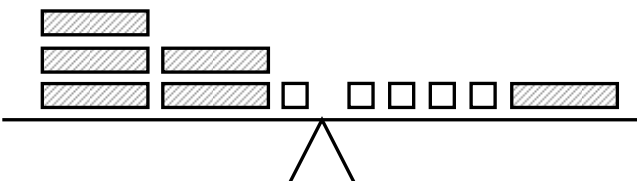

Name: _____ Date: _____

Use Algebra Tiles and the Balance Scale template to determine the answer to each of the problems below. Give the value for x and explain how you determined the answer.

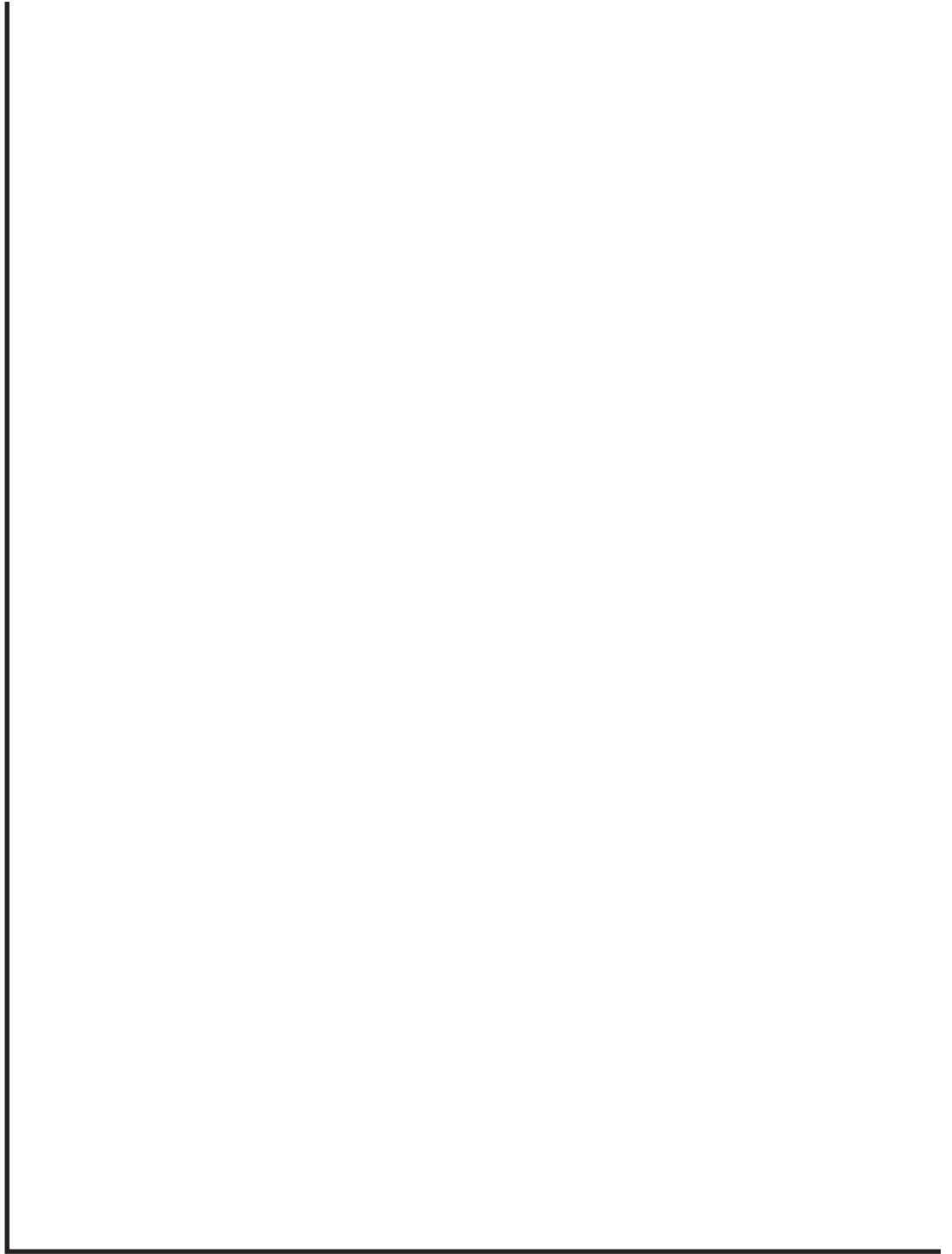
1.   = _____

2.   = _____

3.   = _____

4.   = _____

Multiplication Rectangle



Multiplying Binomials - First Lesson



A. Use the multiplication rectangle to multiply $(x + 1)$ by $(x + 2)$. Set up the dimensions along the top and the side. Then build the rectangle that has those dimensions. Draw a copy of your rectangle below.

What new piece did you use in the multiplication?

How many different size pieces do you have in your rectangle?

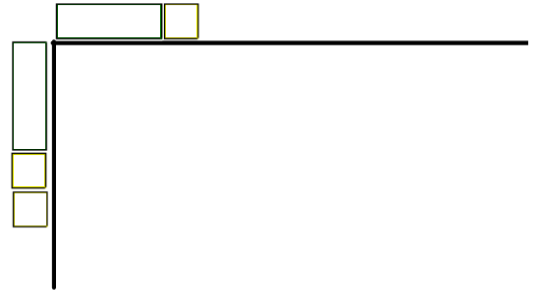
What is the name for each of these pieces?

How many of each size piece do you have?

What multiplication does the first row represent?

What multiplication does the second row represent?

What expression is represented by the rectangle for $(x + 1)(x + 2)$?



B. Try another multiplication: $(x+2)(x+3)$. Set up the dimensions $x+2$ and $x + 3$ along the top and the side. Build the rectangle with those dimensions. Draw a copy of your rectangle below.

How many different size pieces do you have in your rectangle?

What multiplication does the first row represent?

What multiplication does the second row represent?

What is the simplified answer for the multiplication of $(x + 1)(x + 2)$?



C. Multiply these binomials together. Draw a copy of your rectangle below each problem. Write the answer below each rectangle.

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

$(x+2)(2x+5)$

$(3x+2)(x+4)$



Describe any patterns you see.

Describe how you can predict how many of each size piece will be in your answer from the original problem?

D. Multiply these binomials together. Draw a copy of your rectangle below each problem. Write the answer below each rectangle.

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



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



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



Describe any patterns you see.

Describe how you can predict how many of each size piece will be in your answer from the original problem?

E. Let's try some problems with negative numbers. Multiply these binomials together. Draw a copy of your rectangle below each problem. Write the answer below each rectangle.

$$(x - 1)(x + 1)$$



$$(x + 2)(x - 2)$$



$$(2x - 1)(2x + 1)$$



Describe any patterns you see.

Describe how you can predict how many of each size piece will be in your answer from the original problem?

Describe how this set of problems is similar and different from set D.

G. Can you multiply these binomials together without the tiles? Think about the rectangle and what pieces will fit on the outside and what pieces will fit on the inside.

$$(x+1)(x+4)$$

$$(x+7)(x+5)$$

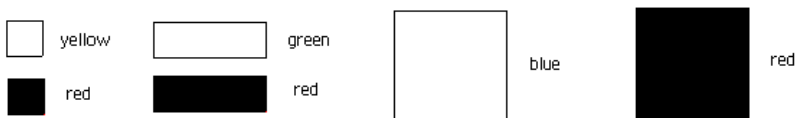
$$(3x+1)(3x+1)$$

$$(x-4)(x+4)$$

Summarize Your Ideas

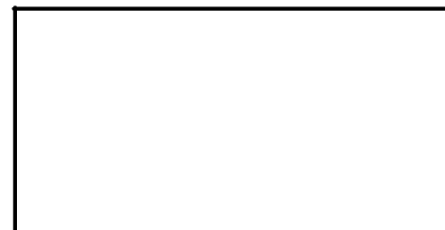
Describe your ideas for multiplying two binomials together.

Multiplying Binomials - Second Lesson



- A. In the first lesson you multiplied two binomials together by building a rectangle. Use the multiplication rectangle to multiply $(x + 2)$ by $(x + 3)$. Set up the dimensions along the top and the side. Then build the rectangle that has those dimensions. Draw a copy of your rectangle below.

Describe what you remember about the pieces and where they are placed?



What expression is represented by the rectangle for $(x + 2)(x + 3)$?

- B. Let's use some negative numbers. Try multiplying $(x + ^{-}2)(x + 3)$. Set up the dimensions $x + ^{-}2$ and $x + 3$ along the top and the side.

Build the rectangle with those dimensions. Draw a copy of your rectangle below. When positive and negative are used you may be able to find some zero pairs. If there are zero pairs you can remove them from the rectangle.



How is this rectangle different from problem A?

How is this rectangle the same as problem A?

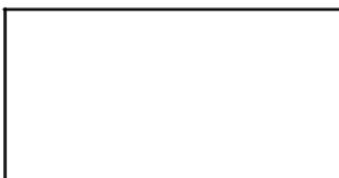
What is the simplified answer for the multiplication of $(x + ^{-}2)(x + 3)$?

- C. Multiply these binomials together. Draw a copy of your rectangle below each problem. Write the answer below each rectangle.

$$(2x + ^{-}3)(x + ^{-}1)$$



$$(x + ^{-}3)(2x + ^{-}1)$$



$$(x + ^{-}2)(3x + ^{-}1)$$



Describe any patterns you see.

Describe how you can predict how many of each size piece will be in your answer from the original problem?

D. Multiply these binomials together. Draw a copy of your rectangle below each problem. Write the answer below each rectangle.

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



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



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

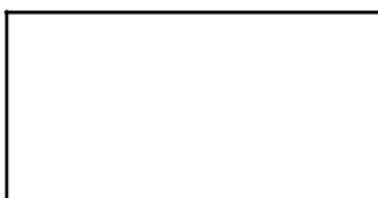


Describe any patterns you see.

Describe how you can predict how many of each size piece will be in your answer from the original problem when it is of the form $(ax + b)(ax + b)$?

E. Multiply these binomials together. Draw a copy of your rectangle below each problem. Write the answer below each rectangle.

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



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



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



Describe any patterns you see.

Describe how you can predict how many of each size piece will be in your answer from the original problem?

F. Multiply these binomials by thinking what the multiplication rectangle would look like. Write your answer below each problem.

$$(x+4)(2x+3)$$

$$(2x+1)(x+4)$$

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

Describe any patterns you see.

Describe how you can predict how many of each size piece will be in your answer from the original problem?

Describe how this set of problems is similar and different from set E.

G. Can you multiply these binomials together without the tiles? Think about the rectangle and what pieces will fit on the outside and what pieces will fit on the inside.

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

$$(2x+7)(x+5)$$

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

$$(2x+1)(x+7)$$

Factoring Polynomials - First Lesson



Color Key for Algebra Tiles

First let's review how we multiply.

1. Multiply $(x+2)(x+3)$ using the multiplication rectangle. Represent $x+2$ along the top and $x+3$ along the left. Make a rectangle whose dimensions are equal to these two binomials. Draw a picture of your rectangle at the right.



Notice where the x square piece is located. Notice where the x pieces are located. Notice where the unit pieces are located.

2. Try to draw the picture of the multiplication rectangle for $(x+4)(x+1)$ without using the tiles.



3. Draw the picture of the multiplication rectangle for $(2x+1)(x+3)$ without using the tiles.



4. Describe the pieces you would use to build the multiplication rectangle for $(x+2)(2x+3)$ and where they would be located in the multiplication rectangle. Try to do this without building the rectangle. (Use the rectangle only if you have having difficulty picturing the rectangle.

Now let's try to reverse the process.

5. Use the following pieces: one x^2 piece, four x pieces, and three unit pieces. Form a rectangle from these eight pieces. Draw a picture of your multiplication rectangle at the right.

What polynomial is represented by the rectangle?

Describe the polynomial represented by these eight pieces.

Describe the dimensions of your rectangle.



6. Use the following pieces: one x^2 piece, four x pieces, and four unit pieces. Form a rectangle from these nine pieces. Draw a picture of your multiplication rectangle at the right.

What polynomial is represented by the rectangle?

Describe the polynomial represented by these nine pieces.

Describe the dimensions of your rectangle.



7. Use the following pieces: one x^2 piece, five x pieces, and six unit pieces. Form a rectangle from these twelve pieces. Draw a picture of your multiplication rectangle at the right.

What polynomial is represented by the rectangle?

Describe the polynomial represented by these twelve pieces.

Describe the dimensions of your rectangle.



8. Use the following pieces: one x^2 piece, seven x pieces, and six unit pieces. Form a rectangle from these fourteen pieces. Draw a picture of your multiplication rectangle at the right.

What polynomial is represented by the rectangle?

Describe the polynomial represented by these fourteen pieces.

Describe the dimensions of your rectangle.



9. Use the following pieces: one x^2 piece, nine x pieces, and eight unit pieces. Form a rectangle from these eighteen pieces. Draw a picture of your multiplication rectangle at the right.

What polynomial is represented by the rectangle?

Describe the polynomial represented by these eighteen pieces.

Describe the dimensions of your rectangle.



10. Use the following pieces: one x^2 piece, six x pieces, and eight unit pieces. Form a rectangle from these fifteen pieces. Draw a picture of your multiplication rectangle at the right.

What polynomial is represented by the rectangle?

Describe the polynomial represented by these fifteen pieces.

Describe the dimensions of your rectangle.

Which piece helped you most to create the rectangle?

Describe how this number of pieces helped you know how to form your rectangle?



Now try something a little harder:

11. Use the following pieces: two x^2 piece, seven x pieces, and three unit pieces. Form a rectangle from these twelve pieces. Draw a picture of your multiplication rectangle at the right.

What polynomial is represented by the rectangle?

Describe the polynomial represented by these twelve pieces.

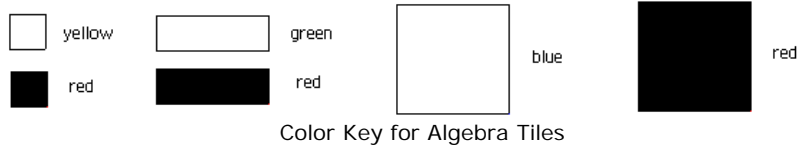
Describe the dimensions of your rectangle.



Summarizing Your Ideas

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.

Factoring Polynomials - Second Lesson



In the first lesson you learned to use the algebra tiles to factor a general polynomial of the form $ax^2 + bx + c$.

1. Find the factors for $1x^2 + 5x + 4$. Draw the rectangle in the space at the right.

What do you notice about the 8 unit tiles?

What do you notice about the 6x tiles?

What are the factors of $1x^2 + 5x + 4$?



2. Find the factors for $1x^2 + 4x + 4$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $1x^2 + 4x + 4$?



3. Find the factors for $1x^2 + 5x + 6$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $1x^2 + 5x + 6$?



4. Find the factors for $1x^2 + 7x + 6$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $1x^2 + 7x + 6$?



5. Find the factors for $1x^2 + 7x + 12$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $1x^2 + 7x + 12$?



6. Find the factors for $1x^2 + 8x + 12$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $1x^2 + 8x + 12$?



7. Find the factors for $1x^2 + 13x + 12$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $1x^2 + 13x + 12$?



8. Find the factors for $2x^2 + 3x + 1$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $2x^2 + 3x + 1$?



9. Find the factors for $3x^2 + 4x + 1$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $3x^2 + 4x + 1$?



10. Find the factors for $4x^2 + 4x + 1$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

What are the factors of $4x^2 + 4x + 1$?

Which piece helped you most to create the rectangle?

Describe how this number of pieces helped you know how to form your rectangle?



Summarizing Your Ideas

Suppose you want to determine the two factors whose product is $5x^2 + 6x + 1$. Describe how you think about the arrangement of the twelve tiles so it will make a rectangle.

Factoring Polynomials - Third Lesson



Color Key for Algebra Tiles

In the first two lessons you learned to use the algebra tiles to factor a general polynomial of the form $ax^2 + bx + c$, but now let's use negative tiles

1. Find the factors for $1x^2 + 4x + 3$. Draw the rectangle in the space at the right.



What do you notice about the 8 unit tiles?

What do you notice about the 6x tiles?

2. Find the factors for $1x^2 - 4x + 3$. Draw the rectangle in the space at the right.



How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

3. Find the factors for $1x^2 - 5x + 6$. Draw the rectangle in the space at the right.



How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

4. Find the factors for $1x^2 - 7x + 6$. Draw the rectangle in the space at the right.



How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?

5. Find the factors for $1x^2 - 7x + 12$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

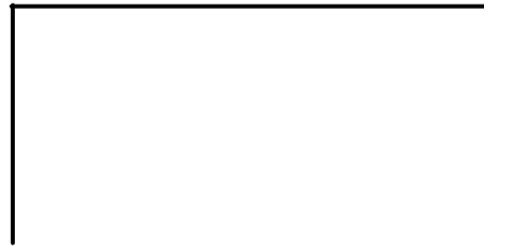
How is this rectangle different from the previous rectangle?



6. Find the factors for $1x^2 - 6x + 12$. Draw the rectangle in the space at the right.

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?



Summarize what you have learned so far

Describe what you have noticed from the last 6 exercises.

7. Find the factors for $1x^2 - 2x - 3$. Draw the rectangle in the space at the right. Check the signs for all tiles. Could you make a rectangle with the six pieces? Remember you can add more tiles to the rectangle by adding zero pairs. How many zero pairs do you want to add?

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?



8. Find the factors for $1x^2 + 2x - 3$. Draw the rectangle in the space at the right. Check the signs for all tiles. Could you make a rectangle with the six pieces? Remember you can add more tiles to the rectangle by adding zero pairs. How many zero pairs do you want to add?

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?



10. Find the factors for $1x^2 + 4x - 5$. Draw the rectangle in the space at the right. Check the signs for all tiles. Could you make a rectangle with the six pieces? Remember you can add more tiles to the rectangle by adding zero pairs. How many zero pairs do you want to add?

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?



11. Find the factors for $1x^2 - 4x - 5$. Draw the rectangle in the space at the right. Check the signs for all tiles. Could you make a rectangle with the six pieces? Remember you can add more tiles to the rectangle by adding zero pairs. How many zero pairs do you want to add?

How is this rectangle the same as the previous rectangle?

How is this rectangle different from the previous rectangle?



Summarizing Your Ideas

Suppose you want to determine the two factors whose product is $x^2 + 8x - 9$. Describe how you think about the arrangement of the eighteen tiles so it will make a rectangle.