April 7, 2015

Can we use algebra tiles to show the factors of **trinomials when a >1**?

$$ax^2 + bx + c$$

Let's begin exploring trinomials with a>1 and b and c both positive integers.

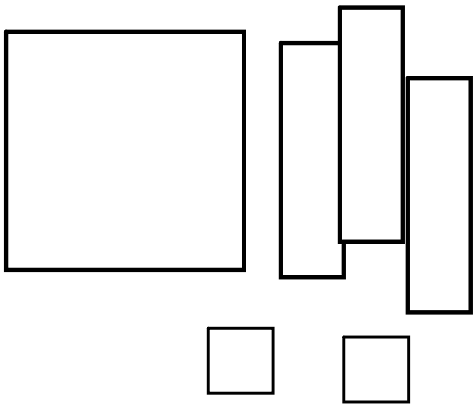
TAKE NOTICE: ***ALWAYS*** look to see if there is a factor common to all terms. If so; factor that out before going any further.

Factor: $4x^2 + 12x + 8$

key: $\boxed{+1}$

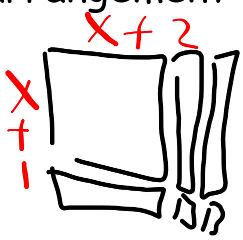
Noticing the common factor:

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



Now have fewer tiles to arrange into a rectangle.

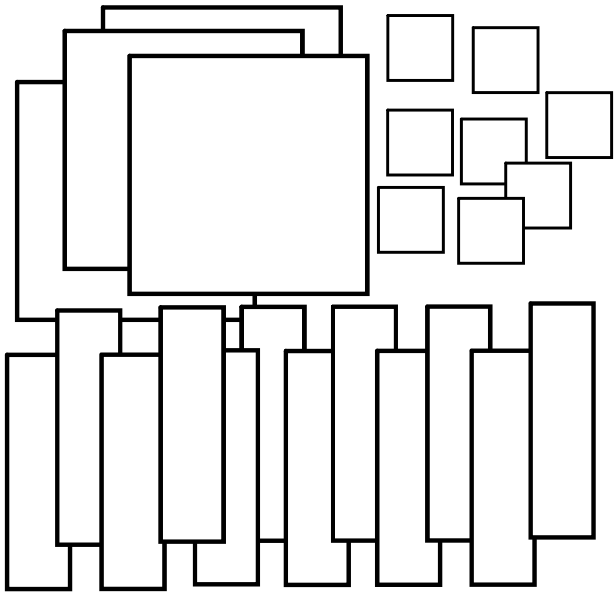
There is **only 1** possible arrangement to check.



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

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

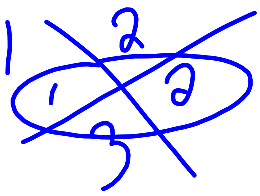
Without noticing the common factor:



All these tiles need to be put in a rectangle.

(There are 6 possible arrangements that will need to be investigated to find the one that forms a rectangle.

AND THEN...the common factor MUST still be noticed!



Can we use algebra tiles to show the factors of **trinomials when a >1**?

$$ax^2 + bx + c$$

Let's begin exploring trinomials with a>1 and b and c both positive integers

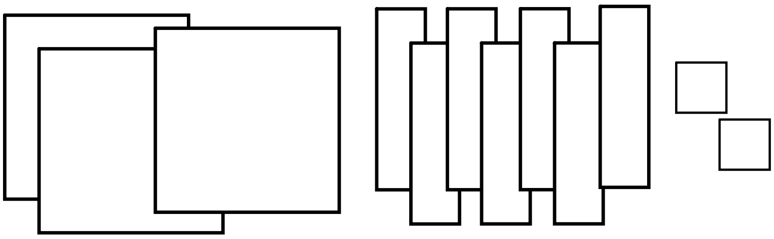
Take note: There isn't a common factor in the following set of trinomials, but always be on the lookout!!

A pictorial representation of factoring trinomials is a sketch of the algebra tiles arranged into a rectangle. Either use colored pencils or shading to indicate the negative tiles.

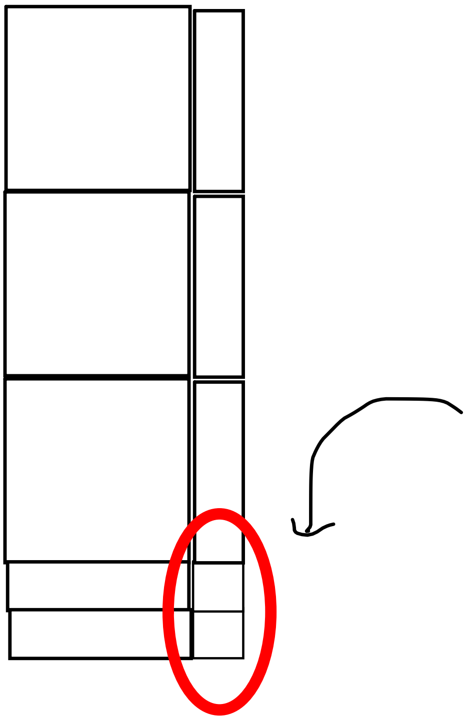
Factor: $3x^2 + 7x + 2$

key: +1

1) Gather the tiles to represent the terms



2) Arrange these tiles into a rectangle, if possible

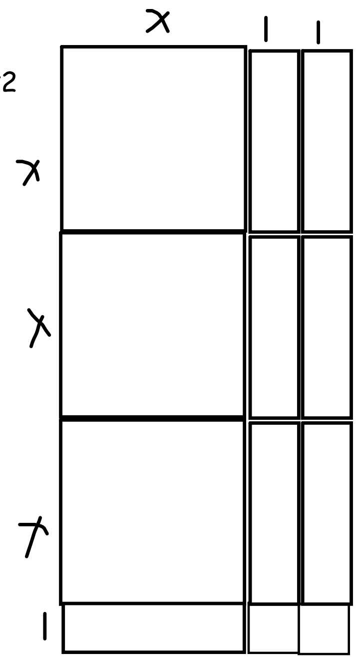


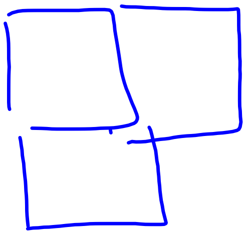
Limited choices for how to arrange the x^2 tiles (1 by 3) and unit tiles (1 by 2)

If this arrangement isn't working then arrange these into 1 row of 2 tiles.

Attempt #2

works!



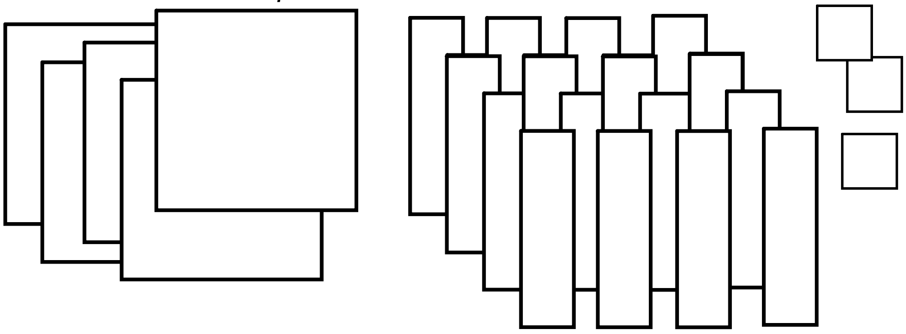


$$3x^2 + 7x + 2 = (3x+1)(x+2)$$ ✓

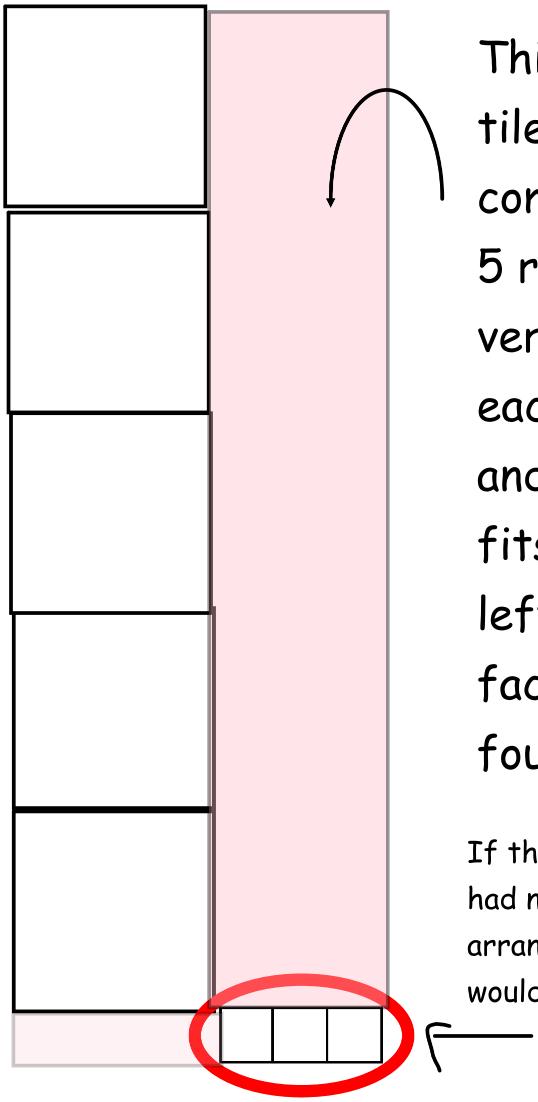
Factor: $5x^2 + 16x + 3$

key: +1

1) Gather the tiles to represent the terms



2) Arrange these tiles into a rectangle, if possible



Thinking about what tiles are needed to complete this array: 5 rows with 3 vertical x tiles in each can be made, and the 16th x tile fits in the bottom left. BINGO!! The factors have been found!

If this arrangement of unit tiles had not have worked: what arrangement for the 3 unit tiles would you have tried next?

$$5x^2 + 16x + 3 = (5x+1)(x+3)$$

F
O
I
L

$5x^2 + 15x + 1x + 3$

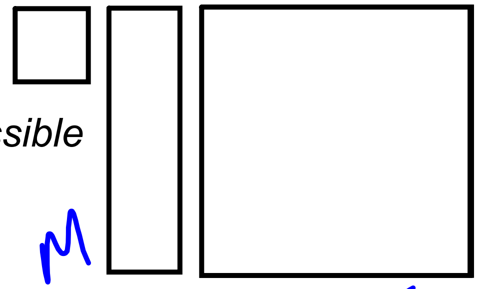
$5x^2\ 16x + 3$

key: $\boxed{+1}$

Factor: $2x^2 + 5x + 2$

1) Gather the tiles to represent the terms

2) Arrange these tiles into a rectangle, if possible



M

4

1 4

5

A

Slide ✓

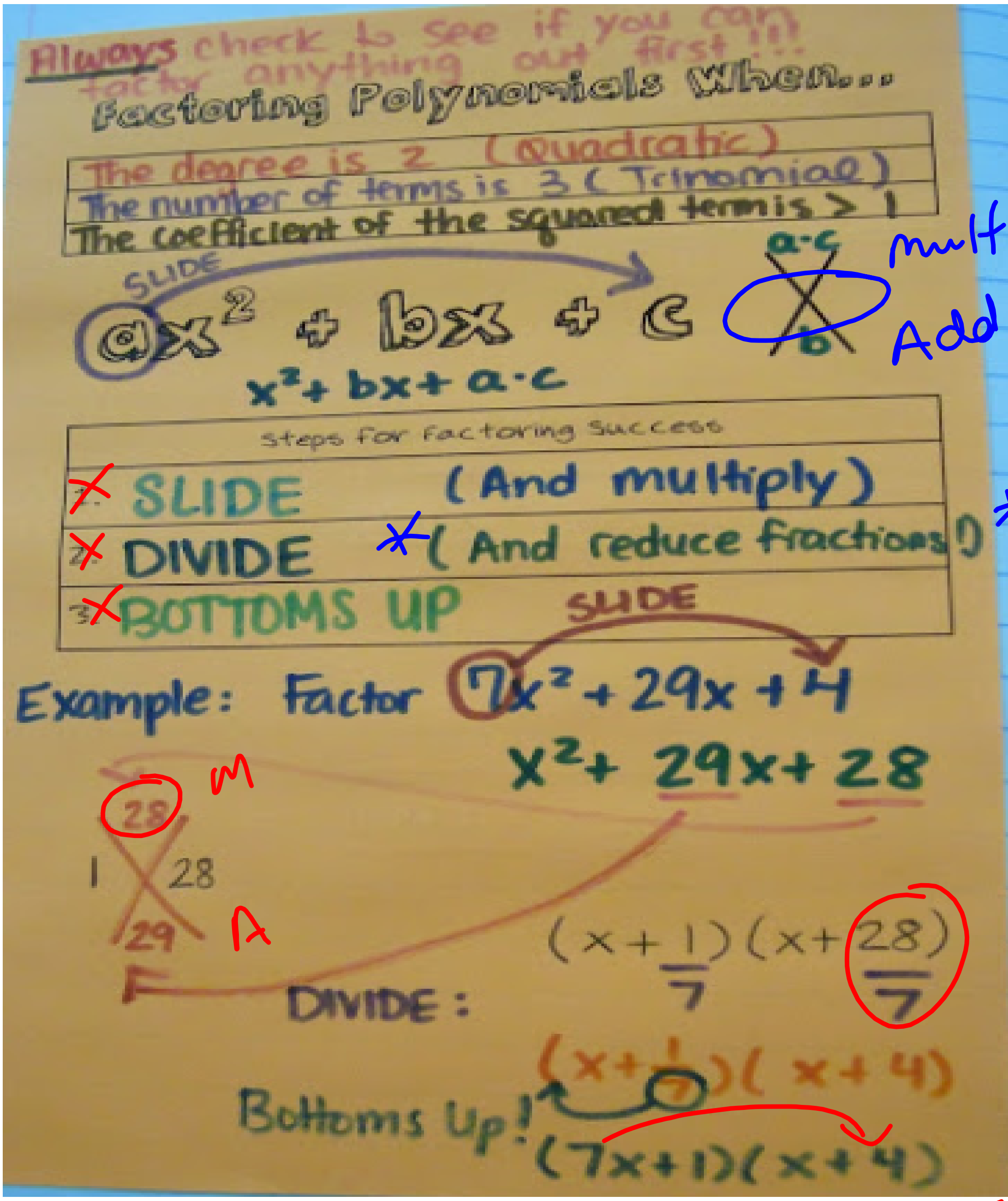
Divide ✓

Bottoms up

$\left(x + \frac{1}{2}\right)\left(x + \frac{4}{2}\right)$

$\left(x + \frac{1}{2}\right)(x + 2)$

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



$7x^2+29x+4$

F $7x^2$

O $28x$

I $1x$

L 4

Mar 28, 2014

What happens when there are more than just two ways to arrange the unit tiles?

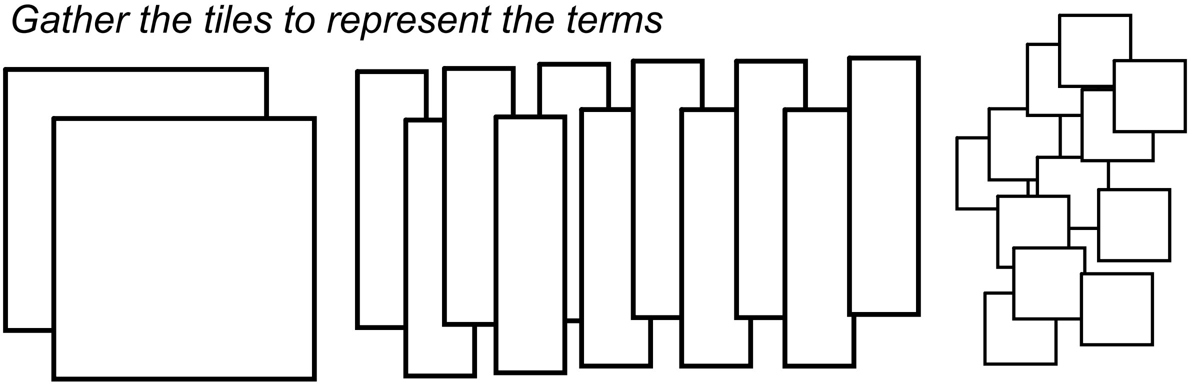
$$ax^2 + bx + c$$

Let's explore trinomials with a>1 and b and c both positive integers, c not being a prime number.

Factor: $2x^2 + 11x + 12$

key: $\boxed{+1}$

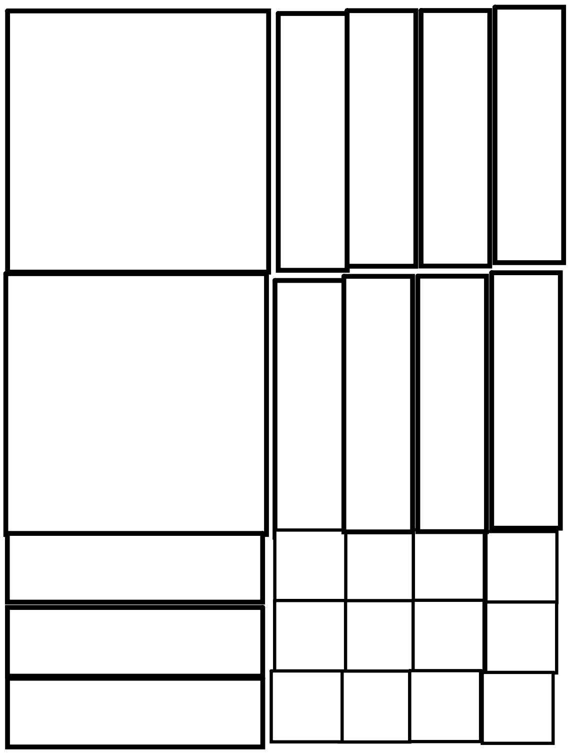
1) Gather the tiles to represent the terms



2) Arrange these tiles into a rectangle, if possible

THE CHALLENGE is to find the array that will require the use of all the x tiles. This may take several attempts. "Try, and try again."

Think about the factors of 12: (1,2,3,4,6, 12) Three pairs of factors means six possible arrangements of the 12 unit tiles: 1 x 12 or 12 x 1, 2 x 6 or 6 x 2, 3 x 4 or 4 x 3.



$2x^2 + 11x + 12$

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

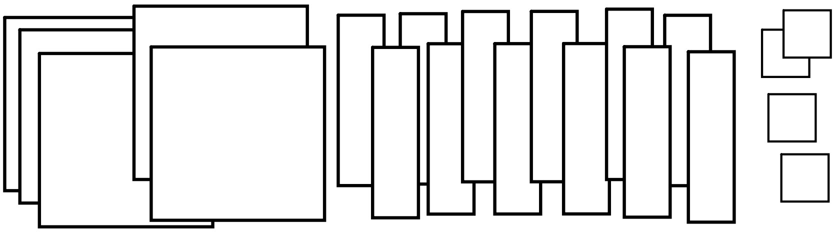
Factor: $5t^2 + 12t + 4$

21t

1 by 4
2 by 2

key: +1

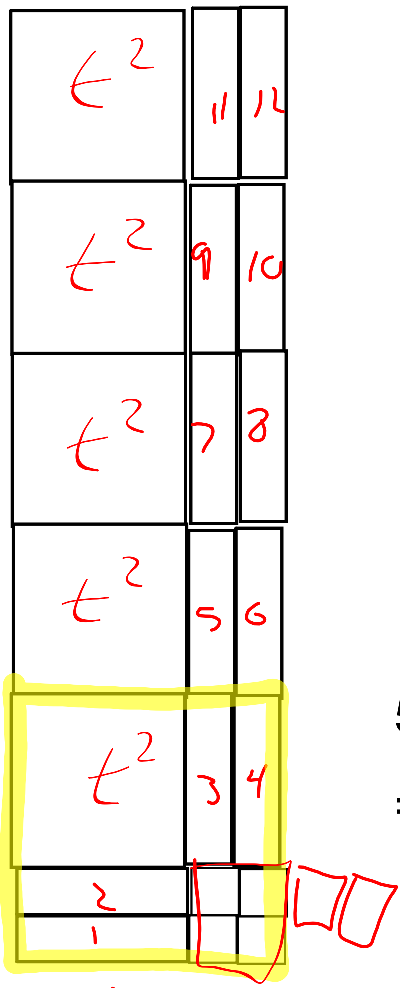
1) *Gather the tiles to represent the terms*



2) *Arrange these tiles into a rectangle, if possible*

THE CHALLENGE is to find the array that will require the use of all the x tiles. This may take several attempts. "Try, and try again."

Think about the factors of 4: (1,2,4) There are three possible arrangements of the 4 unit tiles: 1x4 or 4x1 or 2x2



t^2+4t+4
$(t+2)(t+2)$

FOIL

$5t^2+21t+4$ (1x4)
$(5t+1)(t+4)$

$5t^2 + 12t + 4$ (2x2)

$= (5t + 2)(t+2)$

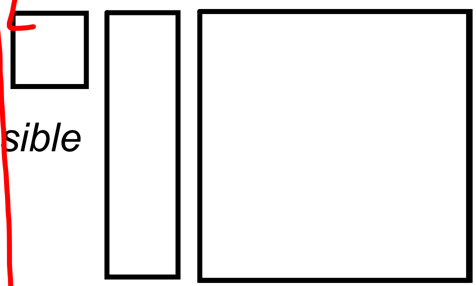
key: +1

Factor: $3m^2 + 19m + 6$

FOIL

1) *Gather the tiles to represent the terms*

2) *Arrange these tiles into a rectangle, if possible*



$(3m+6)(m+1)$

$3m^2 + 3m + 6m + 6$

$(3m+1)(1m+6)$

$3m^2 + 11m + 6$

$3m^2 + 9m + 6$

6

1×6

3×2

Mar 31, 2014

Apr 2, 2014

Factoring Trinomials By Decomposition

Ex # 1: $3x^2 + 4x - 4$

coefficient

Step 1: Multiply the first and last terms.

$3x^2 + 4x - 4$
$(3)(-4) = -12$

Step 2: Determine the factors of the product from step 1 which add to get the middle term of the trinomial. Attach the variable to the two factors.

$-12 = 6 \times -2$	$4 = 6 - 2$
3×-4	$2 + 2$
12×-1	$3 + 1$

Which ones work, which are the same?

Step 3: Write the first and last terms and place the answers from Step 2 in the middle.

$3x^2 + 6x - 2x - 4$

Step 4: Factor the first two terms and last two terms.

$3x^2 + 6x - 2x - 4$

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

Step 5: Factor out the common binomial factor.

$3x^2 + 4x - 4 = (x + 2)(3x - 2)$