

Tic-Tac-Toe Factoring

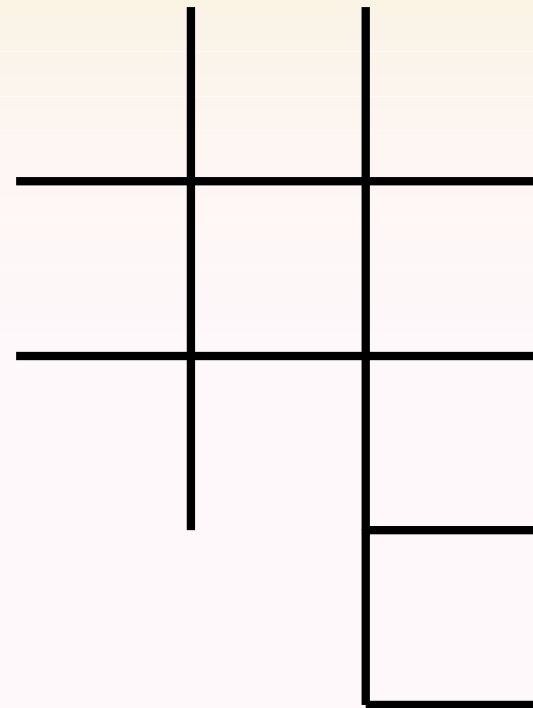
A graphic organizer approach to factoring
2nd degree trinomials

Tic-tac-toe Factoring

- If you have been having a little bit of trouble with factoring trinomials, this graphic organizer, based on a common tic-tac-toe grid, may be just what you need.
- To get the most out of this presentation, use pencil and paper and work through the instructions slowly and carefully.
- Keep in mind that tic-tac-toe will not do the factoring for you. But it will keep everything organized so you can concentrate on the numbers.
- I hope it helps. Have fun!

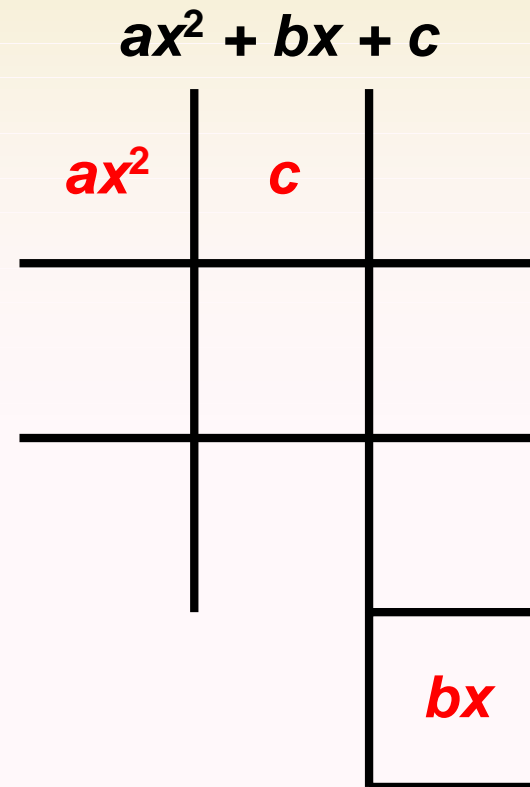
Step 1

- Draw a tic-tac-toe grid with an extra box at the bottom right.



Step 2

- The three terms of the trinomial to be factored are arranged on the grid as shown.



Step 3

- After the terms of the trinomial are entered, put the product of the first and third terms (ax^2 and c) in the upper right corner of the grid.

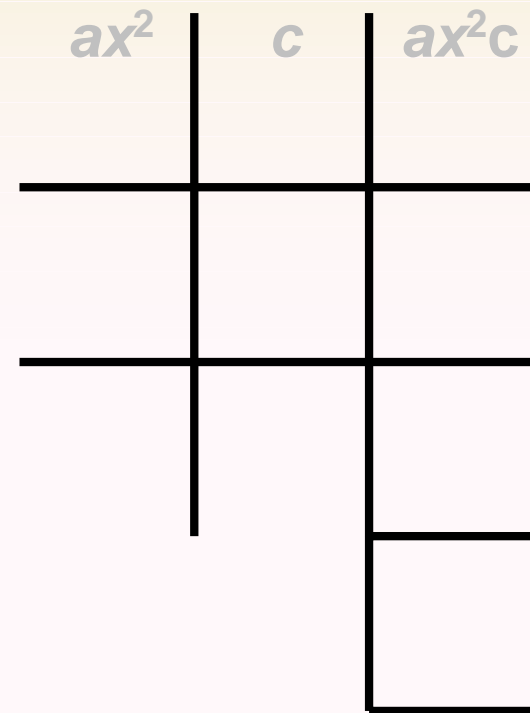
$$ax^2 + bx + c$$

ax^2	c	ax^2c

bx

Step 4

- Now we will put some numbers in and work through the process.



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$$8x^2 - 14x + 3$$

- Use the trinomial $8x^2 - 14x + 3$ and set it up as shown.

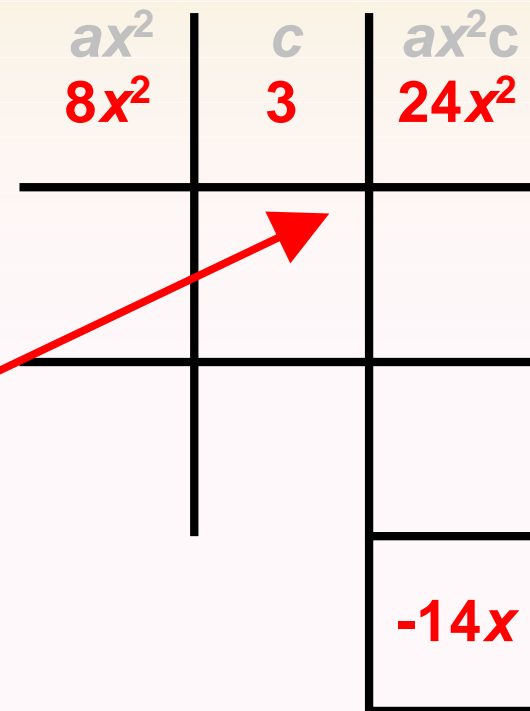
ax^2	c	ax^2c
$8x^2$	3	$24x^2$
		$-14x$

Step 4

- Now we will put some numbers in and work through the process.

$$8x^2 - 14x + 3$$

- Use the trinomial $8x^2 - 14x + 3$ and set it up as shown.
- Remember that the term in the upper right box is the product of the terms in the left and middle boxes.



Step 5

- Now find a pair of factors for the value of ax^2c that will add up to bx .

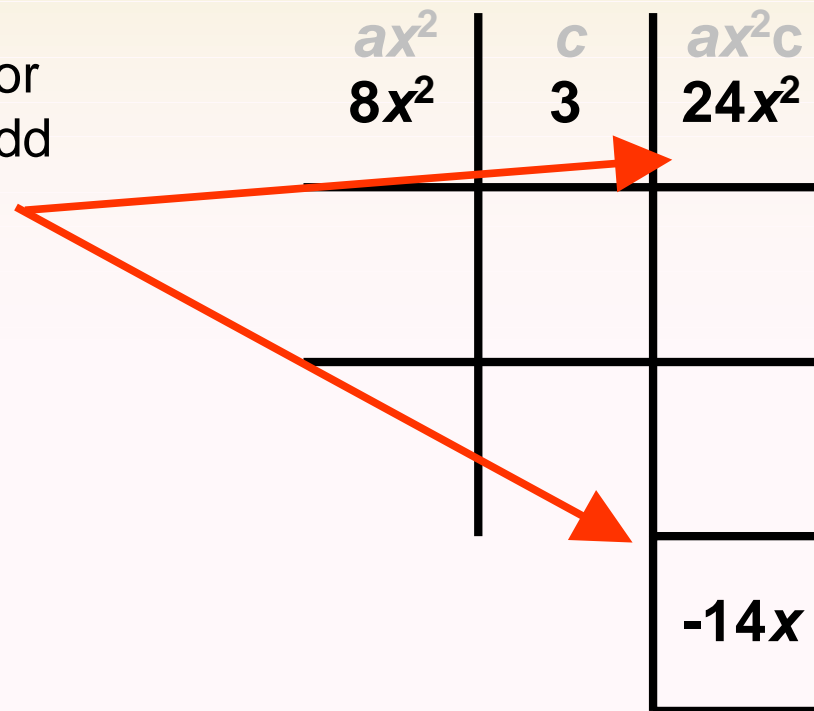
$$8x^2 - 14x + 3$$

ax^2	c	ax^2c
$8x^2$	3	$24x^2$
		$-14x$

Step 5

- Now find a pair of factors for the value of ax^2c that will add up to bx .
- In this case, we are looking for two factors of $24x^2$ that will add up to $-14x$.

$$8x^2 - 14x + 3$$



Step 5

- Now find a pair of factors for the value of ax^2c that will add up to bx .
- In this case, we are looking for two factors of $24x^2$ that will add up to $-14x$.
- $-12x$ and $-2x$ will do nicely.
- Put these two factors into the two boxes in the right column.

$$8x^2 - 14x + 3$$

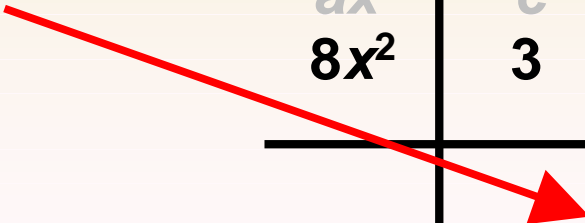
ax^2	c	ax^2c
$8x^2$	3	$24x^2$
		$-12x$
		$-2x$
		$-14x$

Step 6

- Now find a pair of factors for the middle term of the right column that will also be factors of ax^2 and c .

$$8x^2 - 14x + 3$$

ax^2	c	ax^2c
$8x^2$	3	$24x^2$
		$-12x$
		$-2x$
		$-14x$



Step 6

- Now find a pair of factors for the middle term of the right column that will also be factors of ax^2 and c .
- Here we are looking for two factors of $-12x$ that will be factors of $8x^2$ and 3 .

$$8x^2 - 14x + 3$$

ax^2	c	ax^2c
$8x^2$	3	$24x^2$
		$-12x$
		$-2x$
		$-14x$

Step 6

- Now find a pair of factors for the middle term of the right column that will also be factors of ax^2 and c .
- Here we are looking for two factors of $-12x$ that will be factors of $8x^2$ and 3 .
- $4x$ and -3 seem to do the trick.
- Be sure to watch the signs of the factors.

$$8x^2 - 14x + 3$$

ax^2 $8x^2$	c 3	ax^2c $24x^2$
$4x$	-3	$-12x$
		$-2x$
		$-14x$

Step 7

- Now do the same for the bottom term of the right column.

$$8x^2 - 14x + 3$$

ax^2	c	ax^2c
$8x^2$	3	$24x^2$
$4x$	-3	$-12x$
$2x$	-1	$-2x$
		$-14x$

Step 7

- Now do the same for the bottom term of the right column.
- Notice that both negative signs are both in the middle column. Multiplying -3 by -1 will give us the positive 3 required.

$$8x^2 - 14x + 3$$

ax^2	c	ax^2c
$8x^2$	3	$24x^2$
$4x$	-3	$-12x$
$2x$	-1	$-2x$
		$-14x$

Step 8

- Now all the boxes of the tic-tac-toe grid are filled in.
- Double-check that the two bottom terms of the first column are factors of the top term.

$$8x^2 - 14x + 3$$

$$ax^2 + bx + c$$

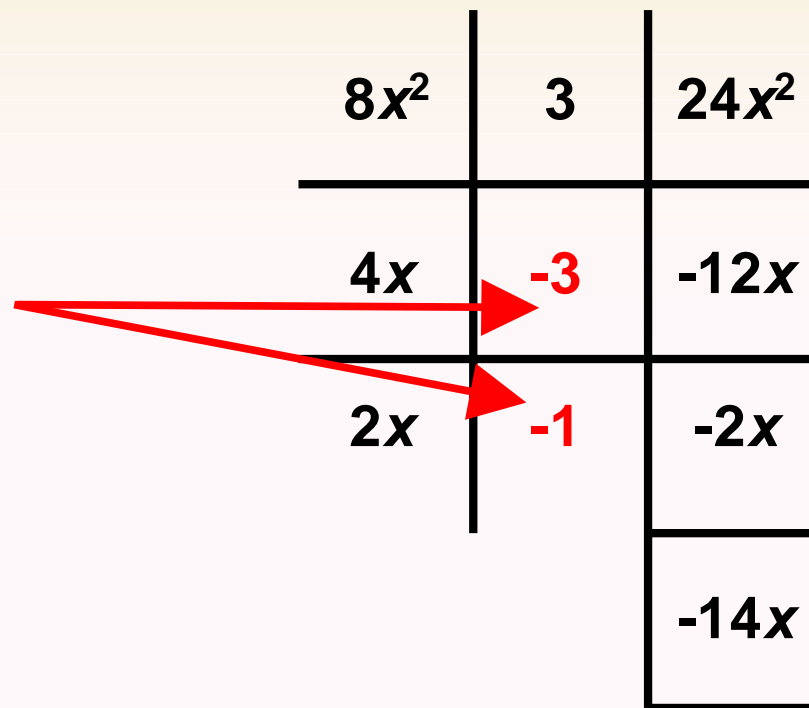
$8x^2$	3	$24x^2$
$4x$	-3	$-12x$
$2x$	-1	$-2x$
		$-14x$

Step 8

- Now all the boxes of the tic-tac-toe grid are filled in.
- Double-check that the two bottom terms of the first column are factors of the top term.
- Do the same for the terms in the middle column.

$$8x^2 - 14x + 3$$

$$ax^2 + bx + c$$



Step 9

- The trinomial is now factored. Each pair of diagonal terms is a binomial.

$$8x^2 - 14x + 3$$

$$ax^2 + bx + c$$

$8x^2$	3	$24x^2$
$4x$	-3	$-12x$
$2x$	-1	$-2x$
		$-14x$

Step 9

- The trinomial is now factored. Each pair of diagonal terms is a binomial.
- Here are the two factors of the trinomial:

$$(4x - 1) (2x - 3)$$

$$8x^2 - 14x + 3$$

$$ax^2 + bx + c$$

$8x^2$	3	$24x^2$
$4x$	-3	$-12x$
$2x$	-1	$-2x$
		$-14x$

Try it. You'll like it!

That's all folks!