What is the purpose of factoring?

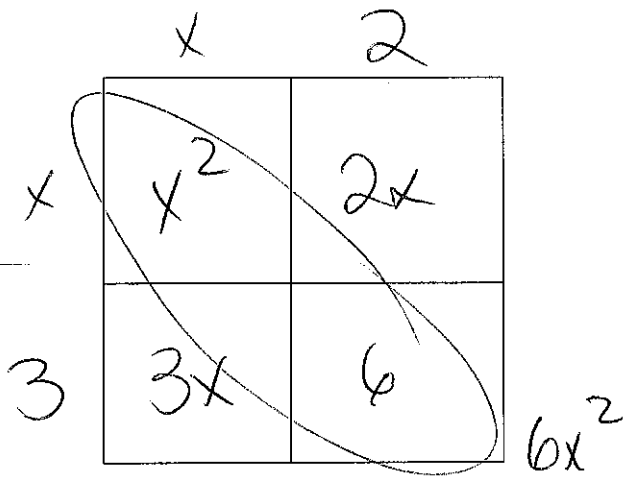
➔ To change standard form to intercept form (easily find x-intercepts)

Idea: Given area of a rectangle, you need to find the length and width.

When you factor, you express a polynomial as a product of two other polynomials.

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

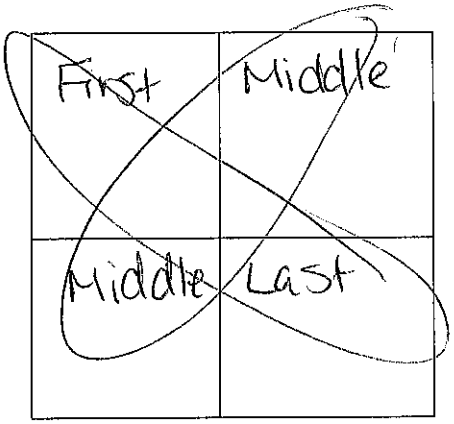
$x^2+3x+2x+6$



Observations:

1. What do you notice about the table?
2. What patterns are present?

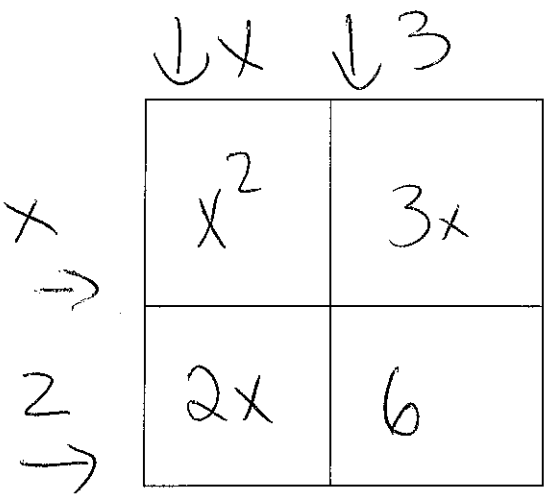
General Template



cross products are =

1) Always make sure polynomial is written in standard form!

1) $x^2 + 5x + 6$



Sum	Product	Factors
5x	$6x^2$	3 2

$(x+2)(x+3) = x^2+3x+2x+6$

x^2+5x+6

1) Write first and last terms

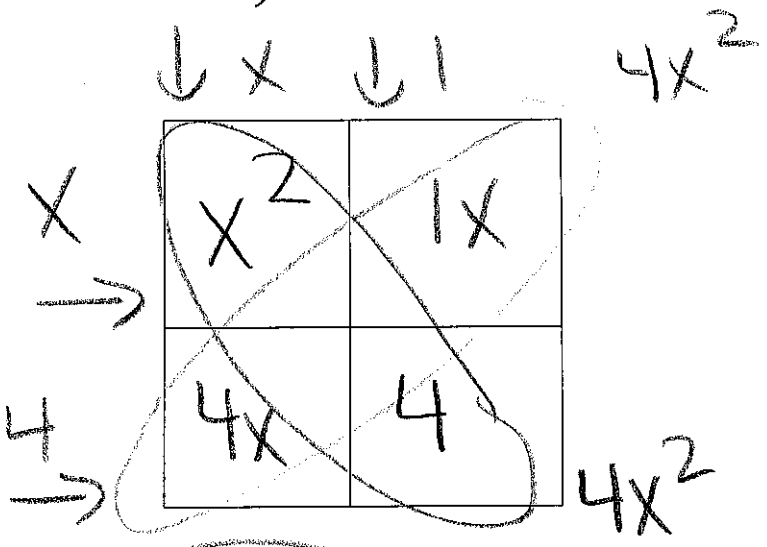
2) Now, fill in middle terms so that...

   a. They add up (sum) to the middle term

   b. They multiply to the cross product of the first and last terms

*Take into consideration the signs, what makes sense mathematically? The box will simply help you come up with the numerical configuration!

2) $x^2 + 5x + 4$



Sum	Product	Factors
5x	$4x^2$	1, 4

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

x^2+5x+4

3) Write first and last terms

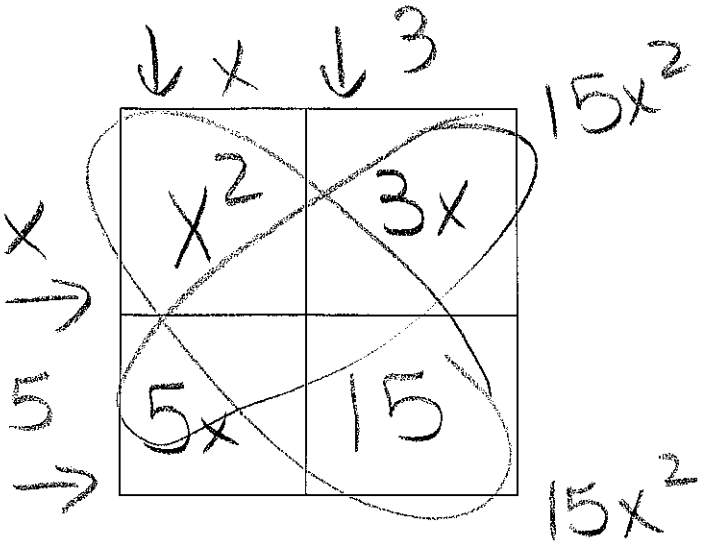
4) Now, fill in middle terms so that...

   a. They add up (sum) to the middle term

   b. They multiply to the cross product of the first and last terms

*Take into consideration the signs, what makes sense mathematically? The box will simply help you come up with the numerical configuration!

3) $x^2 + 8x + 15$

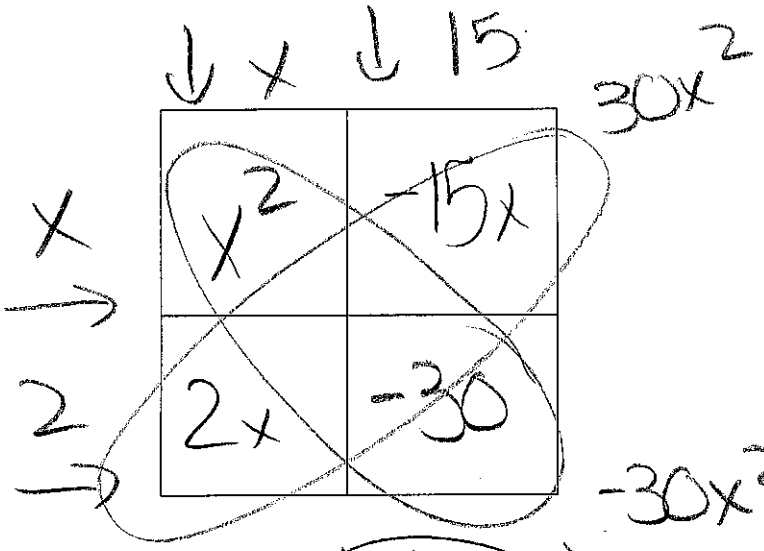


Sum	Product	Factors
$8x$	$15x^2$	5, 3

$(x+3)(x+5) = x^2 + 5x + 3x + 15$

$= x^2 + 8x + 15$

4) $x^2 - 13x - 30$



Sum	Product	Factors
-13x	$-30x^2$	15, 2x -15, 2

$(x-15)(x+2) = x^2+2x-15x-30$

$x^2-13x-30$

5) Write first and last terms

6) Now, fill in middle terms so that...

a. They add up (sum) to the middle term

b. They multiply to the cross product of the first and last terms

*Take into consideration the signs, what makes sense mathematically? The box will simply help you come up with the numerical configuration!

5) $x^2 - 5x - 14$

↓ x ↓ 2

x^2	$2x$
$-7x$	-14

$-14x^2$

Sum	Product	Factors
$-5x$	$-14x^2$	$-7, 2$

$(x-7)(x+2)$

Give neg to bigger # since middle term is neg

$x^2 + 2x - 7x - 14 = x^2 - 5x - 14$

7) Write first and last terms

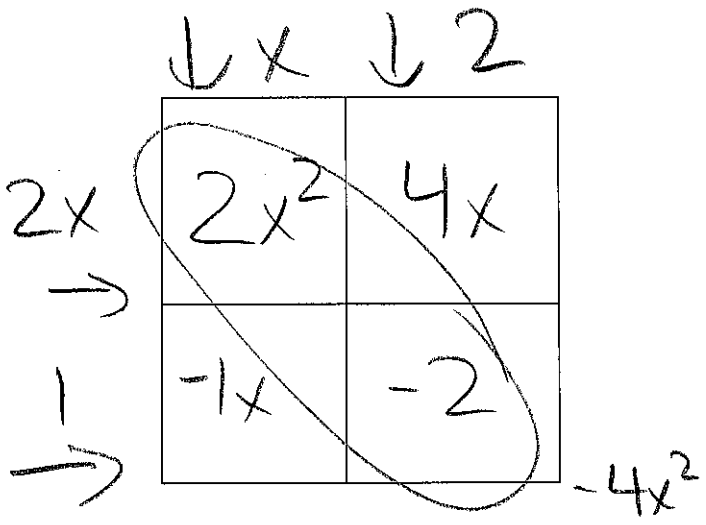
8) Now, fill in middle terms so that...

a. They add up (sum) to the middle term

b. They multiply to the cross product of the first and last terms

*Take into consideration the signs, what makes sense mathematically? The box will simply help you come up with the numerical configuration!

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



Sum	Product	Factors
3x	$-4x^2$	4, -1

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

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

* Give neg to smaller # since middle term is pos

9) Write first and last terms

10) Now, fill in middle terms so that...

a. They add up (sum) to the middle term

b. They multiply to the cross product of the first and last terms

7) $x^2 + 5x + 6$

↓ x ↓ 3

x^2	$3x$
$2x$	6

x →

2 →

Sum	Product	Factors
$5x$	$6x^2$	3, 2

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

$x^2+3x+2x+6 = x^2+5x+6$

8) $2x^2 - 35x + 17$

↓ x ↓ 17

$2x^2$	$-34x$
$-1x$	17

2x →

1 →

$34x^2$

Sum	Product	Factors
$-35x$	$34x^2$	$-34, -1$

*give neg to both since $-x-=+$

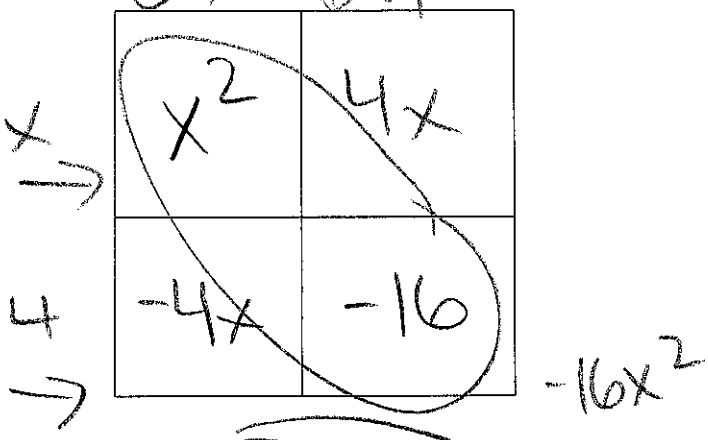
$(2x-1)(x-17)$

$2x^2-34x-1x+17$

$2x^2-35x+17$

9) $x^2 - 16$

$x^2 + 0x - 16$



Sum	Product	Factors
0x	$-16x^2$	4, -4

$(x+4)(x-4) = x^2 - 4x + 4x - 16$

$x^2 - 16$

Write first and last terms

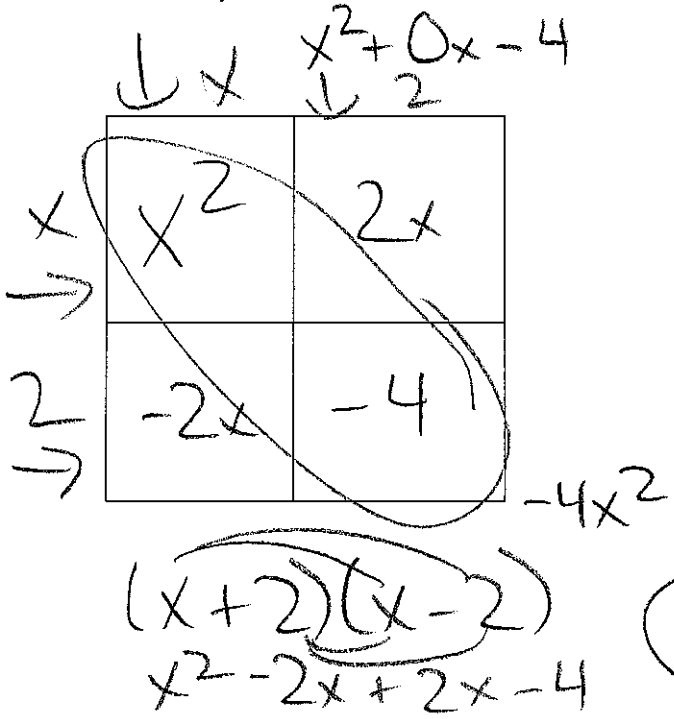
Now, fill in middle terms so that…

c. They add up (sum) to the middle term

d. They multiply to the cross product of the first and last terms

*Take into consideration the signs, what makes sense mathematically? The box will simply help you come up with the numerical configuration!

10) $x^2 - 4$



Sum	Product	Factors
0x	$-4x^2$	2, -2

Write first and last terms

Now, fill in middle terms so that…

a. They add up (sum) to the middle term

b. They multiply to the cross product of the first and last terms

*Take into consideration the signs, what makes sense mathematically? The box will simply help you come up with the numerical configuration!

11) $x^2 - 64$

$1x \quad x^2 + 0x - 64$

$1 \quad 8$

x^2	$8x$
$-8x$	-64

x → 8 →

$-64x^2$

Sum	Product	Factors
$0x$	$-64x^2$	$8, -8$

$(x-8)(x+8) = x^2 + 8x - 8x - 64$

$x^2 - 64$

12) $x^2 - 36$

$1x \quad x^2 + 0x - 36$

$1 \quad 6$

x^2	$6x$
$-6x$	-36

x → 6 →

$-36x^2$

Sum	Product	Factors
$0x$	$-36x^2$	$6, -6$

$(x+6)(x-6)$

$x^2 - 6x + 6x - 36$

$x^2 - 36$