Warm Up

5/27

Check your answers. Are there any homework questions?

35. **a.** Draw and label a rectangle whose area is represented by each expression.

$$x^2 + 3x + 4x + 12 \qquad x^2 + 7x + 10$$

b. For each expression in part (a), write an equivalent expression in factored form.

36. Write each expression in factored form.

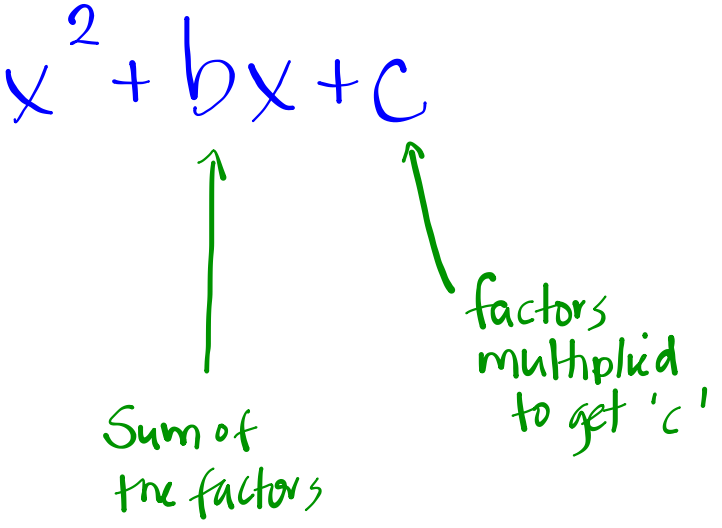
a. $x^2 + 13x + 12$ **b.** $x^2 - 13x + 12$ **c.** $x^2 + 8x + 12$

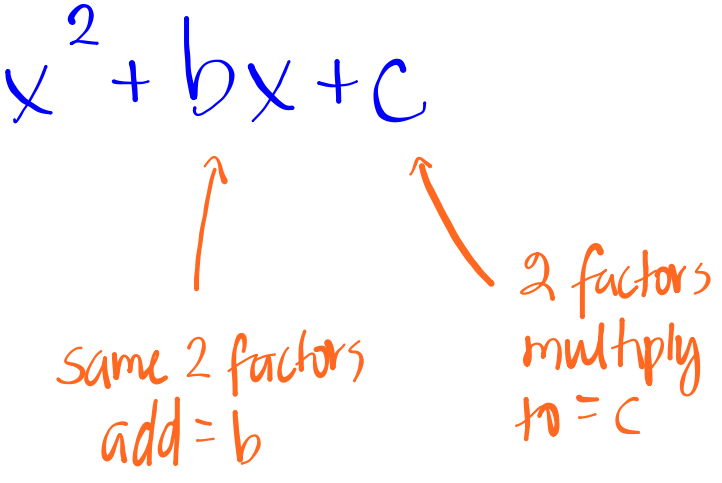
d. $x^2 - 8x + 12$ **e.** $x^2 + 7x + 12$ **f.** $x^2 - 7x + 12$

g. $x^2 + 11x - 12$ **h.** $x^2 - 11x - 12$ **i.** $x^2 + 4x - 12$

j. $x^2 - 4x - 12$ **k.** $x^2 + x - 12$ **l.** $x^2 - x - 12$

Did you notice a pattern when factoring?





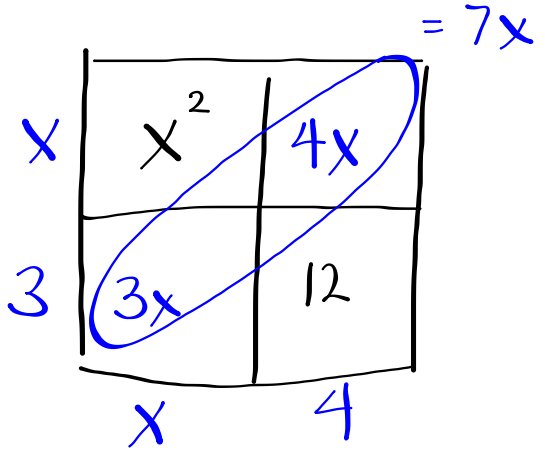
$x^2 + 7x + 12$

Factors of 12

1, 12

2, 6

3, 4 3+4=7



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

Why was #6 harder to factor than the other problems?

E Use the Distributive Property to factor each expression.

1. $1x^2 + 5x + 2x + 10$
2. $1x^2 + 11x + 10$
3. $1x^2 + 3x - 10$
4. $1x^2 - 8x + 15$
5. $15 - 14x - 1x^2$
6. $2x^2 + 7x + 5$

ax^2+bx+c

not 1

There is more to factoring than we are currently seeing!

Factoring is all about

GCF's

It's easy to factor when we just have 2 terms.

Factor the following:

$5x - 15 = 5(x-3)$

We can always check if factored form is correct

$5(x-3) = 5x-15$ ✓

$2x^2 + 12x = 2x(x+6)$

$2x$ $2x$

$2x^2+12x$ ✓

Basic form of a quadratic equation:

$$y = ax^2 + bx + c$$

Expand the following:

$$(x + e)(x + g)$$

$$x^2 + gx + ex + eg$$

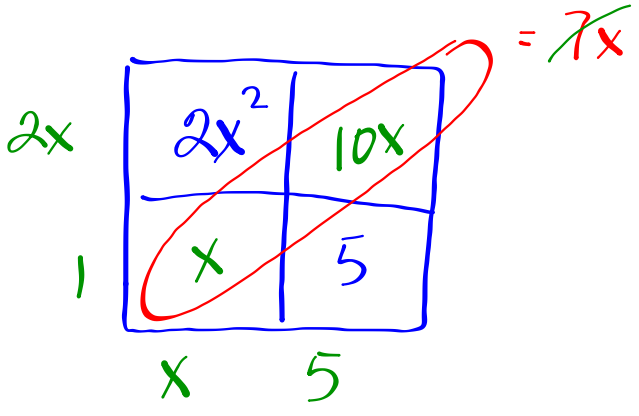
$$x^2 + (g+e)x + eg$$

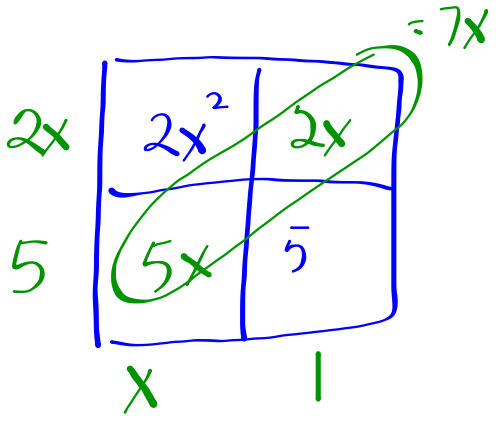
factors are added

factors multiplied

What made this so hard to factor?

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





We had to Guess and Check!

$(2x+5)(x+1)$

BUT the value of "a" is not always = 1.

Expand the following:

$(cx + e)(dx + g)$

$cdx^2 + cgx + edx + eg$

$ax^2 + bx + c$

$cdx^2 + (cg + ed)x + eg$

factors of $a \cdot c$ that add to b

BUT the value of "a" is not always = 1.

Expand the following:

$(dx + e)(fx + g)$

$$(dx+e)(fx+g)$$

$$dfx^2+dgx+efx+eg$$

$$dfx^2+(dg+ef)x+eg$$

$$\boxed{ax^2+bx+c}$$

What do we notice?

sum of factors of $a \cdot c$

The key to factoring is rewriting the equation in 4 terms (instead of the original 3).

We do this by splitting the "b" coefficient into 2 pieces whose sum is equal to "b".

Factoring Methods

"Box" or Factoring by Grouping

Same for both methods!

$x^2+7x+12$

$x^2+3x+4x+12$

Factors of a·c=12	Sum = 7
1, 12	13
2, 6	8
3, 4	7

Rewrite the original equation:

$x^2+7x+12$

$x^2+3x+4x+12$

Box

$x^2+7x+12$ $= 7x$

	x	4
x	x^2	$4x$
3	$3x$	12

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

$x^2+4x+3x+12$

$x^2+7x+12$ ✓

Factor by Grouping

$x^2+3x+4x+12$

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

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

Steps for factoring using Box

- Find factors of ac whose sum = b
- Rewrite eq by "splitting up" bx term
- Put all pieces in the BOX (like terms on the diagonal)
- Find GCF's

Steps for factoring by Grouping

- Find factors of ac whose sum = b
- Rewrite eq by "splitting up" bx term
- 'Split' equation into 2 pieces.
- Find GCF's

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

$a = 2$

$b = 7$

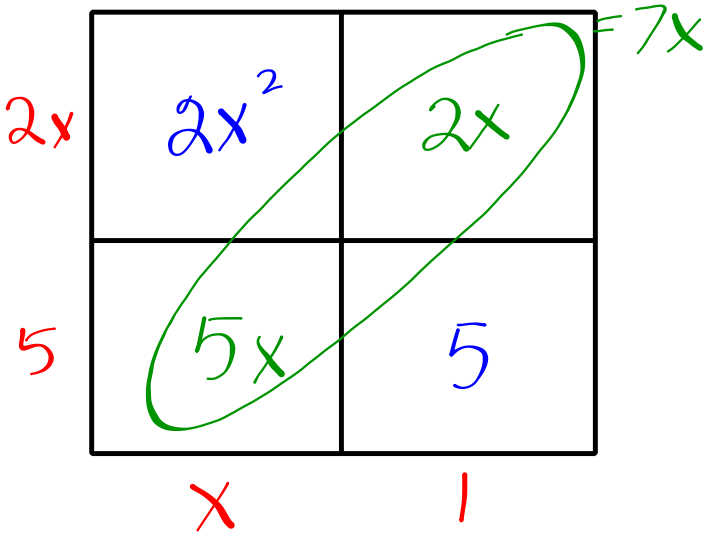
$c = 5$

$a \cdot c = 10$

Factors of 10	Sum = 7
1, 10	11
2, 5	7

$2x^2+7x+5$

$2x^2+2x+5x+5$



$(2x+5)(x+1)$

Area/Box Method

Equation: $x^2+14x+13$

GCF= 1

a = 1

b = 14

c = 13

a·c = 13

Factors of a·c	Sum
1, 13	14

Rewrite Equation with 4 terms:

$x^2+1x+13x+13$

	x^2	$13x$
1	x	13

x 13

Factored Form: $(x+1)(x+13)$

Factor By Grouping

Equation: $6x^2+7x+2$

$3x+4x$

GCF= 1

a = 6

b = 7

c = 2

a·c = 12

Factors of a·c	Sum
1, 12	13
2, 6	8
3, 4	7

Rewrite Equation with 4 terms:

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

$=7x$

	$6x^2$	$4x$
1	$3x$	2

$2x$

$3x$ 2

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

Factored Form:

#2 Equation: $x^2 - 3x - 10$

Area/Box Method

Rewrite Equation with 4 terms: $x^2 - 5x + 2x - 10$

GCF= 1

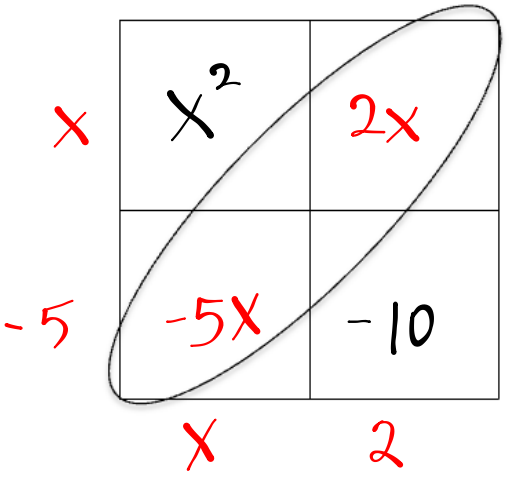
a = 1

b = -3

c = -10

a·c = -10

Factors of a·c	Sum
-1, 10	9
1, -10	-9
-2, 5	3
2, -5	-3



Factored Form: $(x-5)(x+2)$

Equation: $5x^2 - 21x - 20$

Rewrite Equation with 4 terms: $5x^2 - 25x + 4x - 20$ ($-21x$)

Factor By Grouping

GCF= 1

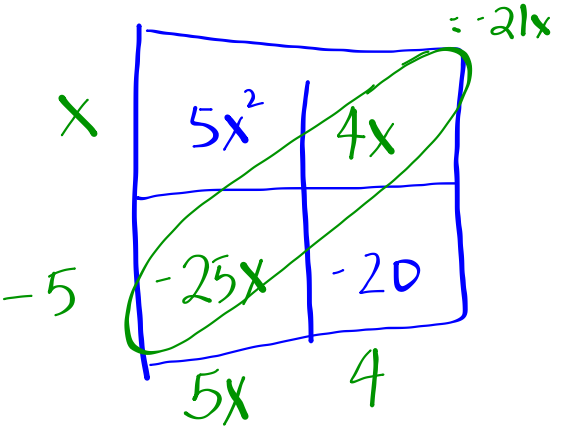
a = 5

b = -21

c = -20

a·c = -100

Factors of a·c (-100)	Sum = -21
1, -100	-99
2, -50	-48
4, -25	-21
5, -20	-15
10, -10	0



Factored Form: $(x-5)(5x+4)$

Classwork

Equation: $x^2 + 14x + 13$

$ax^2 + bx + c$

Rewrite Equation with 4 terms:

GCF= _____

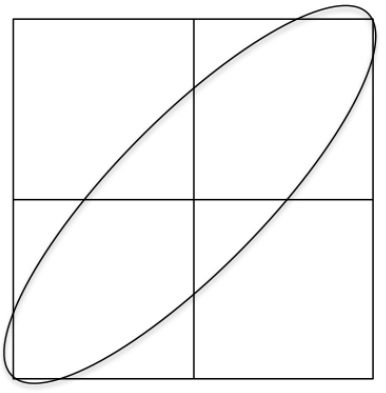
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Equation: $x^2 - 3x - 10$

Rewrite Equation with 4 terms:

GCF= _____

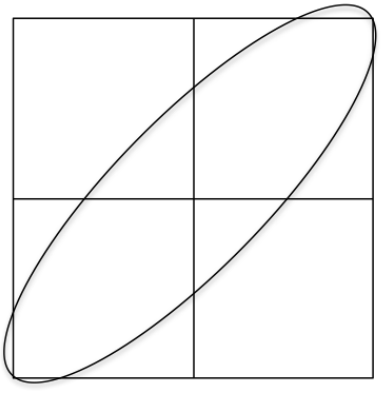
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Equation: $x^2 - 7x + 12$

Rewrite Equation with 4 terms:

GCF= _____

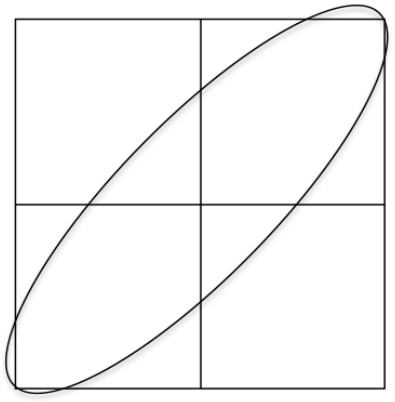
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Equation: $x^2 - 20x + 36$

Rewrite Equation with 4 terms:

GCF= _____

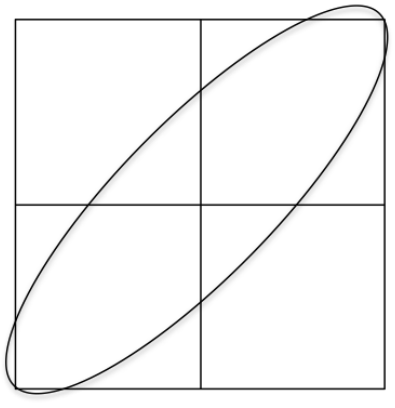
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Equation: $2x^2 + 5x + 3$

Rewrite Equation with 4 terms:

GCF= _____

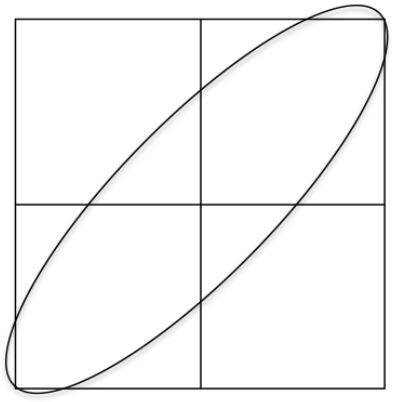
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Equation: $3x^2 - 4x - 4$

Rewrite Equation with 4 terms:

GCF= _____

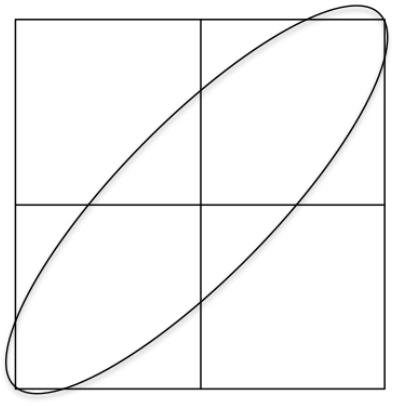
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Equation: $5x^2 - 21x - 20$

Rewrite Equation with 4 terms:

GCF= _____

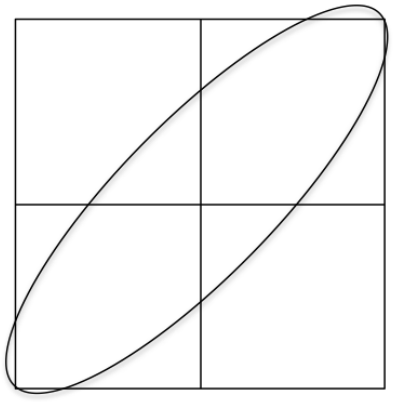
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Equation: $6x^2 + 7x + 2$

Rewrite Equation with 4 terms:

GCF= _____

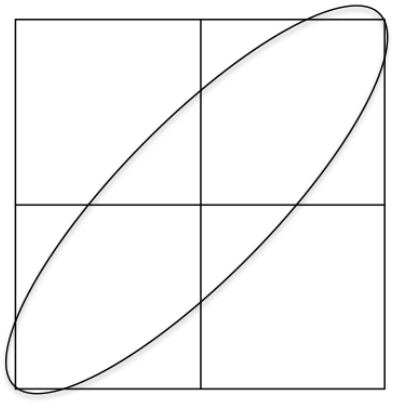
a = _____

b = _____

c = _____

a·c = _____

Factors of a·c	Sum



Factored Form:

Homework

Finish classwork