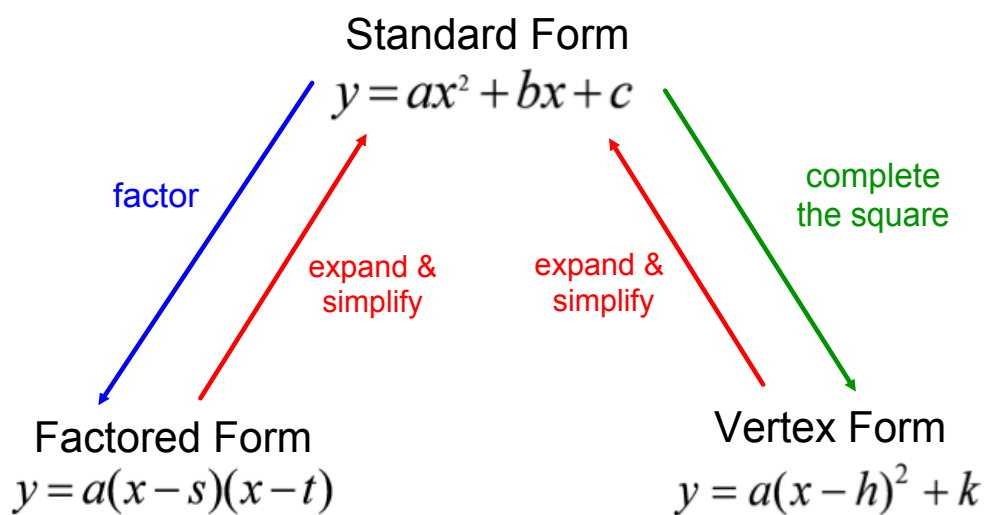


Feb 3/2011

## Review - Part 3

### Factoring Quadratic Relations

Jan 31-2:27 PM



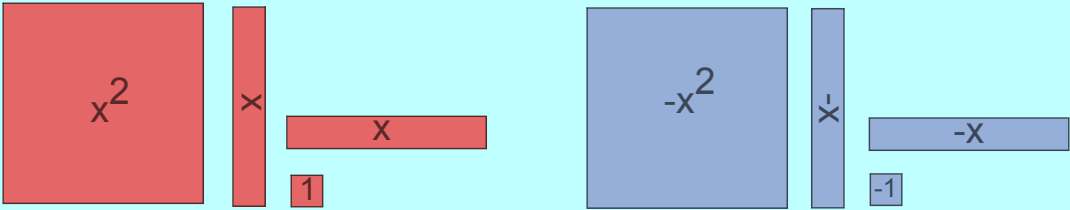
Feb 2-6:19 PM

## Common Factors

Always look for common factors first!

1. Factoring using tiles - form identical groups
2. Factoring by common factors
3. Factoring by grouping

Feb 3-9:02 AM




The diagram shows two sets of algebra tiles. The first set, in red, includes a large square labeled  $x^2$ , a vertical rectangle labeled  $x$ , a horizontal rectangle labeled  $x$ , and a small square labeled  $1$ . The second set, in blue, includes a large square labeled  $-x^2$ , a vertical rectangle labeled  $-x$ , a horizontal rectangle labeled  $-x$ , and a small square labeled  $-1$ .

---

Factor:  $2x^2 + 4x$

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

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


The diagram illustrates the factoring process using algebra tiles. On the left, a large red square labeled  $x^2$  is shown with a vertical red rectangle labeled  $x$  and two vertical red rectangles labeled  $x$  attached to its right side. The total height is labeled  $2x$  and the total width is labeled  $x + 2$ . On the right, the same arrangement is shown, but the two vertical rectangles are grouped together, representing the factor  $2x$ .

Mar 25-8:02 AM

## 2. Factor Algebraically

Look for the greatest common factor of the coefficients and the GCF of the variables.

Ex. Factor:  $8x^3 - 6x^2y^2 + 4x^2y$

The GCF of 8, 6, and 4 is 2.

The GCF of  $x^3$ ,  $x^2y^2$ , and  $x^2y$  is  $x^2$ .

$$\begin{aligned} \frac{8x^3}{2x^2} - \frac{6x^2y^2}{2x^2} + \frac{4x^2y}{2x^2} &= \frac{2(4x^3 - 3x^2y^2 + 2x^2y)}{2x^2} \\ &= \frac{2x^2(4x - 3y^2 + 2y)}{2x^2} \end{aligned}$$

$$\begin{array}{l} \cancel{x} \cdot \cancel{x} \cdot x \\ \hline \cancel{x} \cdot \cancel{x} \\ = x \end{array}$$

Mar 26-8:24 AM

## 3. Factoring by Grouping

Some polynomials do not have common factors in all terms. They can sometimes be factored by grouping terms with common factors.

Ex. Factor:  $\underline{ac} + \underline{bc} + \underline{ad} + \underline{bd}$

$$\begin{aligned} &= c(\underline{a+b}) + d(\underline{a+b}) && \text{let } x = a+b \\ &= cx + dx \\ &= x(c+d) \\ &= (a+b)(c+d) \end{aligned}$$

Mar 26-8:24 AM

## Factoring Simple Trinomials ( $x^2 + bx + c$ ) or Complex Trinomials ( $ax^2 + bx + c$ )

### 1. Using Alge-tiles, or an Area Model

Model the expression as an area. The tiles must form a rectangle (or square). The lengths of the sides are factors.

### 2. Algebraically

What is the relationship between the coefficients of each term in the expression? Use this information to decompose the middle term into two pieces, then factor by grouping.

Mar 26-8:24 AM

Factor:  $x^2 - 5x + 6 = (x-2)(x-3)$

rectangle first

Mar 25-8:02 AM

Factor:  $x^2 - 5x + 6$

algebraically

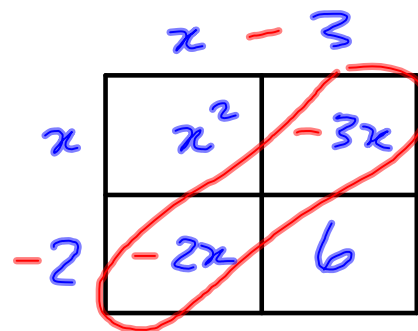
product 6

Sum -5

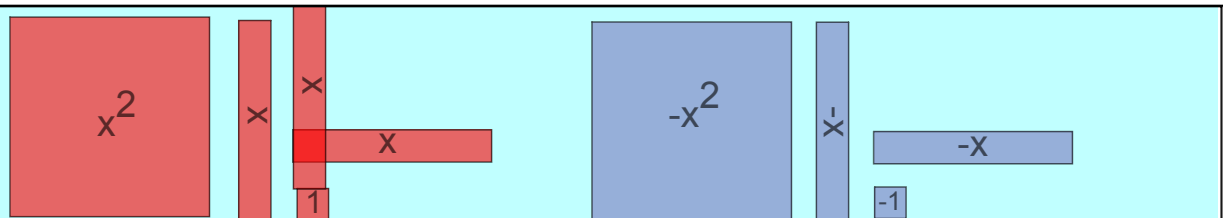
-2, -3

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

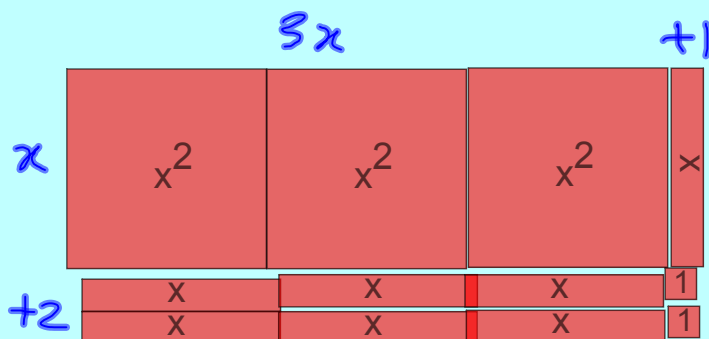
using an area model



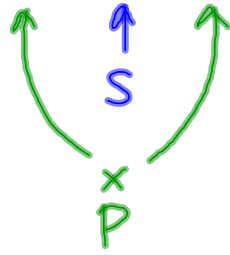
Feb 1-7:13 PM



Factor:  $3x^2 + 7x + 2 = (x+2)(3x+1)$



Mar 25-8:02 AM

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

$$\begin{array}{l} S: +7 \\ P: +6 \\ I: 1, 6 \end{array} \quad \begin{array}{l} 1, 6 \checkmark \\ 2, 3x \end{array}$$

Sum, product  
integers

$$3x^2 + 7x + 2$$

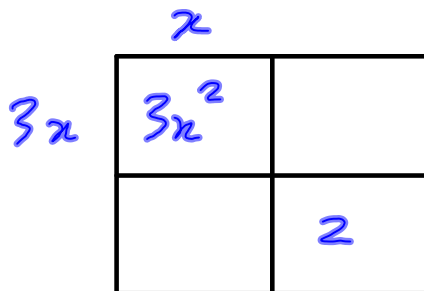
decompose using integers

$$= \underbrace{3x^2 + x} + \underbrace{6x + 2} \quad \text{factor by grouping}$$

$$= x(3x+1) + 2(3x+1) \quad \text{factors should be the same!}$$

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

Feb 1-7:13 PM

Factor  $3x^2 + 7x + 2$  using an area model

Feb 1-7:13 PM

## Factoring Special Quadratics (by patterns)

Perfect Squares:  $a^2 + 2ab + b^2 = (a + b)^2$

$a^2 - 2ab + b^2 = (a - b)^2$

Difference of Squares:  $a^2 - b^2 = (a - b)(a + b)$

(a)  $25d^2 - 144$

$= (5d - 12)(5d + 12)$

(b)  $16x^2 + 24xy + 9y^2$

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

(c)  $18p^2q - 60pq + 50q$

$= 2q(9p^2 - 30p + 25)$

$= 2q(3p - 5)^2$

(d)  $98a^2 - 32b^2$

$= 2(49a^2 - 16b^2)$

$= 2(7a - 4b)(7a + 4b)$

Feb 2-6:44 PM

## Homework:

p.3 # 4odd, 5odd, 6odd



4ace...

5ace...

6ace...

Feb 1-7:30 PM

p. 3 #6 (k)

$$3x^2 + 7x - 20$$

$$= 3x^2 + 12x - 5x - 20$$

$$= 3x(x+4) - 5(x+4)$$

$$= (x+4)(3x-5)$$

S: 7

P: -60

I: 12, -5

Feb 4-9:08 AM

6(c)

$$3t^2 - 11t - 20$$

$$= 3t^2 - 15t + 4t - 20$$

$$= 3t(t-5) + 4(t-5)$$

$$= (t-5)(3t+4)$$

S: -11

P: -60

I: -15, 4

Feb 4-9:11 AM



$6(g)$ 

$$\begin{aligned} & (9a^2 - 16) \\ & = (3a - 4)(3a + 4) \end{aligned}$$

$$\begin{aligned} S & : 0 \\ P & : -144 \\ I & : 12, -12 \end{aligned}$$

$$\begin{aligned} & = 9a^2 + 12a - 12a - 16 \\ & = 3a(3a + 4) - 4(3a + 4) \\ & = (3a + 4)(3a - 4) \end{aligned}$$

Feb 4-9:12 AM