

Warm Up:

Expand and Simplify.

$$y = 3(x - 1)^2 + 2$$

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

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

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

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

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

$$y = -2(x + 2)^2 - 5$$

$$= -2(x+2)(x+2) - 5$$

$$= -2(x^2 + 2x + 2x + 4) - 5$$

$$= -2(x^2 + 4x + 4) - 5$$

$$= -2x^2 - 8x - 8 - 5$$

$$= -2x^2 - 8x - 13$$

Review of Factoring

Lesson objectives

- I know how to factor a simple trinomial
- I know how to factor a complex trinomial
- I know how to factor a difference of squares binomial

1.1

Lesson objectives

Teachers' notes

Lesson notes

Nelson Page 556 #s 1-3, Page 102 #s 1b, 3b 4b & 6cd

Common Factoring: We look for a factor common to each term and divide it out to write the expression as a product.

$$3x^2 + 9$$

$$2x^2 + x$$

$$8x^3 - 6x^2 + 4x$$

TIP: Use the largest number that divides into all the terms exactly and, if there is a variable(s), use the lowest exponent of that variable(s).

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

$$x(2x + 1)$$

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

Factoring Quadratics

- Since factoring is the opposite of multiplication we are essentially looking for what two "pieces" we multiplied together to get the given expression

- If we think back to the visual model, we have the area and we are looking for the side lengths



Decomposition

- When we are factoring a trinomial we are doing decomposition (though there are different methods of decomposition)
- Regardless of the method you choose, the first two steps are always the same:

1. Common Factor (if possible)

2. Find two numbers that:

- add to b
- and multiply to ac

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



Factor the following expressions

$$y = 6x^2 + 11x + 4$$

$$ac = (6)(4) = 24$$

$$3 \times 8 = 24$$

$$3 + 8 = 11$$

$$= \underline{6x^2 + 3x} + \underline{8x + 4}$$

$$= 3x(2x+1) + 4(2x+1)$$

$$= (2x+1)(3x+4)$$

$$12x^2 + 8x - 3x - 2$$

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

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

$$y = 2x^2 + x - 6$$

$$ac = (2)(-6) = -12$$

$$4x - 3 = -12$$

$$4 + -3 = 1$$

$$= \underline{2x^2 + 4x} - \underline{3x - 6}$$

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

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

$$y = 12x^2 + 5x - 2$$

$$ac = (12)(-2) = -24$$

$$8x - 3 = -24$$

$$8 + -3 = 5$$

Factor the following expressions

$$y = x^2 + x - 20$$

$$y = x^2 - 3x - 15$$

If "a" = 1, then we can use a short cut. The decomposed "b" values are the values that go into the brackets

$$\Rightarrow ac = (1)(-20) = -20$$

$$5x - 4 = -20$$

$$5 + -4 = 1$$

$$\Rightarrow = (x+5)(x-4)$$

$$x^2 - 3x - 15$$

$$-1 \times 15 \quad -1 + 15 \quad \times$$

$$-3 \times 5 \quad -3 + 15 \quad \times$$

$$-5 \times 3 \quad -5 + 3 \quad \times$$

$$-15 \times 1 \quad -15 + 1 \quad \times$$

\Rightarrow won't factor



Factoring Difference of Squares Binomials

A difference of squares binomial should be just as quick to factor as a simple trinomial.

These look like they have a "0x" term in the middle.

We take the square root of each term and these values become the values at the beginning and end of each bracket. Then one bracket has a "+" and one has a "-".

Factor the following expressions

$$y = 4x^2 - 9$$

$$y = 121 - x^4$$

$$\sqrt{4x^2} = 2x$$

$$\sqrt{121} = 11$$

$$\sqrt{9} = 3$$

$$\sqrt{x^4} = x^2$$

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

$$\Rightarrow (11+x^2)(11-x^2)$$

<https://www.mangahigh.com/en-gb/games/wrecksfactor>

$$4x^2 - \cancel{6x} + \cancel{6x} - 9$$