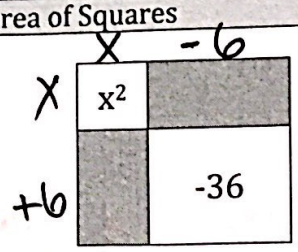
Algebra 1: Unit 4 Notes

Unit 4, lesson 4 Notes: Factoring Special Products

Part 1: Area of Squares



Area: $x^2 - 36$

Factored form: $(x-6)(x+6)$

What is the total area of the unshaded regions?

$x^2 - 36$

What binomials made these areas?

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

***Special Products*: Some factorable quadratics have such a noticeable pattern in the product that the factored form is named and considered "special".**

Special Product #1:

DIFFERENCE OF TWO SQUARES : $a^2 - b^2$

How do you determine if you have a difference of two squares?

- PERFECT SQUARE — PERFECT SQUARE

Subtract

See Factoring Packet. Then do Examples: Factor...

a. $m^2 - 49$

$(m+7)(m-7)$

b. $25 - 4x^2$

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

c. $y^4 - 81$

$(y^2)^2 - 9^2$

$(y^2+9)(y^2-9)$

$(y^2+9)(y+3)(y-3)$

Solve by Factoring : FACTOR - set each binomial = 0

d. $m^2 - 36 = 0$

$(m+6)(m-6) = 0$

$m+6=0$ $\quad$ $m-6=0$

$-6\ -6$ $\quad$ $+6\ +6$

$m=-6$ $\quad$ $m=6$

e. $w^4 - 9 = 0$

$(w^2-3)(w^2+3) = 0$

$w^2-3=0$ $\quad$ $w^2+3=0$

$+3\ +3$ $\quad$ $-3\ -3$

$\sqrt{w^2} = \sqrt{3}$ $\quad$ $\sqrt{w^2} = \sqrt{-3}$

$w = \pm\sqrt{3}$ $\quad$ $w = \pm\sqrt{-3}$

NOT A REAL #

f. $225a^2 - 49 = 0$

$(15a-7)(15a+7) = 0$

$15a-7=0$ $\quad$ $15a+7=0$

$+7\ +7$ $\quad$ $-7\ -7$

$\frac{15a}{15} = \frac{7}{15}$ $\quad$ $\frac{15a}{15} = \frac{-7}{15}$

$a = 7/15$ $\quad$ $a = -7/15$

Algebra Unit 4 Factoring Map

Def Factor:
- Numbers that divide into another (NOUN)
- Write an expression as multiplication of factors (VERB)

1. What can be factored out?
GCF (greatest common factor)

GCF: $2x(4x-2x+3)$ $\quad \frac{8x^2}{2x} - \frac{4x^2}{2x} + \frac{6x}{2x}$

What does factoring look like?
IT LOOKS LIKE MULTIPLICATION!

2. How many terms does the polynomial have?

Two Terms

Difference of Squares: need subtraction of two perfect squares

$x^2 - 9$

$(x+3)(x-3)$

$x^2 - 9$ ✓

$\frac{8x^3}{2x} - \frac{50x}{2x}$

$2x(4x^2-25)$

$(2x)^2 - 5^2$

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

Three Terms...a = 1

ax^2+bx+c

+c: same signs
−c: different signs

mult c, add b

WHAT FACTORS OF c add to be b?

$1x^2+8x+15$ → $+3 \times +5$ → $(x+3)(x+5)$

$1x^2-8x+12$ → -6×-2 → $(x-6)(x-2)$

$1x^2-4x-21$ → $+3 \times -7$ → $(x+3)(x-7)$

Four Terms

Factor by Grouping!

$x^3-5x^2-8x+40$

$(x^3-5x^2)+(-8x+40)$

$x^2(x-5)-8(x-5)$

$(x^2-8)(x-5)$

GCFs! one group of x-5

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

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

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

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

$2x^3-4$

Three Terms...a > 1

Bottoms Up!

1. *Multiply **a** to **c**; rewrite.*
2. *Factor using X*
3. *Divide each constant in each binomial by **a**.*
4. *Reduce.*
5. *Bring any remining denominator from the bottom UP; put it as the coefficient for the binomial.*

$4x^2+4x-3$

$x^2+4x-12$

$(x+\frac{6}{4})(x-\frac{2}{4})$

$(x+\frac{3}{2})(x-\frac{1}{2})$

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

-12 → 6×-2 → 4

$2x+3$ by $2x$: $4x^2$, $6x$ → $4x^2+6x-2x-$