

→ same value, different signs (+/-) in a binomial pair

Lesson #4 - **Conjugates** and More Expanding

I. Conjugates **FOIL**

1. $(x+3)(x-3) = x^2 - 3x + 3x - 9 = x^2 - 9$

middle term cancels

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

3. $(3m+10)(3m-10) = 9m^2 - 100$

recognize the pattern: NO MIDDLE TERM

- FOIL (+)** * **MUST**
- same value ←
 - opposite signs
 - binomials
 - multiplied

4. $(\frac{1}{2}x - y)(\frac{1}{2}x + y) = \frac{1}{4}x^2 - y^2$ difference of squares ✓

5. $(m^3+1)(m^3-1) = m^6 - 1$ difference of squares ✓

$m^3 \cdot m^3 = m^{3+3} = m^6$

$(a+b)(a-b) = a^2 - b^2$
 the product of conjugates is a binomial "a difference of squares"

II. Expand and Simplify

1. $(x+5)(x-1) + (x+3)(x-2)$ Binomials are being ADDED!
 $[x^2 - x + 5x - 5] + [x^2 - 2x + 3x - 2]$ * drop brackets + collect like terms
 $x^2 + x^2 + 4x - 4x - 5 - 2$
 $2x^2 - 26 = 2x^2 - 26$

2. $(x+1) - (x-4)(x+4)$ - recognize conjugate pair
 $(x+1) - (x^2 - 16)$ * difference of squares
 $x + 1 - x^2 + 16$ * collect like terms. $x \neq x^2$
 $= -x^2 + x + 17$

3. $6 - 3(2x-1)(2x+1) - (x+4)^2$ NOT a diff. of squares They have the SAME sign ⊕
 $6 - 3(4x^2 - 1) - (x+4)(x+4)$ **FOIL**
 $6 - 12x^2 + 3 - x^2 - 4x - 4x - 16$ drop brackets, collect like terms!
 $= -13x^2 - 8x - 7$



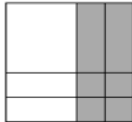
Homework

ASSIGNMENT # 4
 pages 25-27 Questions #140-153

Special Products: Follow the patterns

$$\begin{aligned} \text{Conjugates: } & (a + b)(a - b) \\ & = a^2 + ab - ab - b^2 \\ & = a^2 - b^2 \end{aligned}$$

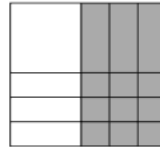
140. Write an expression for the following diagram (do not simplify):



What two binomials are being multiplied above?

Write an equation using the binomials above and the simplified product.

141. Write an expression for the following diagram (do not simplify):



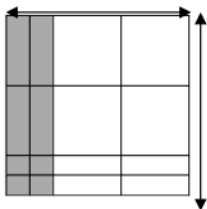
What two binomials are being multiplied above?

Write an equation using the binomials above and the simplified product.

QUESTION... Describe any patterns you observe in the two questions above.

Remember this pattern...it will be important when we factor "A Difference of Squares" later in this booklet.

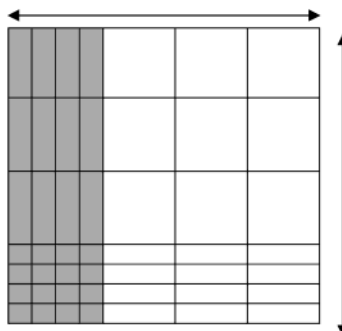
142. Write an expression (polynomial) for the following diagram (do not simplify):



What two binomials are being multiplied above?

Write an equation using the binomials above and the simplified product.

143. Write an expression for the following diagram (do not simplify):



What two binomials are being multiplied above?

Write an equation using the binomials above and the simplified product.

Simplify the following.

144. $(x + 3)(x - 3)$

145. $(2x + 3)(2x - 3)$

146. $(3x - 1)(3x + 1)$

147. $(x + \sqrt{2y})(x - \sqrt{2y})$

Simplify the following.

148. $3(b - 7)(b + 7)$

149. $-2(c - 5)(c + 5)$

150. $(x + 6)(x + 4) + (x + 2)(x + 3)$

151. $3(x - 4)(x + 3) - 2(4x + 1)$

152. $5(3t - 4)(2t - 1) - (6t - 5)$

153. $10 - 2(2y + 1)(2y + 1) - (2y + 3)(2y + 3)$

Some key points to master about the Distributive Property...

FOIL

$(a + b)(a - b)$

$(a + b)^2$

$(a + b)^3$