

TOPIC: QUADRATIC EQUATIONS

Multiply Binomials Using the FOIL Method

◆ Many problems involve multiplying two _____. Instead of distributing, use the **FOIL** method and simplify.

► **FOIL** is an acronym that tells you which two terms to multiply and in what order!

F.O.I.L.

Multiply **F** _____ terms $\Rightarrow$ **O** _____ terms $\Rightarrow$ **I** _____ terms $\Rightarrow$ **L** _____ terms

Distributive Property

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

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

F.O.I.L.

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

PRACTICE

Multiply the polynomials by using FOIL.

(A) $(x - 5)(x - 12)$

(B) $(4x + 7)(-x + 6)$

(C) $(x^2 - 3x)(2x + 8)$

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EXAMPLE

Multiply the polynomials by using FOIL.

$$(2x + y)(xy - 3)$$

PRACTICE

Multiply the polynomials by using FOIL.

$$(5xy + 3)(4xy - 2)$$

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Factor Trinomials of the Form $x^2 + bx + c$

◆ Recall: *Multiply* two binomials $(x + p)(x + q)$ into a trinomial $x^2 + bx + c$ using the distributive property/FOIL.

► Factor a trinomial back into two binomials by finding p & q that **multiply** to c and **add** to b .

New

Factoring $x^2 + bx + c$

Multiply (FOIL) →

$$(x + 3)(x + 7) = x^2 + 7x + 3x + 21 = x^2 + 10x + 21$$

← *Factor*

Multiply to c

Add to b

EXAMPLE

Factor the given polynomial.

(A)

$$x^2 + 3x - 28$$

$p \cdot q =$ <u> </u>	$p + q$ must = <u> </u>
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$$(x + \underline{\hspace{1cm}})(x + \underline{\hspace{1cm}})$$

(B)

$$x^2 - 11x + 30$$

$p \cdot q =$ <u> </u>	$p + q$ must = <u> </u>
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$$(x + \underline{\hspace{1cm}})(x + \underline{\hspace{1cm}})$$

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PRACTICE

Factor the following trinomials completely.

(A) $y^2 - 7y + 12$

(B) $z^2 - 11z + 30$

EXAMPLE

Factor the trinomial completely.

$$x^2 - 5xy + 6y^2$$

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Factor Trinomials Using Trial and Error

- ◆ To factor by trial & error, find possible binomial factors, then FOIL to test options until you get original trinomial.
 - ▶ Find binomial factors where the 1st terms multiply to ax^2 & the 2nd terms multiply to c .

New

Factoring by Trial & Error

$$2x^2 + 11x + 5 = (\underline{\quad}x + \underline{\quad})(\underline{\quad}x + \underline{\quad})$$

Multiplies to $\underline{\quad}x^2$

Multiplies to $\underline{\quad}$

Possible Binomial Factors:

$$(\underline{\quad}x + \underline{\quad})(\underline{\quad}x + \underline{\quad}) =$$
$$(\underline{\quad}x + \underline{\quad})(\underline{\quad}x + \underline{\quad}) =$$

- ◆ Remember to pay attention to the _____ of all terms when determining possible binomial factors.

EXAMPLE

Factor the polynomial.



$$6x^2 + 19x - 7$$

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PRACTICE

Factor the following using trial and error.

(A) $3y^2 - 14y + 8$

(B) $8a^2 - 22a + 15$

EXAMPLE

Completely factor.

$$2x^2 + 5xy + 3y^2$$

EXAMPLE

Factor completely. *Hint: Factor out the GCF first.*

$$8x^2 - 28x - 16$$

PRACTICE

Factor the following using trial and error.

$$15a^2 + 25a - 40$$

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Solving Quadratic Equations by Factoring

◆ A **quadratic equation** is an equation that can be written in the form:

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$$ax^2 + bx + c = 0$$

(Standard Form)

► To solve a quadratic equation, write in standard form, factor, then set each factor equal to ____ & solve for x .

New

Solving Quadratic Equations by Factoring

$$x^2 + 10x + 21 = 0$$

Factor: $(x + \quad)(x + \quad) = 0$

Set each factor = 0: _____ = 0 _____ = 0
(Zero Product Property)

Check answers:

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EXAMPLE

Solve the quadratic equation by factoring.

$$-x^2 = 3x - 4$$

Factors of $a \cdot c = \underline{\hspace{1cm}}$	Sum of factors

HOW TO: Solve Quad Eqns by Factoring

- 1) Write in **standard form**
- 2) Factor using any method
- 3) Set each factor = 0, solve for x
- 4) Check answers by plugging into orig. eqn

PRACTICE

Use the zero product rule to solve the following equations for x .

(A) $(x - 5)(x + 3) = 0$

(B) $2(x - 4)(x + 6) = 0$

PRACTICE

Solve the following quadratic equations.

(A) $2x^2 - 10x = 0$

(B) $2x^2 = 5x + 3$

(C) $\frac{x^2}{2} - 4 = x$