Section 2.6: Finding the x-intercepts of a Quadratic Functions By Factoring

→ II. Factoring a Difference of Two Squares

$x^2 - 16$ is an example of a Difference of Two Squares

x^2 is a "square" because it = $x \cdot x$
16 is a "square" because it = $4 \cdot 4$

Other Examples of a Difference of Two Squares

$x^2 - 25$	$4x^2 - 49$	$9x^2 - 36$
$x \cdot x$, $5 \cdot 5$	$2x \cdot 2x$, $7 \cdot 7$	$3x \cdot 3x$, $6 \cdot 6$

Now, onto solving quadratic equations by factoring a difference of two squares.

Step 1: Find the square root of each term.
Step 2: Factor into two binomials - one plus and one minus.

$$a^2 - b^2 = 0$$
$$(a + b)(a - b) = 0$$

$$(\sqrt{Term1} + \sqrt{Term2})(\sqrt{Term1} - \sqrt{Term2}) = 0$$

Step 3: Set each bracket equal to zero and solve for the variable.

Example: Solve the following quadratic equations.

A) $x^2 - 16 = 0$

$\sqrt{x^2} = x$ $\sqrt{16} = 4$

$x \cdot x$ $4 \cdot 4$

$(x+4)(x-4) = 0$

$x+4=0$ $x-4=0$

$x=-4$ $x=4$

B) $x^2 - 25 = 0$

$\sqrt{x^2} = x$ $\sqrt{25} = 5$

$x \cdot x$ $5 \cdot 5$

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

$x+5=0$ $x-5=0$

$x=-5$ $x=5$

C) $4x^2 - 49 = 0$

$2x \cdot 2x$ $7 \cdot 7$

$(2x+7)(2x-7) = 0$

$2x+7=0$ $2x-7=0$

$\frac{2x}{2} = \frac{-7}{2}$ $\frac{2x}{2} = \frac{7}{2}$

$x = -\frac{7}{2}$ $x = \frac{7}{2}$

D) $9x^2 - 36 = 0$

GCF = 9

$\div 9$ $\div 9$

$9(x^2 - 4) = 0$

$x \cdot x$ $2 \cdot 2$

$9(x+2)(x-2) = 0$

$x+2=0$ $x-2=0$

$x=-2$ $x=2$

E) $4x^2 = 25$

F) $9x^2 = 49$

2. Find the x-intercepts or zeros of the quadtratic functions below.

A) $y = x^2 - 81$

$0 = x^2 - 81$

$x \cdot x \quad 9 \cdot 9$

$(x+9)(x-9) = 0$

$x+9=0 \quad x-9=0$

$x=-9 \quad x=9$

B) $y = 25x^2 - 16$

$0 = 25x^2 - 16$

$5x \cdot 5x \quad 4 \cdot 4$

$(5x+4)(5x-4) = 0$

$5x+4=0 \quad 5x-4=0$

$\frac{5x}{5} = \frac{-4}{5} \quad \frac{5x}{5} = \frac{4}{5}$

$x = -\frac{4}{5} \quad x = \frac{4}{5}$

C) $y = 12x^2 - 75$

$0 = 12x^2 - 75$ GCF = 3

$\div 3 \quad \div 3$

$3(4x^2 - 25) = 0$

$2x \cdot 2x \quad 5 \cdot 5$

$3(2x+5)(2x-5) = 0$

$2x+5=0 \quad 2x-5=0$

$\frac{2x}{2} = \frac{-5}{2} \quad \frac{2x}{2} = \frac{5}{2}$

$x = -\frac{5}{2} \quad x = \frac{5}{2}$

D) $y = 28x^2 + 63$

$0 = 28x^2 + 63$ GCF = 7

$\div 7 \quad \div 7$

$0 = 7(4x^2 + 9)$

This is a sum of 2 squares.

* Cannot factor it

Cannot solve