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

We have already seen that we can find the x-intercepts of any quadratic function using the calculator.

We can also find the x-intercepts of some quadratic functions using factoring. We will study 4 types of factoring:

- Removing the Greatest Common Factor (GCF)
- Difference of Two Squares
  $a^2 - b^2 = (a - b)(a + b)$
- Trinomials of the form $x^2 + bx + c$
  $(x \pm \_\_\_)(x \pm \_\_\_)$
  Find two numbers that multiply to give "c" and add to give "b".
- Trinomials of the form $ax^2 + bx + c$ using decomposition → "box"

Reminder:

Quadratic Equations

- Have the form $ax^2 + bx + c = 0$
- Solutions to a quadratic equation are called roots.
- To find the roots of a quadratic equation factor the equation and then solve for x.

Quadratic Functions

- Have the form $y = ax^2 + bx + c$
- Solutions to the quadratic function are called zeros or x-intercepts.
- To find the zeros or x-intercepts of a quadratic function, set y = 0 (or f(x) = 0), factor the equation and then solve for x.

* If the **roots**, **zeros** or **x-intercepts** of a quadratic equation are $x = a$ and $x = b$, then the **factors** of the equation are $(x-a)$ and $(x-b)$. The equation in factored form is $(x - a)(x - b) = 0$. To simplify the equation - use the FOIL rule (i.e. Distributive Property twice). *

I. Removing a Common Factor

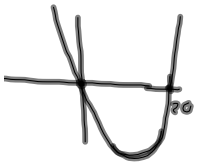
Example: Find the roots of the following quadratic equations.

A) $0 = x^2 - 20x$

$0 = x(x-20)$

$x = 0$ $\quad x - 20 = 0$

$x = 20$

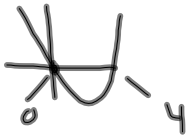


B) $0 = 10x^2 - 40x$

$0 = 10x(x-4)$

$\frac{10x}{10} = \frac{0}{10}$ $\quad x - 4 = 0$

$x = 0$ $\quad x = 4$



C) $0 = 0.5x^2 - x$

$0.5x^2 - x = 0$

$x(0.5x - 1) = 0$

$x = 0$ $\quad 0.5x - 1 = 0$

$0.5x = 1$

$\frac{0.5x}{0.5} = \frac{1}{0.5}$

$x = 2$

D) $0 = 2x^2 - 5x$

$0 = x(2x - 5)$

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

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

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

Example: Find the x-intercepts (or zeros) of the following quadratic functions. (Factor)

A) $y = 14x^2 - 49x$

$0 = 14x^2 - 49x$

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

$\frac{7x}{7} = \frac{0}{7}$ $\quad 2x - 7 = 0$

$x = 0$ $\quad \frac{2x}{2} = \frac{7}{2}$

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

B) $y = 24x^2 - 60x$

$0 = 24x^2 - 60x$

$0 = 12x(2x-5)$

$\frac{12x}{12} = \frac{0}{12}$ $\quad 2x - 5 = 0$

$x = 0$ $\quad \frac{2x}{2} = \frac{5}{2}$

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

C) $y = 18x^2 - 27x$

$0 = 18x^2 - 27x$

$0 = 9x(2x-3)$

$\frac{9x}{9} = \frac{0}{9}$ $\quad 2x - 3 = 0$

$x = 0$ $\quad \frac{2x}{2} = \frac{3}{2}$

$x = \frac{3}{2}$

D) $y = 12x^2 - 30x$

Example: Solve the following quadratic functions.

A) $5x^2 = -35x$

B) $16x^2 = 24x$

C) $-28x = -8x^2$

D) $21x^2 = -35x$