Warm-Up

Factor:

1) $x^2 - 36$ $(x+6)(x-6)$

2) $x^2 - 2x - 35$ -35, $5 \cdot -7$, -2, $(x+5)(x-7)$

3) $\sqrt[3]{x^3} - \sqrt[3]{27}$

$a^3 - b^3 \Rightarrow (a-b)(a^2+ab+b^2)$

$x \quad 3 \qquad (x-3)(x^2+3x+9)$

Objective

Today we will:

- Introduce basic properties of Quadratic Functions
- Solve Quadratic Equations by Factoring

Agenda

- Intro to Quadratic Functions
- Solving Quadratic Functions by Factoring Examples
- Test Review

What is a function?

What are some properties of Quadratic Functions?

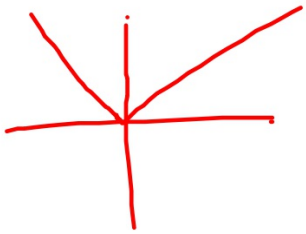
What are other terms for Solutions?

What is the difference between Factors and Solutions?

Functions

A Function is a relation of inputs and outputs.

- Every Possible Input has exactly one output



Unit 2
Quadratic Functions

multi-term involving x + −

- Polynomial Function with a degree of 2

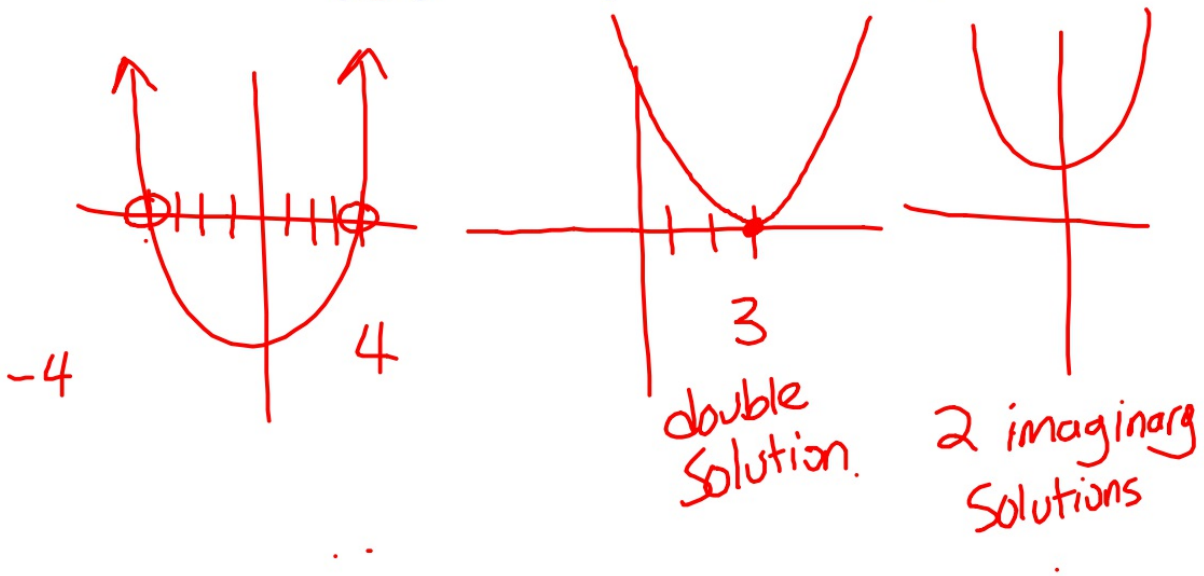
highest exponent

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

$4x^5-2$

- Has 2 solutions

- Parabola (∪) Shaped or ∩



Standard Form

$$Ax^2 + Bx + C = 0$$

Examples

1) $8x^2 - 3x + 7 = 0$

A=8
B=-3
C=7

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

A=5
B=0
C=-12

3) $-14x^2 + 11x = 0$

A=-14
B=11
C=0

4) $4x + 9 = 0$

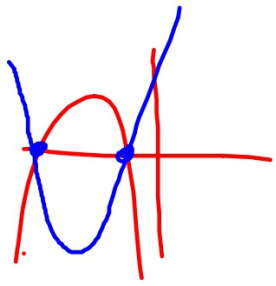
Linear

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

5) $x^2 + 42 = 13x$

$-13x$

$x^2 - 13x + 42 = 0$



6) $9x^2 + 53 = 8x^2 + 14x + 5$

$-9x^2$ -53 $-9x^2$ -53

$0 = -1x^2 + 14x - 48$

$\therefore$

Solutions

- Also Called "Roots" or "Zeros"

- Can be found by:
  - Factoring
  - Taking square roots
  - Quadratic Formula * Always works
  - Completing the square
  - Graphing

Solutions by Factoring

Ex. 1 $x^2 - 2x - 35 = 0$ Short A·C

-35

$-7 \quad 5 \mid -2$

Factors: $(x-7)(x+5)=0$

$x-7=0 \qquad x+5=0$

$x=7 \qquad x=-5$

Solutions, Roots, zeros

$\{7, -5\}$ Solution set

Ex. 2 $5n^2 - 16n + 12 = 0$ Long A·C

60

$-6 \quad -10 \quad -16$

$(5n^2 - 6n)(-10n + 12) = 0$

$n(5n-6) - 2(5n-6) = 0$

Factors $(n-2)(5n-6) = 0$

$n - 2 = 0$

$+6 \quad +6$

$n = 2$

$5n - 6 = 0$

$5n = 6$

$n = \frac{6}{5}$

Solutions
Zeros
Roots

$\{2, \frac{6}{5}\}$

Ex. 3 $2a^2 + 3a = 0$

$a(2a+3)=0$

$a=0$ or $2a+3=0$

$2a=-3$

$a=\frac{-3}{2}$

$\left\{0, -\frac{3}{2}\right\}$

Ex. 4 $12a^2 + 8 = 0$

$4(3a^2+2)=0$

$4 \neq 0$

$3a^2+2=0$

$-2 \quad -2$

$\frac{3a^2}{3} = \frac{-2}{3}$

$\sqrt{a^2} = \sqrt{\frac{-2}{3}}$

$a = \pm\sqrt{\frac{-2}{3}}$

$a = \pm i\sqrt{\frac{2}{3}}$

$\left\{i\sqrt{\frac{2}{3}}, -i\sqrt{\frac{2}{3}}\right\}$

Ex. 5 $\sqrt{4x^2} - \sqrt{49} = 0$ Difference of squares

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

$2x-7=0$ $\quad +7 \; +7$

$2x=7$

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

$2x+7=0$ $\quad -7 \; -7$

$2x=-7$

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

$\left\{\frac{7}{2}, \frac{-7}{2}\right\}$

Ex. 6 $11n^2 - 7n - 2 = 8n^2 - 8n$

Wrap-Up

- What is a function?
- What are some properties of Quadratic Functions?
- What are other terms for Solutions?
- What is the difference between Factors and Solutions?

Lesson Check

$$8r^2 - 10 = -11r$$

$$14n^2 + 13n = -3$$

$$3v^2 + 4v - 40 = -5 - 4v$$