Chapter 1- Quadratics

Algebra 2

Chapter 1: Quadratic Functions and Factoring

Forms.

- 1. Standard Form: $y = ax^2 + bx + c$
- 2. Vertex Form: $y = a(x - h)^2 + k$
- 3. Intercept Form: $y = a(x - p)(x - q)$

- The solutions (graph) form a Parabola

  The parent function is: $y = x^2$

  Find Vertex and use x / y chart

- **Properties of Quadratics**
  - a > 0 opens up a < 0 opens down
  - $|a|$ > 1 narrower $|a|$ < 1 wider
  - Axis (line) of Symmetry x = (x of vertex)
  - Vertex (VIP):
  - y-intercept: c (0,c)
  - Maximum Value: graph opens down
  - Minimum Value: graph opens up
    - The y value of the vertex

1.1-1.2 Graphing

- **To Graph:**
- **1.** Standard Form: $y = ax^2 + bx + c$
  - Find Vertex $\frac{-b}{2a}$,

  2. Vertex Form: $y = a(x - h)^2 + k$
     Find Vertex (h,k)

- 3. Intercept Form: $y = a(x - p)(x - q)$
     Find Vertex $\frac{p+q}{2}$

1.3-1.4 Solve Quadratic Equations by Factoring

- **To Solve a Quadratic Equation**:
  - 1. Standard Form = 0
  - 2. Factor 1.GCF 2. FOIL
  - 3. Set each factor = 0
  - 4. Solve for x

Solutions are called……

– Roots
– Zeros
– Intercepts
– x-intercepts
– X = ____, _____

1.5 Solve Quadratics by Finding Square Root

- **Square Root**: radical = $\sqrt{2}$ 2=radicand
- Simplify;
  - 1. Take out any factors that are perfect squares
    - $\sqrt{24} = 2\sqrt{6}$
  - 2. Multiply: $\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$
    - A. Add and Subtract like: $3\sqrt{2} + 4\sqrt{2} = 7\sqrt{2}$
  - 3. $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ NO radical in denominator so…….
  - $\frac{\sqrt{a}}{\sqrt{b}} \cdot \frac{\sqrt{b}}{\sqrt{b}} = \frac{\sqrt{ab}}{b}$

- **To Solve**:
  - Quantity on one side( )² = number on other
  - Square root both sides
  - Remember 2 answers ±

1.6 Complex Numbers

- Complex Numbers made up of real and imaginary parts $a + bi$

- Pure Imaginary: bi

  Add, subtract, multiply

$i = \sqrt{-1} = i$

$i^2 = -1$

- Can't have *i* in denominator
  - Rationalize the denominator: multiply by conjugate
  - *2 + 3i* conjugate = *- 2 – 3i*
- Absolute Value: distance from origin
- $$|a + bi| = \sqrt{a^2 + b^2}$$

1.7 Completing the Square

- To **Solve** Quadratic Equations:
  - 1. Factor ( ) ( ) = 0
  - 2. Square Roots ( )^2 = 8
  - 3. Complete the Square (then use Square Roots)

- **To complete the square:**
  - 1. make $ax^2 + bx = c$
  - 2. $a = 1$
  - 3. take $\frac{1}{2}$(b) then square it
  - 4. add it to both sides
  - 5. factor
  - 6. solve
- Use to put equation in vertex form

1.8 The Quadratic Formula and the Discriminant

- To **Solve** Quadratic Equations
- 1. Factor
- 2. Square Root (Complete Square)
- 3. Quadratic Formula:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- **Discriminant**: determines what kind of answers

$b^2 - 4ac$

If $b^2 - 4ac > 0$ 2 real solutions

$b^2 - 4ac = 0$ 1 real solution

$b^2 - 4ac < 0$ 2 imaginary solution

1.9 Graphing and Solving Quadratic Inequalities

- To **Graph**: $ax^2 + bx + c < (>) 0$
  - Graph Vertex
  - Pick points x/y chart
  - Solid or dashed
  - Test point
  - Shade

- To **Solve** a Quadratic Inequality
  - Set = 0
  - Solve for x
    - Factor
    - Quadratic Formula
  - Test Intervals
  - Write Solution as Inequality

Chapter 1 Test

- **Graph**: 3 forms
  - Find Vertex
  - Find x-intercepts
  - Find y-intercept
  - Find axis of symmetry
  - Know when to shade

  Change Forms

  2 story problems

Solve:

1. Factor
2. Square Roots

   Complete Square
3. Quad Formula