

Foundations of Math 2
Unit 4 Study Guide
Quadratic Functions

Key Terms:

- Axis of Symmetry
- Parabola
- Roots of the Equation
- Standard Form of a Quadratic Equation
- Discriminant
- Quadratic Equation
- Vertex
- Standard Form of a Quadratic Function
- Maximum
- Quadratic Formula
- Zero of a Function
- Zero-Product Property
- Minimum
- Quadratic Function

Material by Subject:

4.1. Quadratic Graphs and Their Properties

- Be able to recognize a quadratic function from both its equation and its graph.
- Understand what the standard form of a quadratic function is and be able to put a quadratic function in standard form.
- Know the Quadratic Parent Function ($y = x^2$)
- Be able to describe the graph of a quadratic function. Know its name and be able to identify both the vertex and its axis of symmetry from the graph.
- Based on the equation of a parabola, be able to determine what the vertex is and whether it will be a maximum or a minimum.
- Be able to use the equation of several quadratic functions to compare their widths.
- Be able to graph a quadratic function in the form $y = ax^2$ and $y = ax^2 + c$

4.2. Quadratic Functions

- Be able to graph a quadratic function in the form $y = ax^2 + bx + c$
- Given a word problem with an equation for the function, be able to find the vertex and the range of a projectile.
- Be able to determine the vertex from the vertex form $y = a(x - h)^2 + k$
- Understand how a quadratic function has been transformed from its parent function using the vertex form.

4.3. Quadratic Regression

- Given three coordinate points (including the y-intercept), be able to find the equation of a parabola using a system of equations.
- Be able to use your calculator to determine the equation of a quadratic function from three points (not necessarily including the y-intercept)
- Be able to determine the equation of a parabola from a graph.
- Be able to use quadratic regression to solve real-world problems.

4.4. Solving Quadratic Equations

- Given the graph of a parabola, be able to find the roots of its corresponding equation (x-intercepts).
- Understand how roots of the equation and zeros of the function are related (they are the same thing)
- Be able to rearrange a simple quadratic equation in the forms $y = ax^2$ and $y = ax^2 + c$ to solve by taking square roots.
- Remember that when taking the square root of both sides of an equation, you get two resulting answers.

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- Given a real-world situation (word problem), be able to determine which answer(s) are realistic for the given scenario. (Ex – negative length would not be reasonable when finding the length of the side of a square)

4.5. Factoring to Solve Quadratic Equations

- Recall the methods of factoring from Unit 3 and be able to apply them to quadratic equations in this unit.
- From the factored form of a quadratic equation, be able to apply the zero-product property to find the solutions.
- Given a quadratic equation in standard form, be able to factor and solve for the solutions.
- Be able to put an equation in standard form before factoring and solving.
- Be able to apply factoring to solve to real-world scenarios (word problems)

4.6. The Quadratic Formula and the Discriminant

- Know the quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- Be able to put a quadratic function in standard form prior to using the quadratic formula.
- Recognize that if a term is missing, then the coefficient is zero (ex: $y = x^2 - 3$ $a = 1$, $b = 0$, $c = -3$)
- Be able to solve for the zeros of a quadratic function using the quadratic formula, including estimating answers concerning word problems.
- Know how to find the discriminant of a quadratic function: $b^2 - 4ac$
- Understand how to use the discriminant to predict the number of real solutions a quadratic function will have.