Algebra I

Unit 3: Modeling & Analyzing Quadratic Functions

**Issue 1**

Dear Parents

Below is information regarding Unit 3: Modeling & Analyzing Quadratic Functions.

# Quadratic Functions

**Students will analyze quadratic functions in the forms *f(x) = ax² + bx + c* and *f(x) = a(x – h)² + k***

* Convert between standard and vertex form
* Graph quadratic functions as transformations of *f(x) = x²*
* Investigate & explain characteristics of quadratic functions
* Explore quadratic sequences recursively and explicitly
* Students will solve quadratic equations and inequalities in one variable.
* Solve equations graphically & with technology
* Find real & complex solutions of equations by factoring, taking square roots, and applying the quadratic formula
* Analyze roots using technology and the discriminant
* Solve quadratic inequalities both graphically and algebraically
* Describe the solutions using linear inequalities and interval notation

Web Resources

* <http://www.purplemath.com/modules/quadform.htm> (quadratic equation)
* <http://www.purplemath.com/modules/solvquad.htm> (solving quadratic equations)
* <http://www.purplemath.com/modules/complex.htm> (complex numbers)
* <http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/col_alg_tut12_complexnum.htm> (complex numbers)
* <http://www.purplemath.com/modules/grphquad2.htm> (vertex form)
* <http://www.analyzemath.com/quadratics/quadratics.htm> (standard form)
* <http://www.purplemath.com/modules/ineqquad.htm> (quadratic inequalities)
* <http://www.regentsprep.org/Regents/math/algtrig/ATP2/ArithSeq.htm> (arithmetic sequences)
* <http://www.regentsprep.org/Regents/math/algtrig/ATP2/ArithSeq.htm> (partial sums)

## Textbook Connections

Holt McDougal Analytic Geometry:

Unit 5, Module 14-16

Online Access:

<http://my.hrw.com/>



**Quadratic Function Vocabulary Terms**

**Complete factorization over the integers**: writing a polynomial as a product of polynomials as that none of the factors is the number 1, there is at most one factor of degree zero, each polynomial factor has degree less than or equal to the degree of the product polynomial, each polynomial factor has all integer coefficients, and none of the factor polynomial can be written as such a product.

**Standard Form:** f(x) = ax2 + bx + c

**Vertex Form:** a formula *f(x) = a(x-h)²+ k*, where a is a nonzero constant and the vertex of the graph is the point *(h,k)*

**Discriminant:** in the quadratic equation, the value of *b²- 4ac*

**Theorems:**

1) The graph of any quadratic function can be obtained from transformations of the graph of *f(x) = x²*

2) The discriminant is positive, zero, or negative if & only if the equation has 2 real solutions, 1 real solution or 2 complex conjugate solutions respectively

3) Quadratic Formula: 

4) For and , f(x) = a(x-h)²+ k is the same function as f(x) = ax²+ bx + c

For examples & help with vocabulary, visit:

[*http://intermath.coe.uga.edu/*](http://intermath.coe.uga.edu/)

**Sample Practice**

1. What happens to the graph of y = x² when you multiply x² by 3?
2. Find the product of (2x + 3) (3x + 4).
3. Factor 6x² +7x -20.
4. Solve the quadratic equation: 2x² + 3x – 54 = 0.
5. Find the y-intercept of f(x) = x²- 4x + 9.
6. Find the discriminate of 3x² +15x = 12

**Answers:**

1. It causes a vertical stretch:
2. (6x²+17x+12)
3. (2x+5)(3x -4)
4. (2x-9)(x+6)=0 x = 4.5 or x = -6
5. f(0) = 0²-4(0) +9 y-intercept=9
6. b²-4ac = (15)²-4(-36) = 369

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**Street Address**

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