**Algebra2 Test Study Notes**

**Unit 5 – Quadratic Functions**

Transformations of Quadratics

* Parent function is f(x) = x2
* Vertical and horizontal shifts are f(x) = (x-h)2 + k
* Reflections across x axis f(x) = -(x-h)2 + k
* Stretch / Shrink $f\left(x\right)=a\left(\frac{x-h}{b}\right)^{2}+k$
* If a < 0 the parabola is reflected over the x axis

Quadratic Equations

* Standard Form of a quadratic function f(x) = ax2 + bx + c
* A graphed quadratic results in a parabola
* The axis of symmetry occurs at $x=-\frac{b}{2a}$
* Vertex of a parabola – the minimum or maximum point
	+ Occurs on the axis of symmetry
	+ Find the y value by plugging in for the axis of symmetry
	+ To graph find the axis of symmetry, the vertex and one other point (along with its point of symmetry)
* If a < 0 the curve points down

Solving Quadratic Equations by Graphing

* Changing an equation from 0= to f(x) = allows the equation to be graphed
* Utilize graphing skills described above to find the location where the graph crosses the x-axis
* X-axis crossings are roots, or solutions to the original equation

Solving quadratic Equations by Factoring

* Factor out the GCF before all other processes
* Process for factoring quadratics
	+ Multiply the “a” and “c” coefficients
	+ Find all factors that multiply to the product, find the one that adds/subs to the “b” term
	+ Re-write with four terms and factor with grouping
* Recognize perfect squares and difference of squares

Completing the Square

* Perfect square quadratic equations 
* This can be used to solve quadratics that cannot be factored
* The last term must be half the middle term squared
* Quadratic equations can be turned into vertex form using completing the square
* Solving with completing the square may result in imaginary results
* Write equations in vertex form by completing the square, balancing on the same side of the equal sign.

Complex Numbers

* The square root of -1 is defined as *i* which is referred to as an imaginary number
* *i* 2 = -1
* Complex numbers have a real component and an imaginary one e.g. a + b *i*
* Complex numbers can be added, subtracted, multiplied and divided. Follow normal algebra rules, treating *i* as a “non” like term and using the rules above.

Quadratic Formula

* Completing the square for the general case results in the quadratic formula
* The disciminant is the portion under the square root sign
	+ If it is negative, two complex answers
	+ If it is positive two real answers
	+ If it is zero, one real answer

Operations with complex numbers

* Complex numbers can be graphed with imaginary component on the y-axis
* Absolute value of a complex number is the resultant length on the graph
* Addition of complex numbers, combine real components and imaginary components
* Multiplication of complex numbers utilizes FOIL, make sure to simplify $i^{2}=-1$
* Use complex conjugates to simplify fractional complex numbers. a - bi

No formulas will be provided

**Graphing calculators are not allowed**