UbD Algebra 2 - Transformations of Functions

Time Frame: 11 Lessons	Unit 5: Transformations of Functions	Course Name: Algebra 2

Stage 1: Desired Results

Established Goal(s)

Standards Addressed:

HSA-REI.A.1
Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

HSA-REI.A.2
Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

HSA-REI.B.4
Solve quadratic equations in one variable.

HSA-REI.B.4.a
Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x-p)^2=q that has the same solutions. Derive the quadratic formula from this form.

HSA-REI.B.4.b
Solve quadratic equations by inspection (e.g., for x^2=49), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a+-bi for real numbers a and b.

HSA-REI.D.11
Explain why the x-coordinates of the points where the graphs of the equations y=f(x) and

Transferable Skills

Students will be able to independently use their learning to...

- **apply transformations of functions, mathematical knowledge, skill, and reasoning to solve real-world problems.**
- develop clear and effective communication.
- increase self-direction.
- develop creative and practical problem-solving.
- develop informed and integrative thinking.

Meaning

Understandings
Students will understand that...

- they can write equations for functions that are defined in terms of another to describe transformations using function notation.
- transformations such as reflections across the horizontal and vertical axes are defined using function notation and they can make connections to the same topic from geometry.
- the use of clear and precise language is critical as students make sense of the effects of different scale factors

Essential Questions

- What are the properties and applications of functions, including polynomial, rational, exponential, and logarithmic functions?
- How can we use algebra to analyze and solve problems including solving equations, graphing functions, and applying identities?
- How has algebra developed over time, and how has it contributed to our understanding of mathematics and the natural world?

Acquisition

UbD Algebra 2 - Transformations of Functions

y=g(x) intersect are the solutions of the equation f(x)=g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. **HSN-CN.A.1** Know there is a complex number i such that iˆ2=-1, and every complex number has the form a+bi with a and b real. **HSN-CN.A.2** Use the relation iˆ2=-1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. **HSN-CN.C.7** Solve quadratic equations with real coefficients that have complex solutions. **HSN-RN.A.1** Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 5ˆ(1/3) to be the cube root of 5 because we want (5ˆ(1/3))ˆ3=5ˆ((1/3)*3)) to hold, so (5ˆ(1/3))ˆ3 must equal 5. HSN-RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	*Students will know...* ● how to use function notation to represent a vertical or horizontal translation from one graph to another. ● how to write equations to represent vertical and horizontal translations of graphs. ● how to reflect a graph across either the x-axis or y-axis. ● how to identify even and odd functions by their graphs. ● how to complete graphs of even and odd functions if I know what half the graph looks like. ● how to identify even and odd functions by their equations. ● how to calculate the scale factor needed to transform the output of a function to model data. ● how to describe the effect of a scale factor on the input of a function.	*Students will be able to...* ● understand the differences between scaling the outputs and scaling the inputs of a function. ● describe how a graph is transformed. ● understand the relationship between graphs and equations describing horizontal translations. ● write an equation from a description of how a graph is transformed. ● combine two functions in different ways. ● transform a function so its graph models a data set. Mathematical Practices: ● make sense of problems and persevere in solving them. ● reason abstractly and quantitatively. ● construct viable arguments and critique the reasoning of others. ● model with mathematics. ● use appropriate tools strategically. ● attend to precision. ● look for and make use of structure. ● look for and express regularity in repeated reasoning.