UbD Algebra 2 - Trigonometric Functions

Time Frame: 19 Lessons	Unit 6: Trigonometric Functions	Course Name: Algebra 2

Stage 1: Desired Results

Established Goal(s)

Standards Addressed:

HSF-BF.B.3
Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

HSF-IF.B.4
For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

HSF-IF.B.5
Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the

Transferable Skills

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

- **apply trigonometric 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 apply their knowledge of transformations to trigonometric functions and use these functions to model periodic situations.
- the symmetry of the unit circle and they study specific radian angles and learn to use them.
- that the cosine and sine of an angle (θ) can be defined as the x- and y-coordinates, respectively, of the point on the unit circle corresponding to (θ).
- they can apply their previous work with transformations of graphs to trigonometric functions.

Essential Questions

- How can we use advanced algebraic techniques to model and solve real-world problems?
- How can we use algebra to analyze and solve problems related to trigonometry, 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 - Trigonometric Functions

positive integers would be an appropriate domain for the function. **HSF-IF.C** Analyze functions using different representations. **HSF-IF.C.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **HSF-IF.C.7.c** Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. **HSF-TF.A.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. **HSF-TF.A.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. **HSF-TF.B.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. **HSF-TF.C.8** Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.	*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 write an equation from a description of how a graph is transformed. ● 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. ● how to combine two functions in different ways.	*Students will be able to...* ● describe how a graph is transformed. ● understand the relationship between graphs and equations describing horizontal translations. ● understand the differences between scaling the outputs and scaling the inputs of a function. ● 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.