*Unit 7 Graphs of Trigonometric Functions

Content Area: **Mathematics**
Course(s): **Trigonometry and Analytical Geometry**
Time Period: **May**
Length: **10 Blocks**
Status: **Published**

Enduring Understandings

The methods learned for graphing algebraic equations directly relate to graphing trigonometric equations.

The graphs of trigonometric functions can be modified through their equations.

The graphs of trigonometric functions has applications to heart function, the response of a spring, and waves.

Essential Questions

How can you compare the graphs of the sine, cosine, tangent functions and their inverses?

How do you graph tangent, cotangent, secant, and cosecant functions?

What are the basic similarities and differences between the graphs of sine and cosine?

What effect do changes in amplitude, period, and phase shift have on the graphs of sine and cosine?

How do we use trigonometric functions to describe cyclic behavior?

How do we translate and transform trigonometric functions?

Content

Vocabulary

Domain

Range

Maxiumum

Minimum

Increasing

Decreasing

Intercepts

Transformations

Asymptotes

Sine Function

Cosine Function

Tangent Function

Cotangent Function

Secant Function

Cosecant Function

Skills

Use the graphs of the six trigonometric functions

Find the amplitude, period, and phase shift for a trigonometric function

Write equations of trigonometric functions given the amplitude, period, and phase shift

Graph various trigonometric functions

Resources

Content Vocabulary

Practices quizzes

Teacher website

www.KhanAcademy.org

www.Desmos.com

Standards

Trigonometric Functions F-TF

B. Model periodic phenomena with trigonometric functions

5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★

6. (+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.

7. (+) Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.★

MP1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions

or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

MP6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

MP8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x2 + x + 1)$, and $(x – 1)(x3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

MA.F-TF	Trigonometric Functions
MA.F-TF.B	Model periodic phenomena with trigonometric functions
MA.F-TF.B.5	Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
MA.F-TF.B.6	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
MA.F-TF.B.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.