High School Functions Playlist: Symmetry and Periodicity of Trigonometric Functions

Aligns with *CCSS.MATH.CONTENT.HSF.TF.A.4:* Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.

Related Standards

- *CCSS.MATH.CONTENT.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*

- *CCSS.MATH.CONTENT.HSF.BF.B.3*: Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, 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.*

- *CCSS.MATH.CONTENT.HSF.TF.B.5*: Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Objectives

In this module, you will learn and practice the following skills:

- Use the unit circle to explain odd and even symmetry in trigonometric functions
- Use the unit circle to explain the periodicity of trigonometric functions

Let's get started!

Key Terms

- A function $f(x)$ has **odd symmetry** if $f(-x)=-f(x)$ for any value of x
- A function $f(x)$ has **even symmetry** if $f(-x)=f(x)$ for any value of x
- A function $f(x)$ is **periodic** if, for some value P, $f(x + P)=f(x)$ for any value of x; visually, shifting the graph of a periodic function horizontally by a distance P will leave the function unchanged.

Connections

- https://openstaxcollege.org/textbooks/algebra-and-trigonometry; section 7.4
- www.ck12.org/book/CK-12-Trigonometry-Second-Edition; sections 2.3