Unit 4: Functions

Lesson Outline

Big Picture

Students will:
- graph and transform sinusoidal functions using radian measure;
- identify domain, range, phase shift, period, amplitude, and vertical shift of sinusoidal functions using radian measure;
- develop equations of sinusoidal functions from graphs and descriptions expressed in radian measure;
- solve problems graphically that can be modelled using sinusoidal functions;
- prove trigonometric identities;
- solve linear and quadratic trigonometric equations using radian measure;
- make connections between graphic and algebraic representations of trigonometric relationships.

Day	Lesson Title	Math Learning Goals	Expectations
1	*(lesson not included)*	• Demonstrate an understanding of transformations of sine and cosine functions using radians. • Sketch the graphs of transformations of the form $y = \sin(x) + c,\ \ y = \cos(x) + c,\ y = \sin(x - d),\ y = \cos(x - d),$ $y = \sin(x - d) + c,\ \ y = \cos(x - d) + c,\ y = a\sin(x),\ y = a\cos(x).$ • State the domain and range, phase shift, period, amplitude, vertical translation for transformations of sine and cosine functions using radians. • Recognize equivalent trigonometric expressions, such as those involving horizontal translations, by considering the graphs.	B2.4, 2.5, 3.1
2–3	*(lessons not included)*	• Demonstrate an understanding of transformations of sine and cosine functions using radians. • Sketch the graphs of transformations of the form $y = \sin k(x),$ $y = \cos k(x),\ y = \sin(kx),\ y = \cos(kx),\ y = \sin(kx - d),$ $y = \cos(kx - d).$ • State the domain and range, phase shift, period, amplitude, and vertical translation for transformations of sine and cosine functions. • Sketch graphs of $y = a\sin(k(x - d)) + c$ and $y = a\cos(k(x - d)) + c$ in radians. • Recognize equivalent trigonometric expressions, such as those involving transformations by considering the graphs.	B2.4, 2.5, 3.1
4	*(lesson not included)*	• Determine an equation of a sinusoidal function given its graph or descriptions of its properties, in radians. • Recognize that more than one equation can be used to represent the graph of the function.	B2.6, 3.1
5–6	*(lessons not included)*	• Pose and solve problems involving real world applications of sinusoidal functions in radians, given a graph or a graph generated with or without technology from its equations.	B2.7, 3.1

Day	Lesson Title	Math Learning Goals	Expectations
7	*(lesson not included)*	• Develop an understanding of compound angle formulae through exploration of numeric examples, and using technology. • Use the formulae to determine the exact trigonometric ratios for special angles, e.g., $\sin\left(\dfrac{\pi}{12}\right)$.	B3.1, 3.2
8	*(lesson not included)*	• Demonstrate an understanding that an identity holds true for any value of the independent variable (graph left side and right side of the equation as functions and compare). • Apply a variety of techniques to prove identities.	B3.3
9–10	*(lessons not included)*	• Solve linear and quadratic trigonometric equations with and without graphing technology, for real values in the domain from 0 to 2π. • Make connections between graphical and algebraic solutions.	B3.4
11-12	Jazz		
13	Summative Assessment		