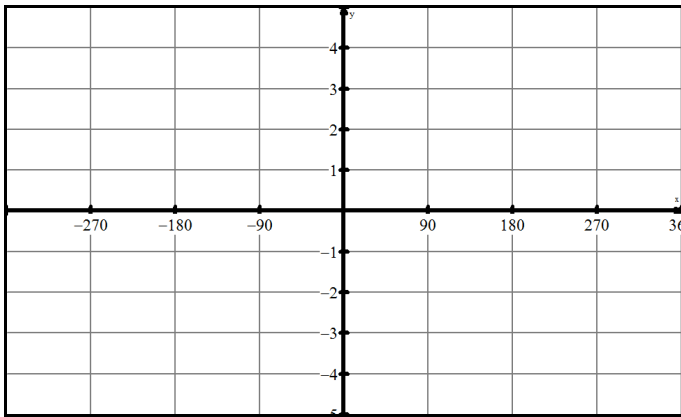


BIG PICTURE of this Unit

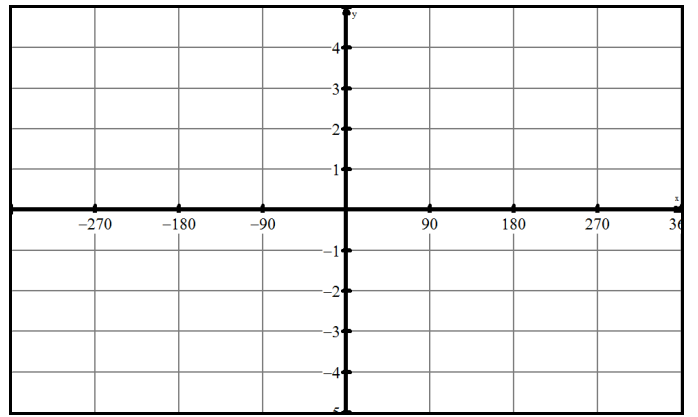
- How can we extend our geometry skills with triangles to go beyond right triangles to (i) obtuse triangles and (ii) circles and Cartesian Planes?
- What do triangles have to do with sinusoidal functions in the first place?
- How can we connect previously learned function concepts and skills to sinusoidal functions?
- How can use the equation of a sinusoidal function be used to analyze for key features of a graph of a sinusoidal curve?
- When and how can triangles and sinusoidal functions be used to model real world scenarios?

1. (CI) Prepare sketches of the following functions. Label the five key points in each cycle. {17,19,20}

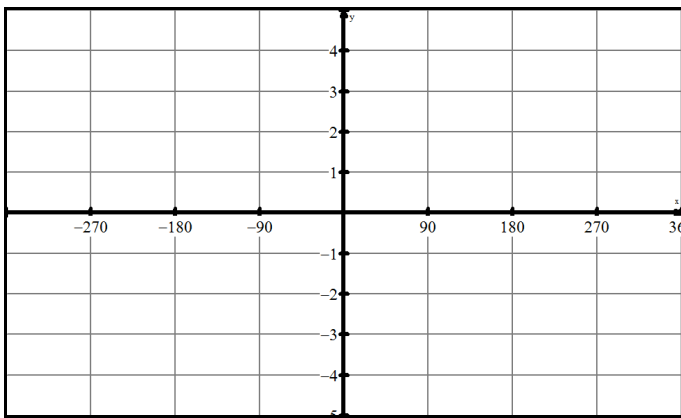
(a) $f(x) = -2 \cos(x^\circ) + 2$



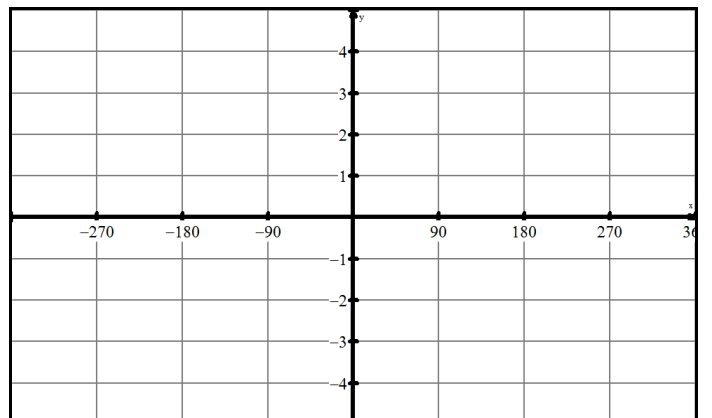
(b) $g(x) = 2 \sin(3x^\circ)$



(c) $f(x) = \cos(x - 60^\circ) + 3$



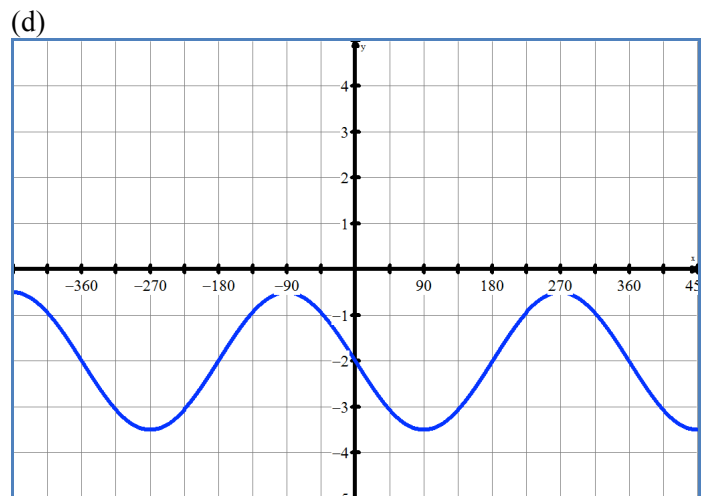
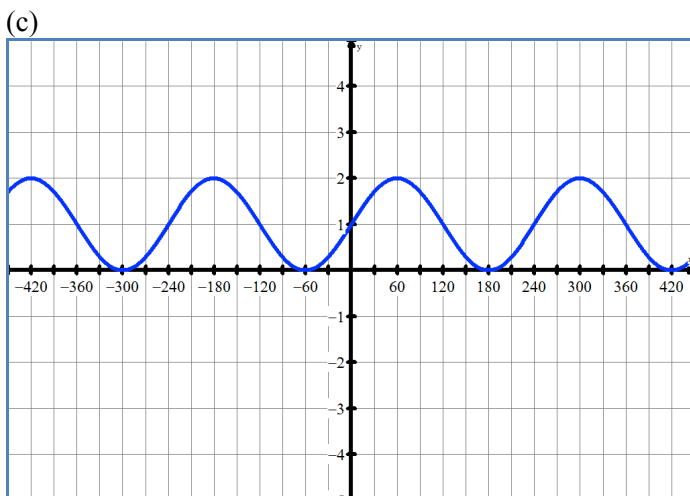
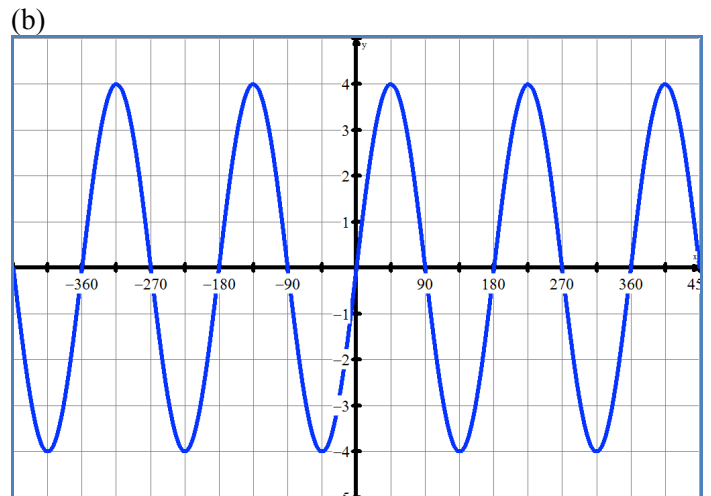
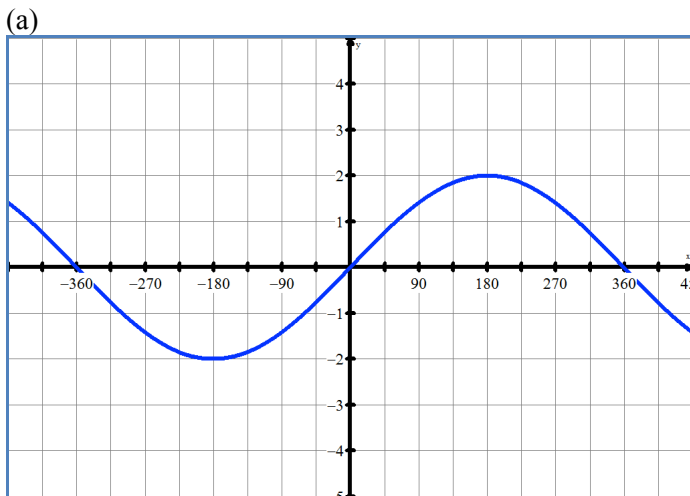
(d) $g(x) = 2 \cos 2(x - 45^\circ)$



2. (CA) Two forest fire towers, A and B, are 20.3 km apart. The bearing from A to B is N70°E. The ranger in each tower observes a fire and reports the fire's bearing from the tower. The bearing from tower A to the fire is N25°E. From tower B, the bearing to the fire is N15°W. How far from is the fire from each tower? {8,9,10}

3. (CA) A surveyor needs to estimate the length of a swampy area. She starts at one end of the swamp and walks in a straight line a distance of 450 paces and then turns 60° towards the swamp. She then walks in another straight line a distance of 380 paces before arriving at the end of the swamp. One pace is about 75 cm. Estimate the length of the swamp, in meters. {8,9,10}

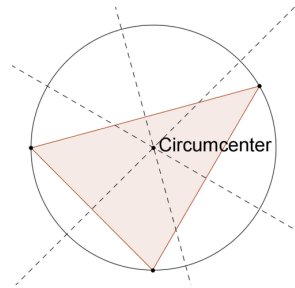
4. (CI) Determine the equation of each graph shown below. {18}



5. (CI) In Canada's Wonderland (an amusement park), there is a roller coaster that is a continuous series of identical hills that are 18m high from the ground. The platform to get on the ride is on top of the first hill. It takes 3 seconds for the coaster to reach the bottom of the hill 2m off the ground. {15,17,19}

- Sketch a graph below which expresses the path of the roller coaster.
- What is the sinusoidal equation (sine and cosine) that best reflects this roller coaster's motion?

6. (CA) A triangle has side lengths of 30 cm, 42 cm and 55 cm. {5,8,9,10}
- True or false? This is a right triangle. Show/explain your reasoning.
 - Determine the area of this triangle.
 - HL ONLY: This triangle is circumscribed by a circle. The area between the circle and the triangle is to be coloured in with blue. Determine the area of this blue region. (see diagram)



Higher Level Questions for More Complex Concepts OR an EXTENSION of basic concepts involved with triangle trigonometry and sinusoidal functions.

- The angles of a triangle are 120° , 40° , and 20° . The longest side is 10 cm longer than the shortest side. Find the perimeter of the triangle to the nearest hundredth of a centimetre.
- In quadrilateral QRST, QR 3 cm, RS 4 cm, ST 5 cm, and TQ 6 cm. Also, diagonal RT is 7 cm. How long is the other diagonal to the nearest tenth of a centimeter?
- A regular pentagon has all sides equal and all central angles equal. Calculate, to the nearest tenth, the area of the pentagon shown.

