Sinusoidal Functions

1. Sketch one cycle of the graph and state the amplitude, period, domain, range and phase shift.

a. $f(x) = 2\sin(x + 90^o) - 3$

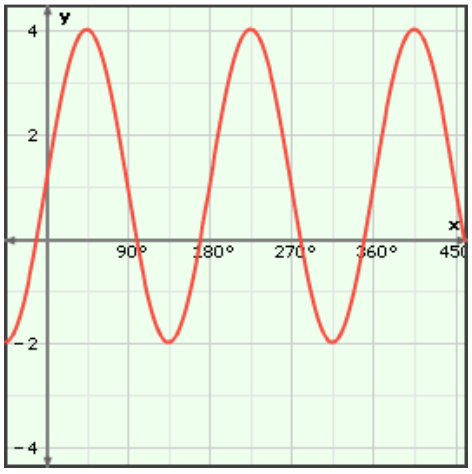
b. $f(x) = \sin 3(x - 60^o) + 5$

c. $f(x) = -2\sin\frac{1}{2}(x - 120^o)$

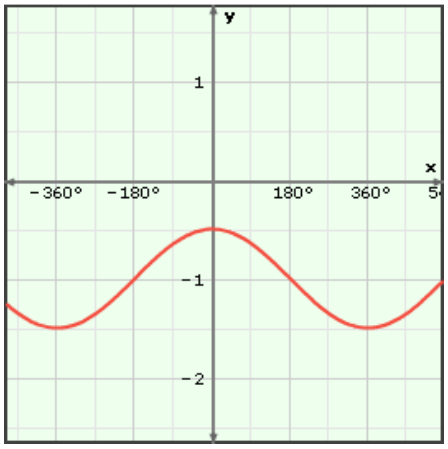
d. $f(x) = -\cos\left(3x - 90^o\right) + 1$

2. Determine a function that defines each graph.

a.



b.



3. Nicole is training by swimming lengths of a 50 – m pool at a constant speed. She swims one length every minute.

a. Graph her distance, in metres, from her starting point versus the time, in minutes, for six lengths of the pool.

b. Determine the period, amplitudes, domain and range.

c. Determine the equation that represents Nicole's swim.

d. Where is Nicole located at 123 s into her swim?

e. When is Nicole located 17 m from the location of the start of her swim?

f. After a month of training Nicole increases her speed by 10%. If she swims six lengths of the pool, determine the new equation.

4. At a county fair, the Ferris wheel has a diameter of 32 m, and its centre is 18 m above the ground. The wheel completes one revolution every 30 s.

a. Graph a rider's height above the ground, in metres, versus the time, in seconds, during a 2-min ride. The rider begins at the lowest position on the wheel.

b. Find the equation that models the rider's height and time.

c. What is the rider's height at 27 s into the ride?

d. When is the rider 20 m above the ground?

5. A skyscraper sways 70 cm back and forth from the "vertical" during high winds. At t = 7 s, the building is 70 cm to the right of the vertical. The building sways back to the vertical and, at t = 17 s, the building is 70cm to the left of the vertical.

a. Write an equation that models the motion of the building in terms of time.

b. Where is the building located at t = 15 s?

c. When is the building 25 cm left of the vertical?