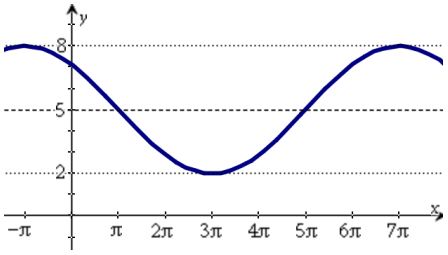
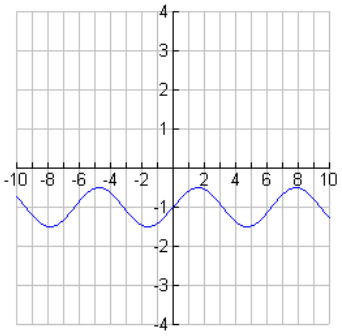
Another Review WS – Writing Equations & Sinusoidal Applications

Write an equation for each sinusoid graphed below.

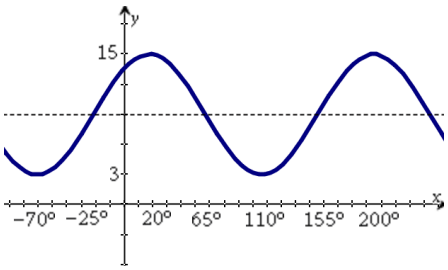
1. Use a cosine function.



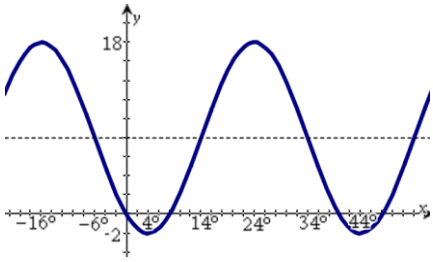
2. Use a sine function.



3. Use a cosine function.



4. Use a sine function.



5. FERRIS WHEEL

As you ride the Ferris wheel, your distance from the ground varies sinusoidally with time. You are the last seat filled and the Ferris wheel starts immediately. Let t be the number of seconds that have elapsed since the Ferris wheel started. You find that it takes you 3s to reach the top, 43 ft. above the ground. The diameter of the wheel is 40 ft.

a) Sketch a graph.

b) What is the lowest you go as the Ferris wheel turns, and why is this number greater than zero?

c) Write an equation.

d) Predict your height above the ground when: 1) t = 6 2) t = 13/3 3) t = 0

e) What is the value of t the second time you are 18 ft above the ground?

6. OIL WELL PROBLEM

The jack on an oil well goes up and down, pumping oil out of the ground. As it does so, the distance varies sinusoidally with time. At time = 1 sec, the distance is at its maximum, 3.7 meters. At time = 4 sec, distance is at its minimum, 1.5 m.

a) Sketch a graph.

b) Write an equation.

c) Find the distance when time = 5.5 sec.

d) Find the first time when distance = 1.78m.

7. BOATING PROBLEM

If the equilibrium point is y = 0 feet, then $y = -5\cos\frac{\pi}{6}x$ models a buoy bobbing up and down in the water.

a) Where is the buoy at t = 0? and at t = 7?

b) What is the maximum height of the buoy? the minimum?

c) What is the period?

8. EXTRATERRESTIAL BEING PROBLEM

Researchers find a creature from an alien planet. Its body temperature varies sinusoidally with time. 35 minutes after they start timing, it reaches a high of 120°F. 20 minutes after that it researchers its next low, 104°F.

a) Sketch a graph.

b) Write an equation expressing temperature in terms of minutes since they started timing.

c) What was its temperature when they first started timing?

d) Find the first three times after they started timing at which the temperature was 114°F.

9. ENTERTAINMENT PROBLEM

A rodeo performer spins a lasso in a circle perpendicular to the ground. The height (in feet) from the ground is modeled by $y = -3\cos t + 3.5$, where t is time measured in seconds.

a) What is the highest point reached by the knot?

b) What is the lowest point reached by the knot?

c) What is the period?

d) Find the height of the knot after 25 seconds.

10. MUSIC PROBLEM

The initial behavior of the vibrations of the note E above middle C can be modeled by $y = 0.5\cos 660\pi t$.

a) What is the amplitude in this problem?

b) What is the period?

c) What is the range?