# SKILLS PRACTICE 107

For use with Section 13-8

Sinusoidal Functions as Mathematical Models

NAME _____

DATE _____

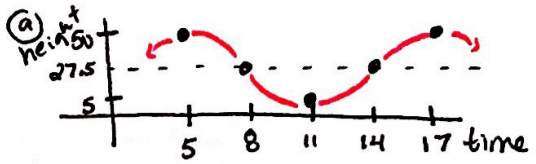
**1.** ***Ferris Wheel Problem #2*** On your second trip to the midway you choose to ride another ferris wheel. Your distance from the ground varies sinusoidally with the time since the wheel began to move. Let $t$ be the number of seconds that have elapsed since the motion of the ferris wheel began. You find that it takes you 5 seconds to reach the top, 50 feet above the ground, and that the wheel makes a revolution once every 12 seconds. The diameter of the wheel is 45 feet.

**a.** Sketch the graph of this function.

**b.** What is the lowest point that you reach on the wheel?

**c.** Write the particular equation of this function.

**d.** Predict your height when i. $t = 11$ seconds, ii. $t = 18$ seconds, and iii. $t = 1.2$ seconds.


(b) 5 feet

(c) $y = 22.5\cos\left[\frac{\pi}{6}(x-5)\right]+27.5$

(d) $t=11$ $h=5$

$t=18$ $h=46.99$ $t=1.2$ $h=18.35$

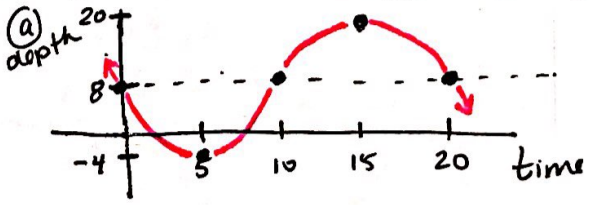
**2.** ***Tidal Wave Problem*** A tidal wave caused by an earthquake off the Alaskan coast begins running toward Carmel, California. The water first goes down from its normal level, and then rises an equal distance above its normal level; the water then returns to normal. Assume that the depth of the water varies sinusoidally with time as the wave passes. Suppose the wave, with a period of 20 minutes and an amplitude of 12 meters, approaches a dock in Carmel where the normal depth is 8 meters.

**a.** Sketch a graph of this function.

**b.** By how many meters will the wave cover the dock?

**c.** Write the particular equation for this function.

**d.** What is the water height at i. 2 minutes, and ii. 5 minutes?




(b) 12 meters

(c) $y = -12\sin\left[\frac{\pi}{10}(x)\right]+8$

(d) $t=2$ $d=.95$ meters

$t=5$ $d=-4$ meters

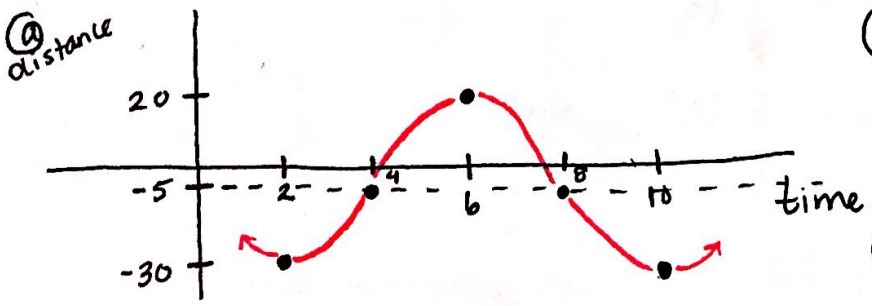
**3.** ***Jane's Problem*** Jane takes her turn on the vine to practice her swing. As she swings, she goes back and forth across the river bank alternately over land and water. She has spent some time thinking about her motion and tells Tarzan to set the stopwatch to take measurements. Assume that her distance varies sinusoidally with the time of her swing. Tarzan finds that when time is 2 seconds, she is $-30$ feet over land. At time equals 6 seconds, she has crossed 20 feet of water.

**a.** Sketch the graph of this function.

**b.** Write the particular equation of this function expressing distance in terms of time in swing.

**c.** Predict her position when i. $t = 3.5$, and ii. $t = 14.5$.

**d.** Where was she when Tarzan started the watch?




(b) $y = -25\cos\left[\frac{\pi}{4}(x-2)\right]-5$

(c) $t=3.5$ $y=-14.57$ (over land)

$t=14.5$ $y=18.1$ (over water)

(d) $t=0$ $y=-5$ (over land)