Pre-Calc Modeling with Sinusoidal Functions Review A

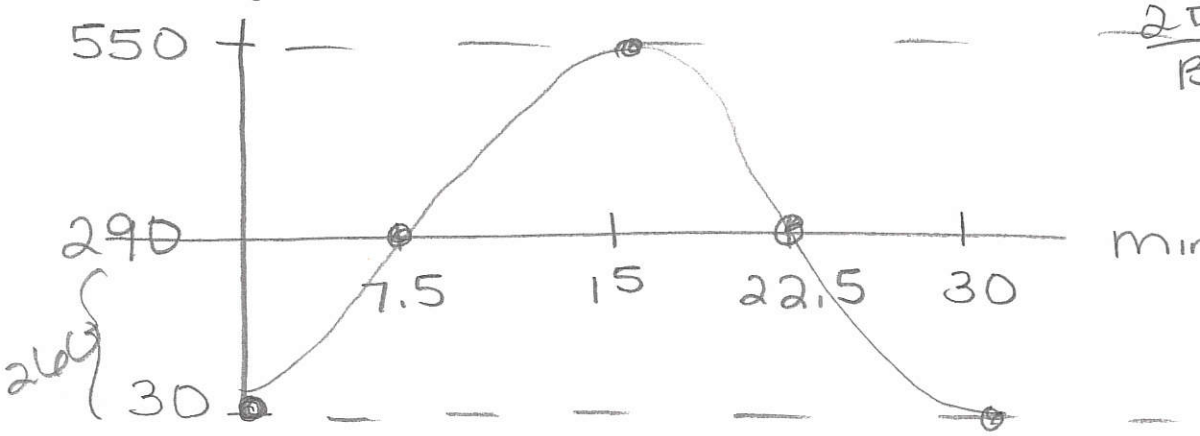
Key

Name: _____

1. The High Roller, a Ferris wheel in Las Vegas, Nevada, opened in March 2014. The **550 ft.** tall wheel has a diameter of **520** feet. A ride on one of its **28** passenger cars lasts **30** minutes, the time it takes the wheel to complete one full rotation. Riders board the passenger cars at the bottom of the wheel. Assume that once the wheel is in motion, it maintains a constant speed for the **30**-minute ride and is rotating in a counterclockwise direction.

$d = \frac{max + min}{2} = \frac{580}{2} = 290$

a. Sketch a graph of the height of a passenger car on the High Roller as a function of the time the ride began.



$\frac{2\pi}{B} = \frac{30}{1}$

$30B = 2\pi$

$B = \pi/15$

b. Write a sinusoidal function H that represents the height of a passenger car t minutes after the ride begins.

$H = -260\cos\left[\frac{\pi}{15}(x)\right] + 290$

c. Explain how the parameters of your sinusoidal function relate to the situation.

$|a|$ = radius of wheel

period = 30 min $= \frac{2\pi}{B}$

d = middle of wheel

d. If you were on this ride, how high would you be above the ground after **20** minutes?

$H = -260\cos\left(\frac{\pi}{15} \cdot 20\right) + 290$

$-260\cos\frac{4\pi}{3} + 290$

$(-260)\left(-\frac{1}{2}\right) + 290$

$130 + 290 = 420$ ft

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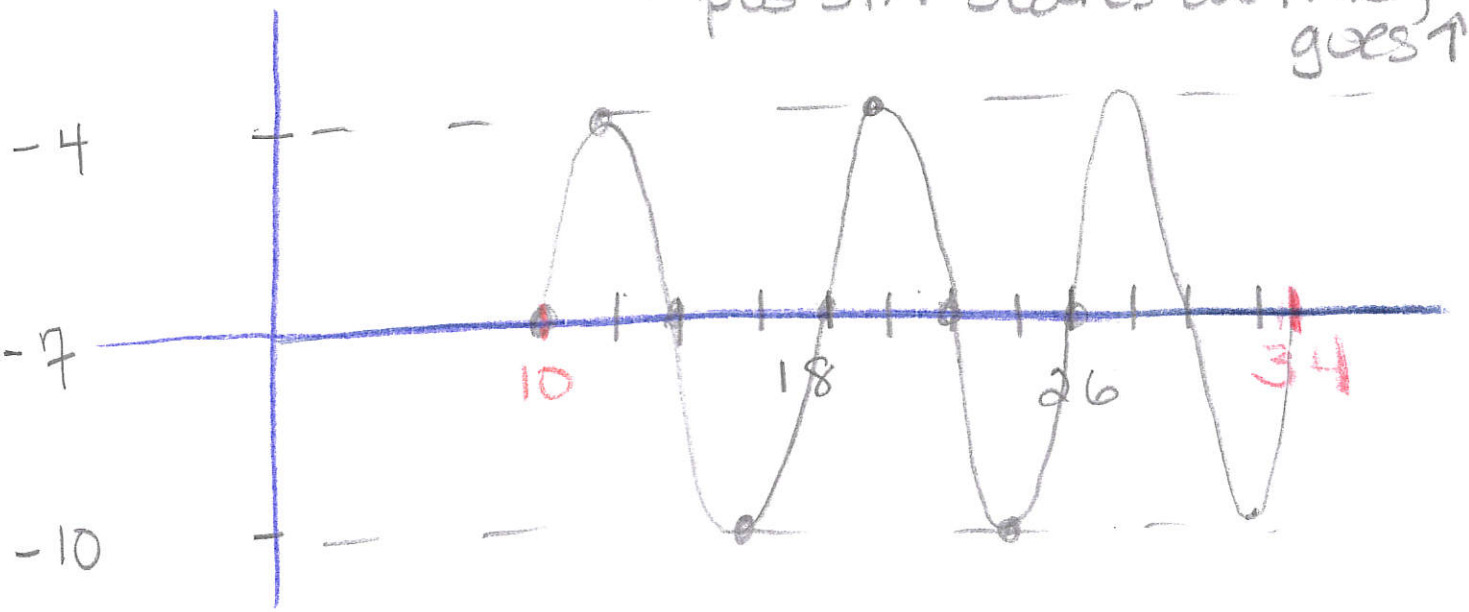
2. The height in meters relative to the starting platform height of a car on a portion of a roller coaster track is modeled by the function $H(t) = 3\sin(\pi/4\,(t-10)) - 7$. It takes a car 24 seconds to travel on this portion of the track, which starts 10 seconds into the ride.

a. Graph the height relative to the starting platform as a function of time over this time interval.

pos sin starts at mid, goes ↑



$\frac{\pi}{4} = B$ ∴ 3 periods in 24 sec

So $\frac{2\pi}{B} = 2\pi \div \frac{\pi}{4} = 2\pi \cdot \frac{4}{\pi} = 8 =$ period

3. Graph, then write the equation of a sinusoidal function that has a max at (3, 10) and a min at (7, 2).

$7 - 3 = 4 = \frac{1}{2}$ per.

$8 = \frac{2\pi}{B}$

$8B = 2\pi$

$B = \pi/4$

$y = 4\cos\left[\frac{\pi}{4}(x-3)\right]+6$