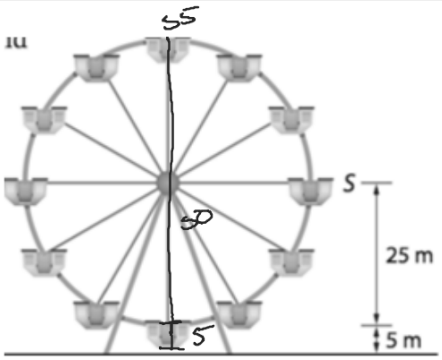
When riding a Ferris wheel, customers are probably more nervous about their height above ground that their distance from the vertical axis of the wheel. Suppose a large Ferris wheel has a radius of 25 meters, the center of the wheel is located 30 meters above the ground, and the wheel starts in motion when seat S is at the "3 o'clock" position.



Modify the sine function to get a rule h(θ) that gives the height of seat S in meters after rotation of θ. Compare the graph of this height with the graph of sin θ.

$y = A \sin B(x-c) + D$

$A = \frac{max-min}{2}$

$= \frac{55-5}{2} = 25$ m

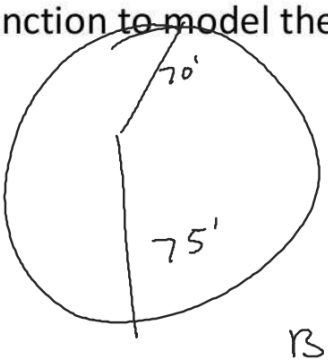
$D = \frac{max+min}{2}$

$= \frac{55+5}{2} = 30$ m

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

$y = 25 \sin x + 30$

The Ferris wheel on Navy Pier in Chicago has 40 equally spaced gondolas and a 70-foot radius. Passengers load the Ferris wheel from a platform at the 3 0'clock position. After loading the passengers, the Ferris wheel moves in a counterclockwise direction. The center of the Ferris wheel is 75 feet off the ground. The wheel takes 3 minutes to make a complete revolution, write a function to model the height at various times during the ride.



max – 145
min – 5

$A = \frac{max - min}{2}$

$\frac{145 - 5}{2} = \frac{140}{2} = 70$

$D = \frac{max + min}{2} = \frac{145 + 5}{2} = \frac{150}{2} = 75$

$B = \frac{2\pi}{Per} = \frac{2\pi}{3}$

$y = 70 \sin \frac{2\pi}{3} x + 75$

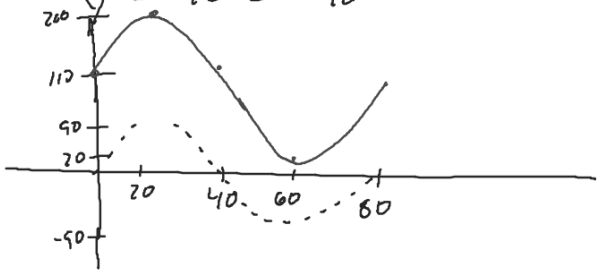
If Sydney begins at the "3 o'clock" position and the maximum height she will reach is 200 feet. At the lowest part of the ride she will be 20 feet off the ground. The Ferris wheel moves at a constant rate and takes 80 minutes to complete one full rotation. Write an equation to model this sinusoidal function. Then sketch a graph.

$$A = \frac{200-20}{2} = \frac{180}{2} = 90$$

$$D = \frac{200+20}{2} = \frac{220}{2} = 110$$

$$B = \frac{2\pi}{Per} = \frac{2\pi}{80} = \frac{\pi}{40}$$

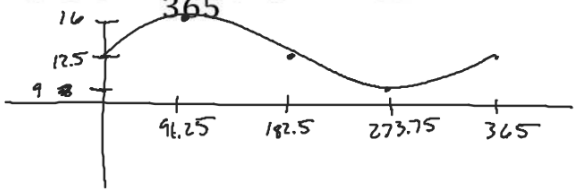
$$y = 90 \sin \frac{\pi}{40} x + 110$$



At every location on Earth, the number of hours of daylight varies with the season in a predictable way. One convenient way to model that pattern of change is to measure time in days, beginning with spring equinox (about March 21st) as t = 0. With that frame of reference, the number of daylight hours in Boston, Massachusetts is given by $d(t) = 3.5 \sin \frac{2\pi}{365} t + 12.5$.

$A = 3.5$

$Per = \frac{2\pi}{B} = \frac{2\pi}{\frac{2\pi}{365}} = 365$



What are the maximum and minimum numbers of hours of daylight in Boston? What times in the year do they occur?

Measuring 520 feet in diameter, the High Roller eclipses both the London Eye and Singapore Flyer. Facing north and south parallel to Las Vegas Boulevard, the wheel turns counterclockwise, takes 30 minutes to complete one full revolution, and features 28 glass-enclosed cabins with broad views of Las Vegas and the Strip. Each spherical cabin can hold up to 40 people, with benches on either side of the cabin and plenty of floor space in between-but we imagine you'll want to stand and admire the view. Allow your body and mind to soar 550 feet in the sky above the Las Vegas Strip. Radius = 260

— 550

= 30

Bailei, Isabella, Aspen, and Brianna enter the Ferris Wheel directly below the center. Write a function rule to model the path of the Ferris Wheel.

$Y = -260 \cos \frac{\pi}{15} X + 290$