## Answer on Question #44665-Physics-Mechanics-Kinematics-Dynamics

The original Ferris wheel, built by George Ferris for the Columbian Exposition of 1893, was much larger and slower than its modern counterparts: it had a diameter of 250 feet and contained 36 cars, each of which held 40 people. It made one revolution every 10 minutes. Suppose that the Ferris wheel revolves counterclockwise in the x-y plane with its center at the origin. Car D in the figure had a coordinates (125, 0) at time t=0. Find the rule of a function that gives the y-coordinate of car D at time t.



## Solution

The most general form of the equation that describes any object undergoing SHM (simple harmonic motion) is given by:

$$y = A\sin(2\pi ft + \varphi) + B.$$

In our case

$$B = 0$$
  
$$f = \frac{1}{10} rpm = \frac{1}{10} \cdot \frac{1}{60} Hz = \frac{1}{600} Hz$$

y = 0 at time t=0:

$$0 = A\sin(\varphi) \rightarrow \varphi = 0$$
$$A = \frac{250}{2} = 125.$$

The rule of a function that gives the y-coordinate of car D at time t

$$y = 125\sin(2\pi\frac{1}{600}t) = 125\sin\left(\frac{\pi t}{300}\right).$$

Answer: 125  $\sin\left(\frac{\pi t}{300}\right)$ .