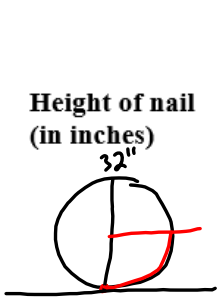
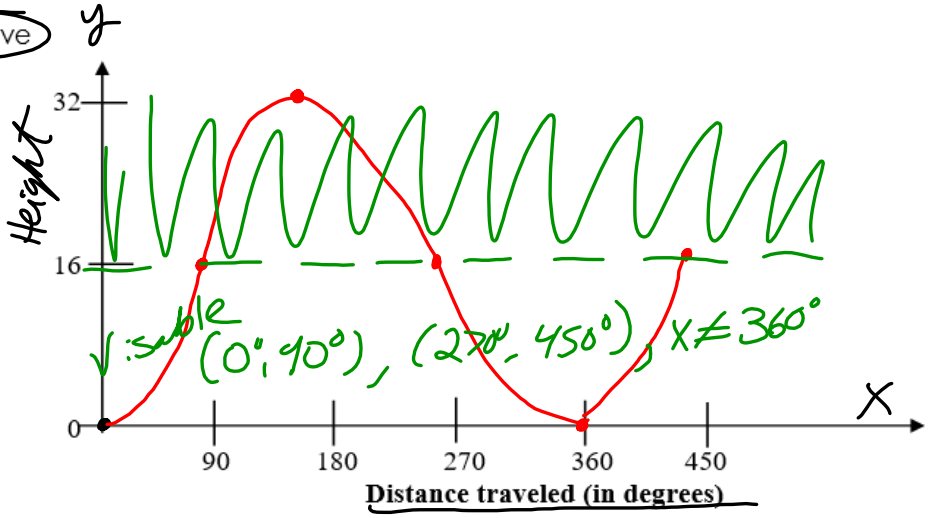
Day 8: Application #1

Feb 6-7:01 PM

A car's tire has a diameter of 32 inches. It runs over a nail, but it is able to continue moving. Write a **cosine** function that describes *the height of the nail above the ground* as a function of the wheel's *angular distance*.

A. Sketch the curve





Feb 6-7:02 PM

B. Identify the vertical shift $f(x) = A\cos(\omega(x-h)) + k$

$k = 16$

C. Identify the amplitude

amp $= 16 = A$

D. Find the horizontal shift — none

Since the nail starts on the ground, no horiz. shift.

E. Find the cycle (distance of each rotation) and period

Since the function will consist of angular distance, we'll use 360 degrees for each cycle

Per $= 360°$ $(= 2\pi)$

$\frac{360°}{1} = \frac{2\pi}{w}$ $\frac{360}{w}$ $\rightarrow w = 1$

F. Write the equation to model this situation.

$f(x) = -16\cos(x) + 16$

G. If the car wheel frame covers the top half of the wheel, when will the nail be visible?

Feb 6-7:03 PM

Nov 12-4:33 PM