At a seaport, the water has a maximum depth of 15 m at 7:00 a.m. The minimum depth of 5 m occurs 1:30pm. Assume the relation between the depth of the water and time is a sinusoidal function.

a) Write an equation for the depth, h meters, of the water at any time, t hours.

b) Estimate the depth at 11:00 a.m.

c) A cargo ship's hull floats at a depth of 8m. How long can it be in port to load its cargo?

$h(t) = 5\cos\left[\frac{2\pi}{13}(t-7)\right]+10$

$y=8$ $y=8$

$8 = 5\cos\left[\frac{2\pi}{13}(t-7)\right]+10$

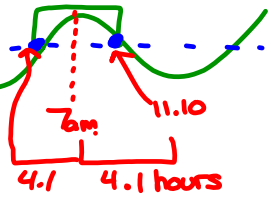
$\frac{-2}{5} = \cos\left[\frac{2\pi}{13}(t-7)\right]$

$\cos^{-1}\frac{-2}{5} = \left[\frac{2\pi}{13}(t-7)\right]$

$\frac{1.98 \cdot 13}{2\pi} = t-7$

$4.101 = t-7$

$t = 11.101$



$= 8.2$ hours !

An ant gets stuck in your car tire as you drive through a creek 0.3m deep. If your tire is 0.5m tall and rotates once every 0.5sec, how long will the ant have to hold its breath for?