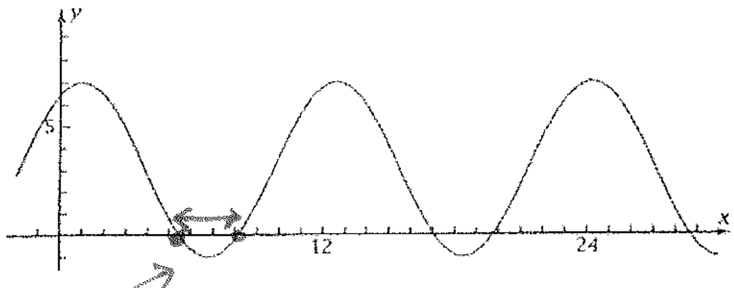
Rehearsal: *key*

The average depth of the water at a particular point on the beach varies sinusoidally with time due to the motion of the tides. The figure shows the depth, y, measured in feet, at such a point as a function of x, measured in hours after midnight at the beginning of January 1. The particular equation of the sinusoid is

$$y = 3 + 4\cos\frac{\pi}{5.8}(x-1)$$



1. What is the deepest the water gets? What is the first time on January 1 at which the water is this deep? What is the period of this function?

period : $\dfrac{2\pi}{\frac{\pi}{5.8}} = 2 \times 5.8 = 11.6$ hrs .

depth (Max): 7 feet

$7 = 3 + 4\cos\frac{\pi}{5.8}(x-1)$ $\qquad x = 1$ Am .

2. Where the graph dips below the x-axis, the water is completely gone, leaving the pint on the beach out of the water. At what time does the lowest tide first occur on January 1? How deep a hole would you have to dig in the sand so that water would flow into it at that time?

① $y = -1$

x-axis ⇒ $y = 0$ $\qquad$ lowest tide $y = -1$

$0 = 3 + 4\cos\frac{\pi}{5.8}(x-1)$ $\qquad -1 = 3 + 4\cos\frac{\pi}{5.8}(x-1)$

⇒ $x = \left[\cos^{-1}\left(-\frac{3}{4}\right)\right]\frac{5.8}{\pi} + 1 = \boxed{5.47 \text{ Am}}$ $\qquad \cos^{-1}(-1)\frac{5.8}{\pi} + 1 = \boxed{6.48 \text{ Am}}$

3. Calculate the depth of the water at 4:00 pm on January 1. Who that the answer agrees with the graph?

4pm ⇒ $x = 16$

$y(16) = 3 + 4\cos\frac{\pi}{5.8}(16-1) = 1.9$ ft .

4. Find the graphically the first interval of times on January 1 for which the water is completely gone.

$y = 0$

$5.47 \le x \le 8.13$

5:28 Am $\le x \le$ 8:08 Am