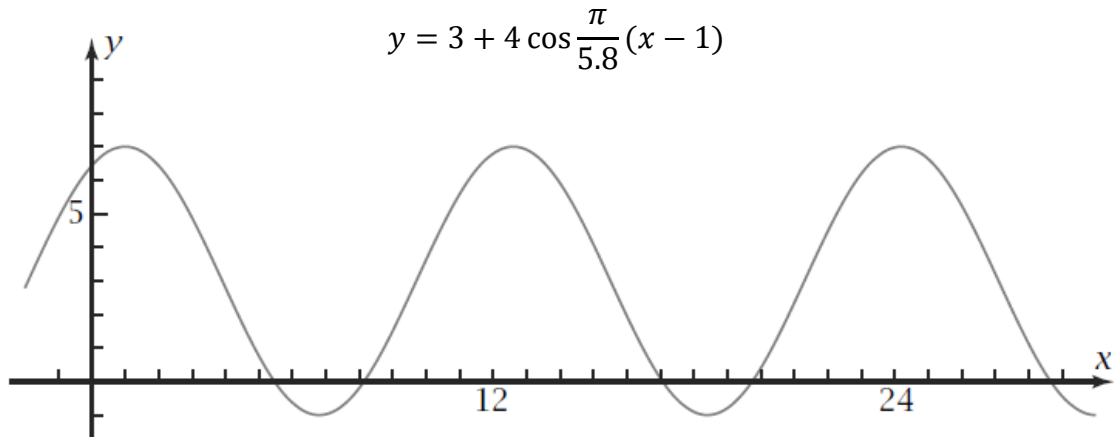


The Tide Problem

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



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?

2. Where the graph dips below the x -axis, the water is completely gone, leaving the point 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?

3. Calculate the depth of the water at 4:00 p.m. on January 1. Show that the answer agrees with the graph.

4. There is a high tide close to midnight at the beginning of January 2 ($x = 24$). Is this high point on January 1 or on January 2? Show calculations to justify your answer.

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

6. Calculate algebraically the first time on January 3 (i.e., $x \geq 48$) at which the depth of the water is exactly zero.