

6.6 Modeling Real-World data with Sinusoidal functions.

LT39: I can write trigonometric equations given amplitude, period, phase shift, and vertical shift.

$$y = A \sin(k\theta + c) + h$$

$$y = A \cos(k\theta + c) + h$$

Ex. The tide in a coastal city peaks every 11.6 hours. The tide ranges from 3.9 m to 3.3 m. Suppose that the low tide is at $t = 0$, where t is the time in hours. Write a function that models the height of the tide.

$$\begin{aligned} \text{Period} & \quad \frac{2\pi}{k} \times \frac{11.6}{1} \\ 11.6k &= 2\pi \\ k &= \frac{2\pi}{11.6} \end{aligned}$$

A is $\frac{1}{2}$ the diff. between high & low tide

$$\frac{3.9 - 3.3}{2} = .3$$

$$y = A \sin(kt + c) + h$$

h is $\frac{1}{2}$ the sum between high & low tide

$$\frac{3.9 + 3.3}{2} = 3.6$$

$$y = .3 \sin\left(\frac{2\pi}{11.6}t\right) + 3.6$$

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$$R = 1200 + 300 \sin\left(\frac{\pi}{2}t\right)$$

$$R = 1200 + 300 \sin\left(\frac{\pi}{2} \cdot 0\right)$$

$$R = 1200$$