Tide/port problem

$t(x) = a \cdot f(b(x-h)) + k$

$t(x) = a \cdot \cos(b(x-h)) + k$

- Period $= \left[\frac{2\pi}{b} = 12.5 \text{ hours}\right] \frac{b}{12.5}$

  solve for b

  $\boxed{b \approx .503}$

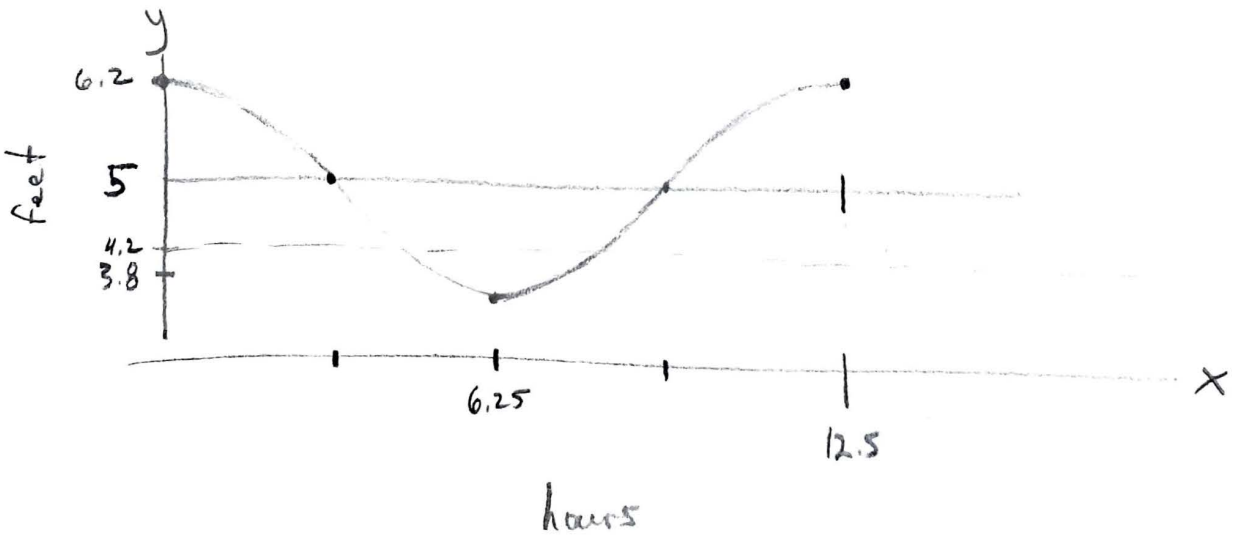
- vertical shift = average of the max & min = avg depth

  $\boxed{k = 5}$

- amplitude = avg depth − min $= 5 - 3.8$

  $\boxed{a = 1.2}$

$$t(x) = 1.2 \cos(.503x) + 5$$



$f(x) = 1.2 \cos(.503x) + 5$

$4.2 = 1.2 \cos(.503x) + 5$

$-5 = \qquad\qquad -5$

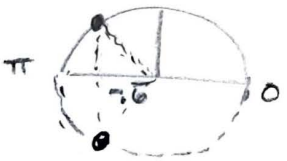
$\frac{-.8}{1.2} = \frac{1.2\cos(.503x)}{1.2}$

$-.\bar{6} = \cos(.503x)$

$\cos^{-1} = \cos^{-1}$

(in radians) $\cos^{-1}(-.\bar{6}) = .503x$

$\cos^{-1}(-.\bar{6}) = 2.3$



2.3 $\qquad\qquad$ $\pi + (\pi - 2.3)$

$\frac{2.3}{.503} = \frac{.503x}{.503}$ $\qquad$ $\frac{3.98}{.503} = \frac{.503x}{.503}$

$x = 4.57$ hrs $\qquad$ $x = 7.92$

boat can't enter the port between 4.57 & 7.92 hours past high tide (4hrs 34min 7hrs. 55m)

The boat can enter the port within (4.57 hours) 4hrs 34min before or after high tide

$.57 \text{ hrs} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = 34.2 \text{ min}$