

Period:

12 hrs 24 min

12.4 hrs

cosine \rightarrow Max

Low

① Amp: $\frac{2.7-2.1}{2} = .3$

② V.S: $\frac{2.7+2.1}{2} = 2.4$

③ Time of Max

④ period = 12.4

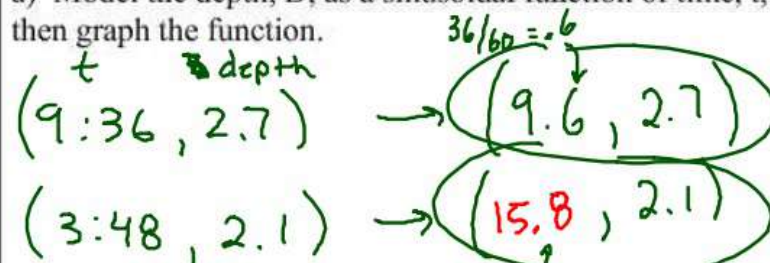
$$12.4 = \frac{2\pi}{B}$$

$$B = \frac{2\pi}{12.4} = \frac{\pi}{6.2}$$

Example 7: Calculating the Ebb and Flow of Tides

One particular July 4th in Galveston, TX, high tide occurred at 9:36 am. At that time the water at the end of the 61st Street Pier was 2.7 meters deep. Low tide occurred at 3:48 p.m., at which time the water was only 2.1 meters deep. Assume that the depth of the water is a sinusoidal function of time with a period of half a lunar day (about 12 hrs 24 min)

a) Model the depth, D, as a sinusoidal function of time, t, algebraically then graph the function.



$$y = .3 \cos \frac{\pi}{6.2} (x - 9.6) + 2.4$$

b) At what time on the 4th of July did the first low tide occur.

2nd Trace 3.39 3:24 am
 $.39 \times 60$

c) What was the approximate depth of the water at 6:00 am and at 3:00 pm?

$t = 6 \rightarrow 2.32 \text{ m}$ TRACE
 $t = 15 \rightarrow 2.12 \text{ m}$

d) What was the first time on July 4th when the water was 2.4 meters deep?

$.3 \text{ of } 60 =$ 2nd Trace 5
 12:18 am

80) Temperature Data: The normal monthly Fahrenheit temperatures in Helena, MT, are shown in the table below (month 1 = January)

Model the temperature T as a sinusoidal function of time using 20 as the minimum value and 68 as the maximum value. Support your answer graphically by graphing your function with a scatter plot.

M	1	2	3	4	5	6	7	8	9	10	11	12
T	20	26	35	44	53	61	68	67	56	45	31	21

$$VS: \frac{68+20}{2} = 44$$

$$y = 23.488 \sin(.513x - 2.028) + 43.481$$

$$\text{Amp} = \frac{68-20}{2} = 24$$

$$\text{Period} = 12 \text{ months}$$

$$12 = \frac{2\pi}{B}$$

$$B = \frac{\pi}{6}$$

$$y = 24 \cos \frac{\pi}{6} \left(x - \overset{\text{time of Max}}{7} \right) + 44$$

$$y = -24 \cos \frac{\pi}{6} (x - 1) + 44$$

$$y = 24 \sin \frac{\pi}{6} (x - 7 + 3) + 44$$

$$y = -24 \sin \frac{\pi}{6} (x - 1 + 3) + 44$$