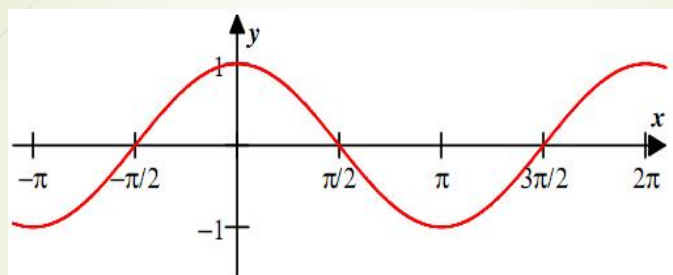


13-5: The Cosine Curve

CP Algebra 2

Mr. gallo

The Graph of $y = \cos(x)$



Graphing $y = a \cos (bx)$

a = amplitude of function.

b = number of complete cycles from 0 to 2π

$\frac{2\pi}{b}$ is the period of the function

- Follow the same steps for graphing cosine, except the five values will be *max, zero, min, zero, max*.
- Note: negative "a" means that the graph starts BELOW the x-axis first.*

Graph $y = 3 \cos(2\theta)$

Amplitude: 3 # of cycles from 0 to 2π : 2

Period: $\frac{2\pi}{2} = \pi$

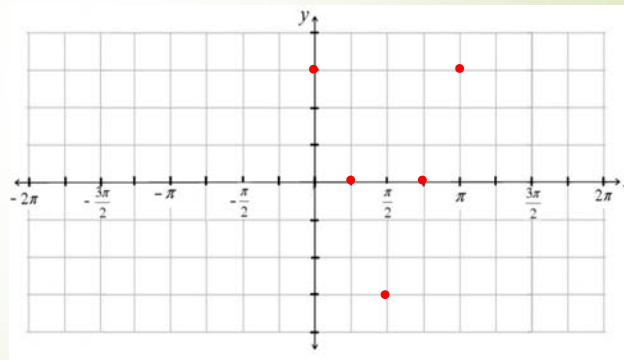
Max: 3

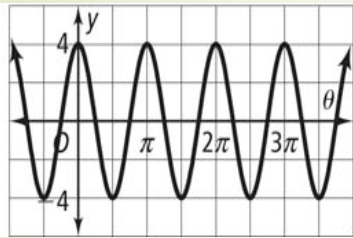
Zero: $\frac{\pi}{4}$

Min: -3

Zero: $\frac{3\pi}{4}$

Max: 3



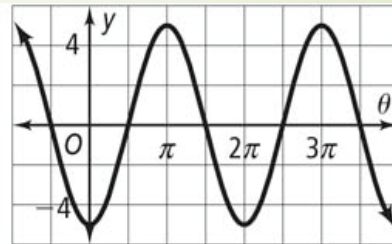


a). Period: $\frac{2\pi}{2} = \pi$

Amplitude: 4

b) Equation:

$y = 4 \cos(2\theta)$



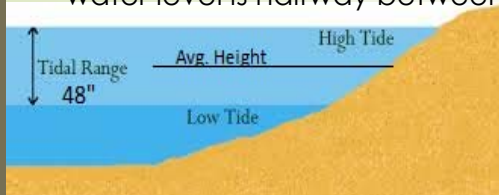
a). Period: $\frac{2\pi}{1} = 2\pi$

Amplitude: 5

b) Equation:

$y = -5 \cos(\theta)$

In Belmar, NJ, the average difference of ocean height between high and low tide is 4 feet. The average time between high and low tide is 6.25 hours. Average water level is halfway between high and low tide.



Let x = time after high tide (in hours)

Let y = depth of water compared to average water level (in feet)

a. What is the amplitude of the cosine function that would model the Belmar tides?
 Difference between high and low tide is 4 feet. $\frac{1}{2}(4) = 2$

b. What is the period of one full cycle of tides?
 The cycle is halfway complete after 6.25 hours. The period is $2(6.25) = 12.5$ hours.

c. What is the b value of the cosine function?
 $\frac{2\pi}{b} = 12.5 \Rightarrow b = \frac{2\pi}{12.5} = \frac{4\pi}{25}$

d. What is the equation of the cosine function to model Belmar tides?

$y = 2 \cos\left(\left(\frac{4\pi}{25}\right)x\right)$

You dock your boat in a marina off Belmar's beach where the high tide water depth is 12 feet deep and the low tide water depth is 8 feet. Your boat requires at least 9 feet of depth to approach or leave the marina. If today's high tide is at 10:00 am, between what times are you not safe to leave and return to the marina? Show your work and explain your reasoning.

Homework: p.864 #7-33 odd, 42