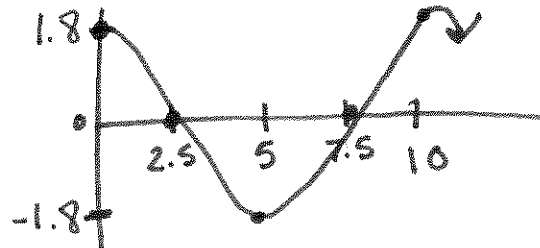


Trig Graph Word Problems
Algebra 2 with Trigonometry

Find an equation (cosine function) that models the following situations.

1. A swimming dock oscillates up and down as waves go past. The dock moves a total of 3.6 feet from its low point to its high point. For the dock to move one cycle (from its high point back to its high point) it takes 10 seconds. Write an equation that gives the dock's vertical position y in feet at a time t in seconds if the dock is at its highest point when $t = 0$.

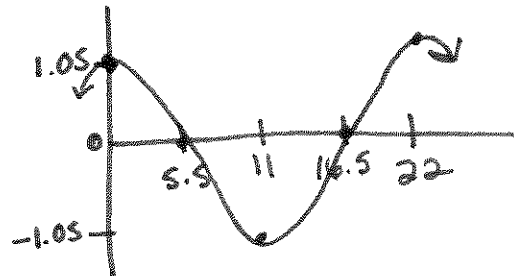
amp: $3.6/2 = 1.8$
 If period: $\frac{2\pi}{X} = 10 \Rightarrow \frac{2\pi}{10} = X$
 $X = \frac{\pi}{5}$



$$y = 1.8 \cos \frac{\pi}{5} t$$

2. A swimmer oscillates up and down as waves go past. The swimmer moves a total of 2.1 feet from its low point to its high point. For the swimmer to move one cycle (from its high point back to its high point) it takes 22 seconds. Write an equation that gives the swimmer's vertical position y in feet at a time t in seconds if the swimmer is at its highest point when $t = 0$.

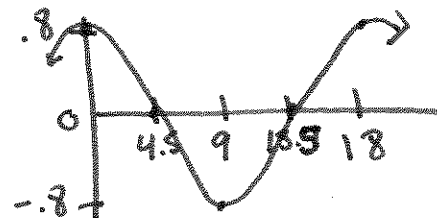
amp: $2.1/2 = 1.05$
 If period = 22 then: $\frac{2\pi}{X} = 22$
 $X = \frac{\pi}{11}$ $\frac{2\pi}{22} = X$



$$y = 1.05 \cos \frac{\pi}{11} t$$

3. A fish swimming at the beach oscillates up and down as waves go past. The fish moves a total of 1.6 feet from its low point to its high point. For the fish to move one cycle (from its high point back to its high point) it takes 18 seconds. Write an equation that gives the fish's vertical position y in feet at a time t in seconds if the fish is at its highest point when $t = 0$.

amp: $1.6/2 = .8$
 If period = 18 then: $\frac{2\pi}{X} = 18$
 $\frac{2\pi}{18} = X$ $X = \frac{\pi}{9}$



$$y = .8 \cos \frac{\pi}{9} t$$

4. Suppose you are riding a Ferris wheel that does a complete cycle in 140 seconds. At $t = 0$, t representing time in seconds, you enter the Ferris wheel at its lowest point, 15 ft above the ground and will reach a maximum height of 190 feet. Write an equation that gives your height, h in feet at any time t .

amp: $\text{midline} = \frac{190 + 15}{2} = 102.5$

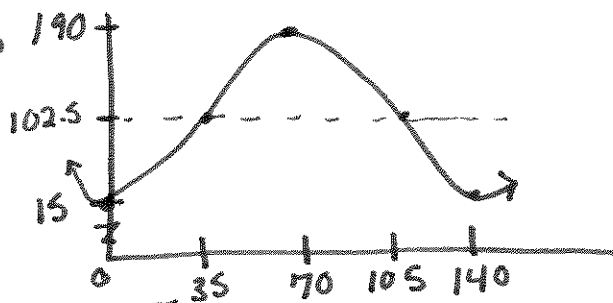
$102.5 - 15 = 87.5$

or
 $\frac{190 - 15}{2} = 87.5$

If period = 140 then $\frac{2\pi}{x} = 140$

$\frac{2\pi}{140} = x$ $x = \frac{\pi}{70}$

$$y = -87.5 \cos \frac{\pi}{70}t + 102.5$$



5. Suppose a clock pendulum is swinging that does a complete cycle in 100 seconds. At $t = 0$, t representing time in seconds, the clock pendulum is at its lowest point, 4 ft above the ground and will reach a maximum height of 12 feet. Write an equation that gives the height, h in feet at any time t .

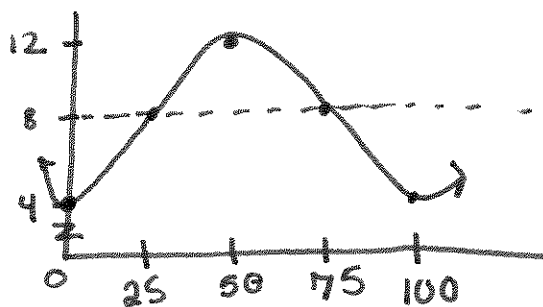
amp: $\frac{12 - 4}{2} = 4$

midline: $\frac{12 + 4}{2} = 8$

If period = 100 then $\frac{2\pi}{x} = 100$

$\frac{2\pi}{100} = x$
 $x = \frac{\pi}{50}$

$$y = -4 \cos \frac{\pi}{50}t + 8$$



6. Suppose you are riding a Ferris wheel that does a complete cycle in 80 seconds. At $t = 0$, t representing time in seconds, you enter the Ferris wheel at its lowest point, 30 ft above the ground and will reach a maximum height of 220 feet. Write an equation that gives your height, h in feet at any time t .

amp: $\frac{220 - 30}{2} = 95$

midline: $\frac{220 + 30}{2} = 125$

If period = 80 then $\frac{2\pi}{x} = 80$

$\frac{2\pi}{80} = x$
 $x = \frac{\pi}{40}$

$$y = -95 \cos \frac{\pi}{40}t + 125$$

