Quiz:

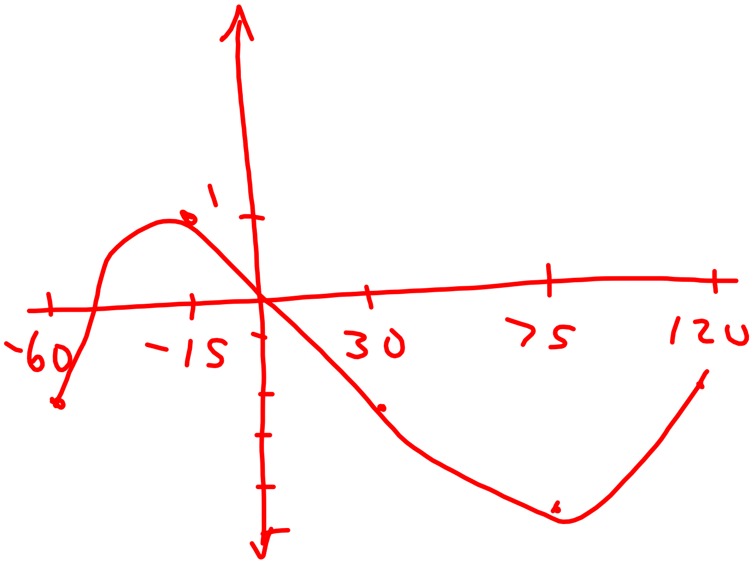
$\rightarrow 1 \geq y \geq -5$

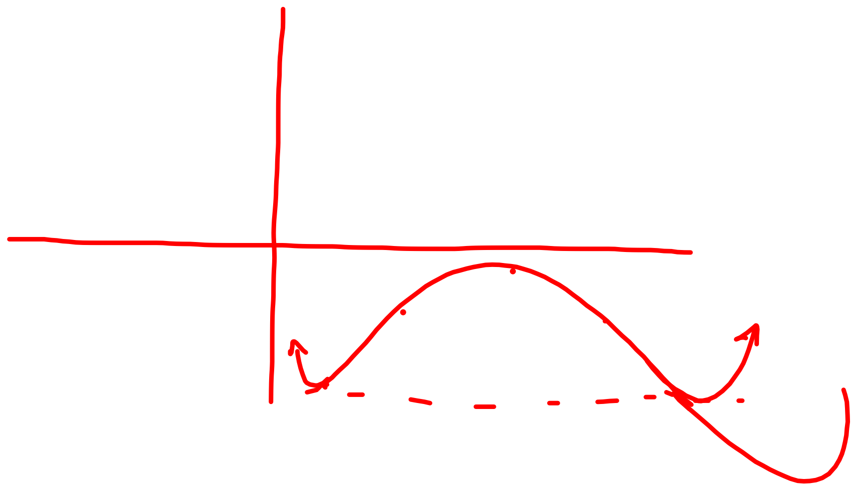
Range: $-5 \leq y \leq 1$

Period: Not "K"

$K = 2$ Period $= \frac{360°}{2}$

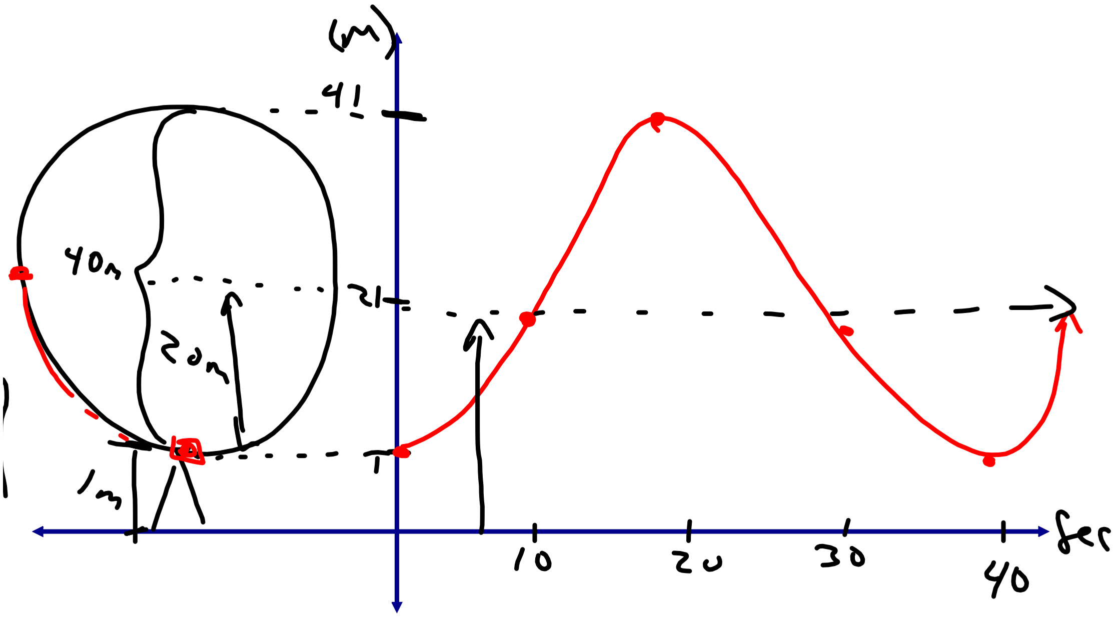
$= \underline{180°}$





Applications of Sinusoidal Functions

ıple: A Ferris Wheel with a radius of 20 m rotates once every 40 s. Passengers get on a seat that is 1 m above ground level. How high above the ground would a passenger be situated 3 minutes and 17 seconds after starting this ride?



Amp = 20

V.Shift.
up 21

Period
Per = 40 (seconds)

$$\frac{360^\circ}{k} = 40$$

$$k = \frac{360}{40} = 9$$

$$h(t) = -20\cos[9t] + 21$$

$$h(t) = 20\cos[9(t-20)] + 21$$

3 min & 17 sec = 197 sec

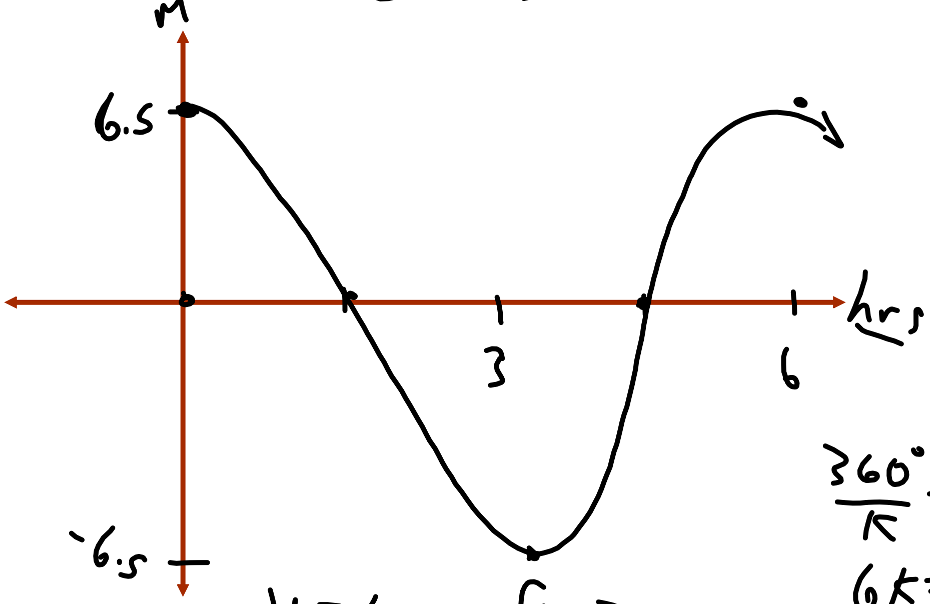
$$h(197) = -20\cos(9(197)) + 21$$

$$= 3.18\text{ m}$$

Ocean Tides

The alternating half-daily cycles of the rise and fall of the ocean are called tides. Tides in one section of the Bay of Fundy caused the water level to rise 6.5m above mean sea-level and to drop 6.5m below. The tide completes one cycle every 6 h. Assume the height of water with respect to mean sea-level to be modelled by a sinusoidal relationship. If it is high tide at 8:00 AM, determine where the water level would be at 1:47 PM.

Note: 0 = 8:00AM



$y = 6.5\cos[60x]$

$\frac{360°}{k} = 6$

$6k = 360°$

$k = 60$

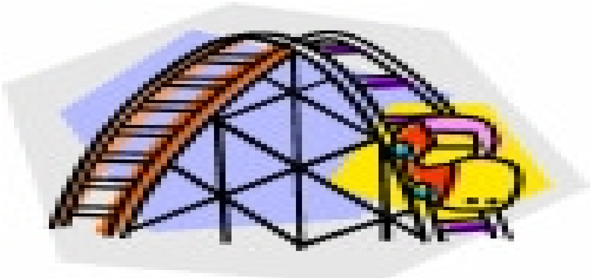
5 hours & 47min

5h $\frac{47}{60} = 0.78$

$y = 6.5\cos\left[60\left(\frac{347}{60}\right)\right]$

$y = 6.3$ m above sea level

Roller Coaster

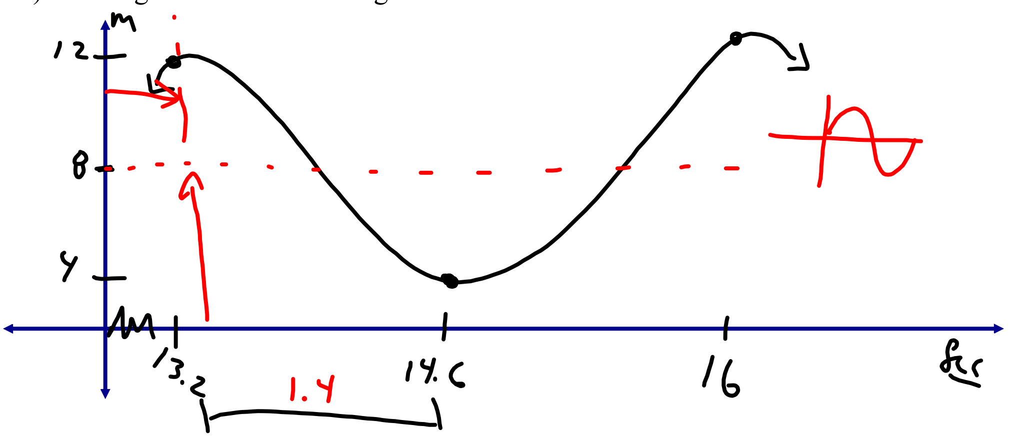


John climbs on a roller coaster at Six Flags Amusement Park. An observer starts a stopwatch and observes that John is at a maximum height of 12 m at t = 13.2 s. At t = 14.6 s, John reaches a minimum height of 4 m.

a) Sketch a graph of the function.

b) Find an equation that expresses John's height in terms of time.

c) How high is John above the ground at t = 20.8 s?



Amp = 4

Period = 2.8

$\frac{360}{K} = 2.8$

$\frac{360}{2.8} = K$

V.Shift

Up 8

$y = 4\cos\left[\frac{360}{2.8}(t - 13.2)\right] + 8$

$y = 4\cos\left[\frac{360}{2.8}(20.8 - 13.2)\right] + 8$

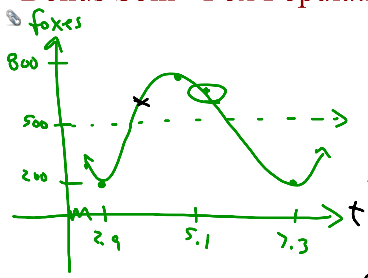
$y = 7.11\text{ m}$

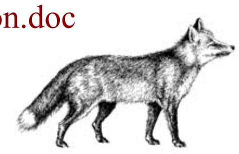
Biology!!

Naturalists find that the populations of some animals varies periodically with time. Records started being taken at t = 0 years. A minimum number, 200 foxes, occurred when t = 2.9 years. The next maximum, 800 foxes, occurred at t = 5.1 years.

Give two different times at which the fox population is 625.

Bonus Soln - Fox Population.doc





Amp = 300

V.sh.ft = up 500

Per = 4.4

$\frac{360}{K} = 4.4$

$4.4K = 360$

$K = \frac{360}{4.4}$

$y = -300\cos\left[\frac{360}{4.4}(t-2.9)\right] + 500$

$625 = -300\cos\left[\frac{360}{4.4}(t-2.9)\right] + 500$

$625 - 500 = -300\cos\left[\frac{360}{4.4}(t-2.9)\right]$

$\frac{125}{-300} = \cos\left[\frac{360}{4.4}(t-2.9)\right]$

$\cos^{-1}\left(\frac{-125}{300}\right) = \frac{360}{4.4}(t-2.9)$

$114.6 = \frac{360}{4.4}(t-2.9)$

$\frac{4.4(114.6)}{360} + 2.9 = t$

$t = 4.3$ years (Period 4.4 years)

$+4.4$

$t = 8.7$

(Ref ∡ 65.4, Q2, 3)

$\cos^{-1}\left(\frac{-125}{300}\right) = 114.6,\ 245.4$

$245.4 = \frac{360}{4.4}(t-2.9)$

$t = 5.899$ sec

Applications of Sinusoidal Functions: Worksheet

Attachments

Bonus Soln - Fox Population.doc