EXTRA PRACTICE...

Worksheet - Finding the Equation.doc

1/ $y=2\sin(3\theta)-1$

$y=2\cos\left(3\left(\theta-\frac{\pi}{6}\right)\right)-1$

2/ $y=\overset{-}{1.5}\cos\left[\frac{3}{2}\left(\theta+\overset{-\pi/12}{\frac{7\pi}{12}}\right)\right]-0.5$

$y=1.5\sin\left[\frac{3}{2}\left(\theta-\frac{5\pi}{12}\right)\right]-0.5$

Per $=\frac{2\pi}{k}$

$\frac{4\pi}{3}=\frac{2\pi}{k}$

$4k\pi=6\pi$

$k=\frac{6\pi}{4\pi}=\frac{6}{4}=\frac{3}{2}$

3/ $y=\sin\left(\frac{1}{2}\left(\theta-\frac{\pi}{2}\right)\right)-2$

$y=\cos\left(\frac{1}{2}\left(\theta-\frac{3\pi}{2}\right)\right)-2$

4/ $y=\sin\left(3\left(\theta-\frac{\pi}{4}\right)\right)+1$

$y=\cos\left(3\left(\theta-\overset{+\pi/4}{\frac{5\pi}{12}}\right)\right)+1$

$\frac{5\pi}{12}-\left(-\frac{\pi}{4}\right)$

$\frac{5\pi}{12}+\frac{3\pi}{12}$

$=\frac{8\pi}{12}=\frac{2\pi}{3}$

$\frac{2\pi}{3}=\frac{2\pi}{k}$

$k=3$

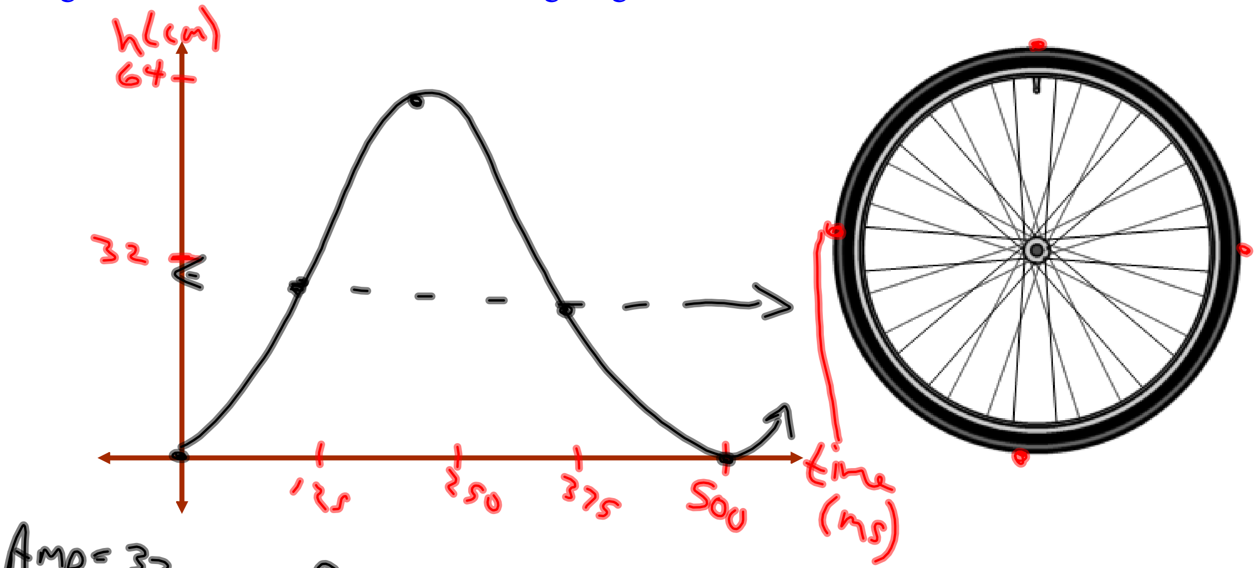
Applications of Sinusoidal Relations

Strategy: (1) Translate ALL key pieces of information from the problem.
(2) Draw a sketch with ALL key points identified.
(3) Develop an equation that models the problem.
(4) Answer the question(s) being asked.

CHECK??? Do the numbers make sense?

EXAMPLE...

Johnny is driving his bike when a tack becomes stuck in his tire. The tire has a radius of 32 cm and makes one complete rotation every 500 ms. How high will the tack be above the ground 12.38 seconds after becoming lodged in his tire????



Amp = 32
V. Shift = Up 32

Period = 500 (ms)

$500 = \frac{360}{k}$

$k = \frac{360}{500}$

$k = 0.72$

$y = -32\cos[0.72t] + 32$

or

$y = 32\sin[0.72(t - 125)] + 32$

$12.38\,s \times \frac{10^3\,ms}{1\,s}$

$= 12380\,ms$

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-32cos(.72*12380
)+32
        29.99070338
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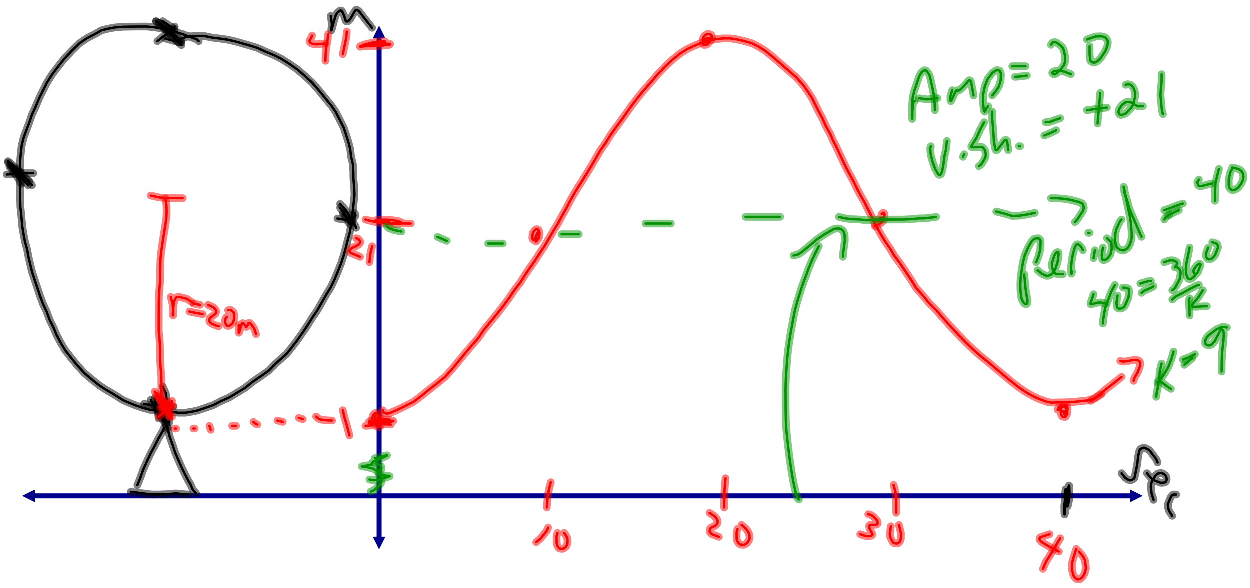
Applications of Sinusoidal Functions

Example: A Ferris Wheel with a radius of 20 m rotates every 40 s. Passengers get on a seat that is 1 m above ground level.

a) Draw a sketch of the motion of the Ferris Wheel, assuming that you are in a loading position when it begins to rotate.



b) Write an equation which expresses your height above the ground as a function of elapsed time.

$$y = -20\cos(9t) + 21$$

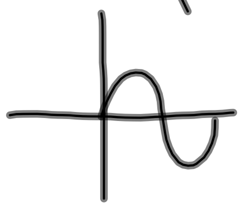
c) Calculate your height above the ground after a 7 minute ride.

21. Compare the graphs of the functions

1) $y = 3\sin\frac{\pi}{3}(x-2) - 1$ and

2) $y = 3\cos\frac{\pi}{3}\left(x-\frac{7}{2}\right) - 1$. Are the graphs equivalent? Support your answer graphically.

1/ $(x,y) \to \left(\frac{3}{\pi}x + 2, 3y - 1\right)$

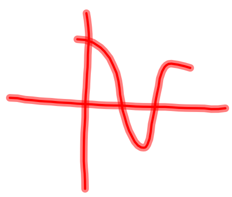


θ	y
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

$\Rightarrow$

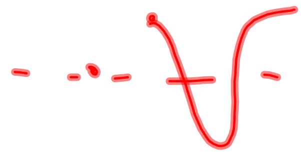
θ	y
2	-1
7/2	2
5	-1
13/2	-4
8	-1

2/ $(x,y) \to \left(\frac{3}{\pi}x + \frac{7}{2}, 3y - 1\right)$



θ	y
0	1
$\pi/2$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1

$\Rightarrow$

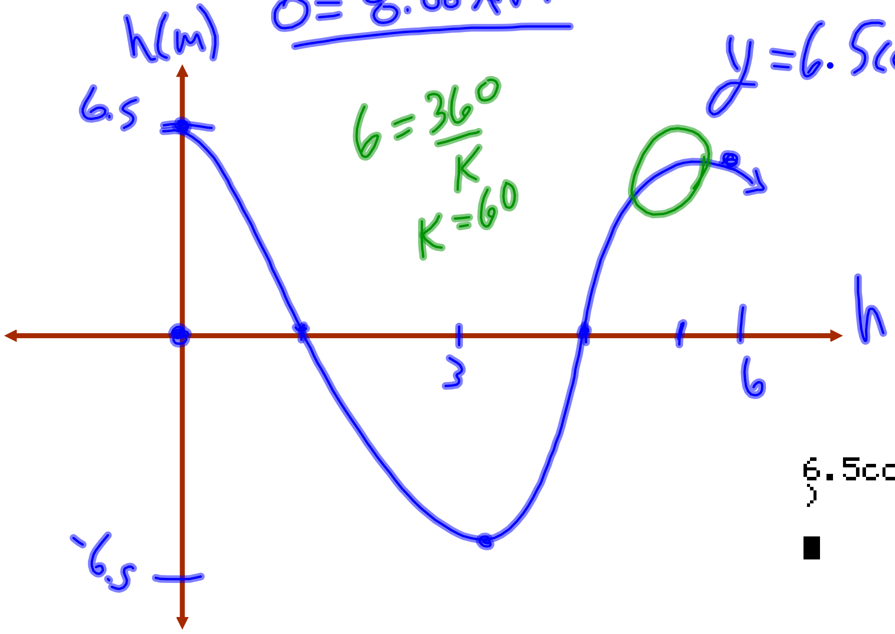


θ	y
$\frac{7}{2}$	2
5	-1
$\frac{13}{2}$	-4
8	-1
$\frac{19}{2}$	2

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.

0 = 8:00 AM



$6 = \frac{360}{K}$

$K = 60$

$y = 6.5\cos[60t]$

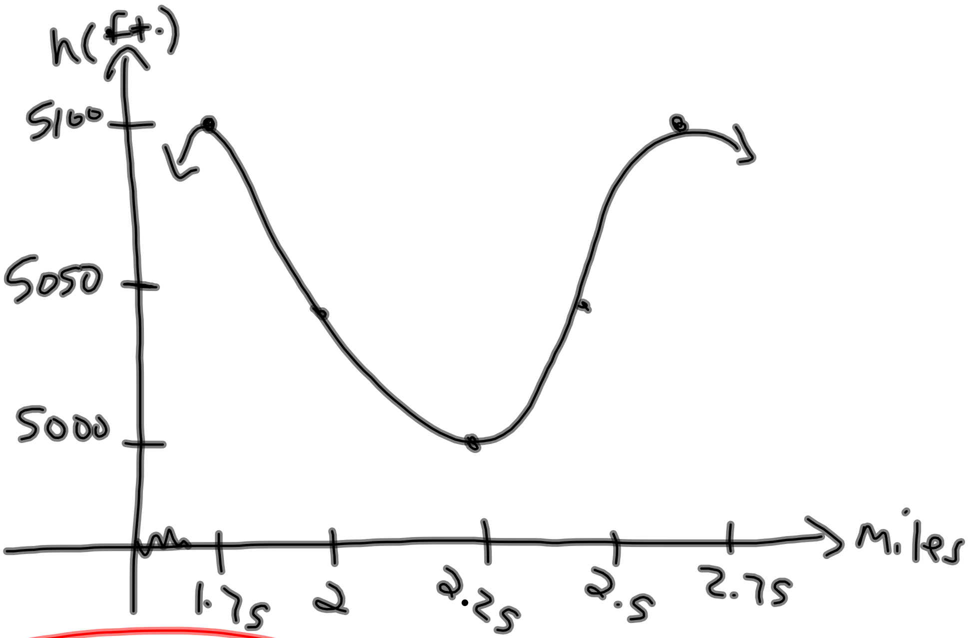
$t = 5\frac{47}{60}$

$t = \frac{347}{60}$

6.5cos(60*347/60)

6.333405421

20.



1 mile = 5280 ft.

$5280 = \frac{2\pi}{K}$

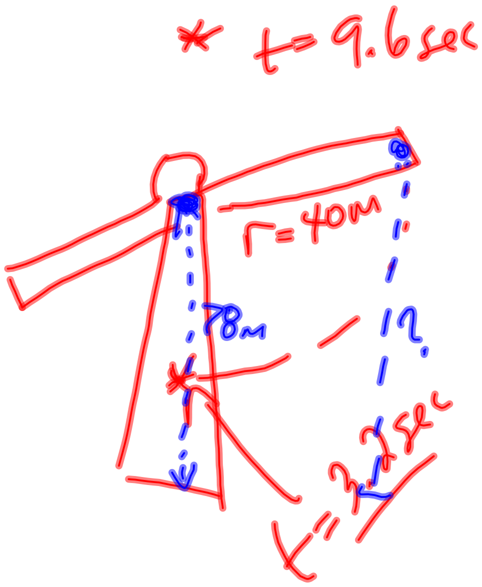
$K = \frac{2\pi}{5280} = \frac{\pi}{2640}$

$Per = \frac{2\pi}{K}$

$(K)1 = \frac{2\pi}{K}(K)$

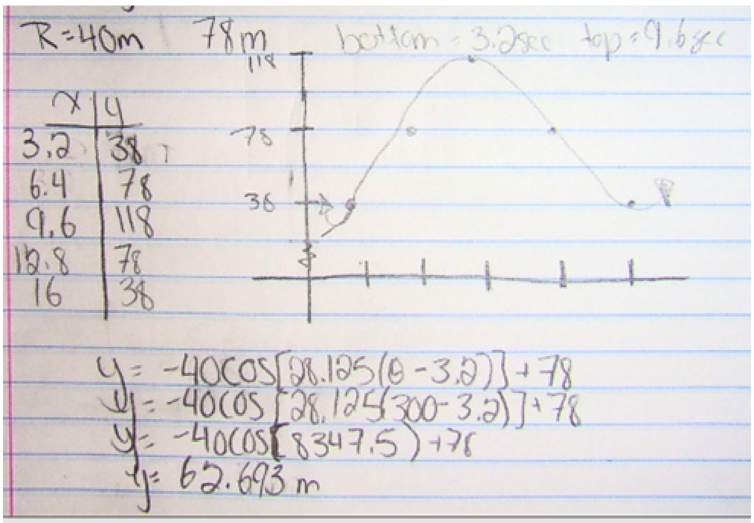
$K = 2\pi$

$y = 50\cos[2\pi(d - 1.75)] + 5050$ (Miles)



Start watch

How high above the ground is this blade 5 minutes after starting stopwatch??


R=40m 78m bottom=3.2sec top=9.6sec

x	y
3.2	38
6.4	78
9.6	118
12.8	78
16	38

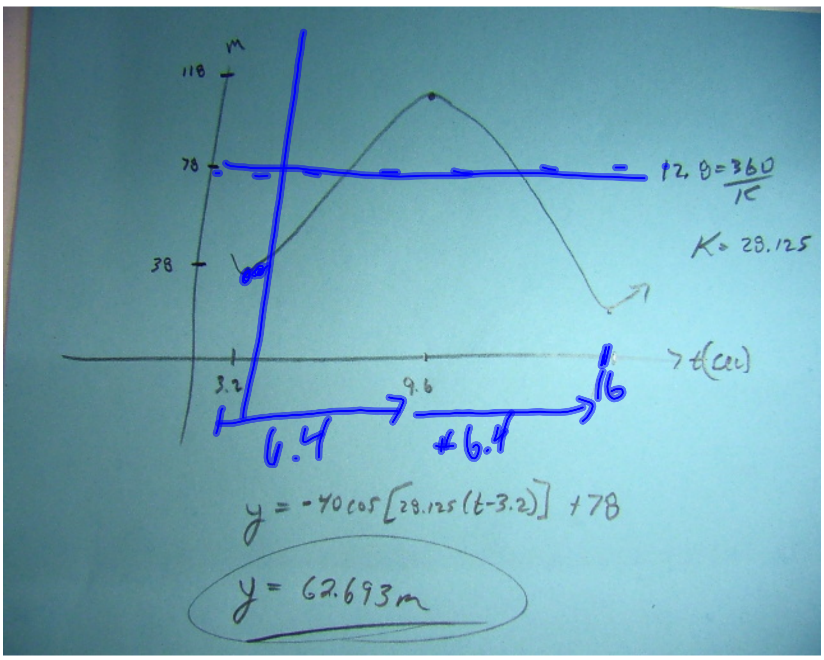
$y = -40\cos[28.125(\theta - 3.2)] + 78$

$y = -40\cos[28.125(300 - 3.2)] + 78$

$y = -40\cos(8347.5) + 78$

$y = 62.693$ m

with permission of Tomica!!



Attachments

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