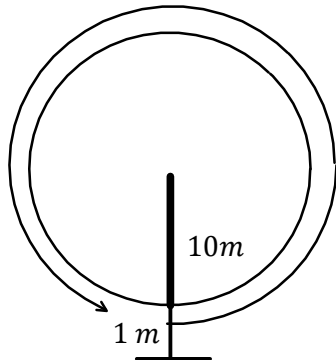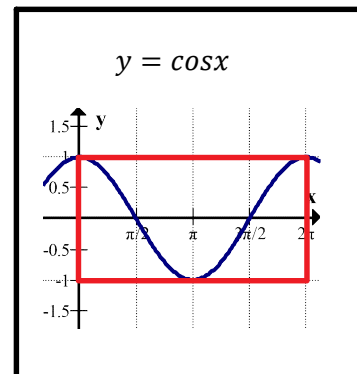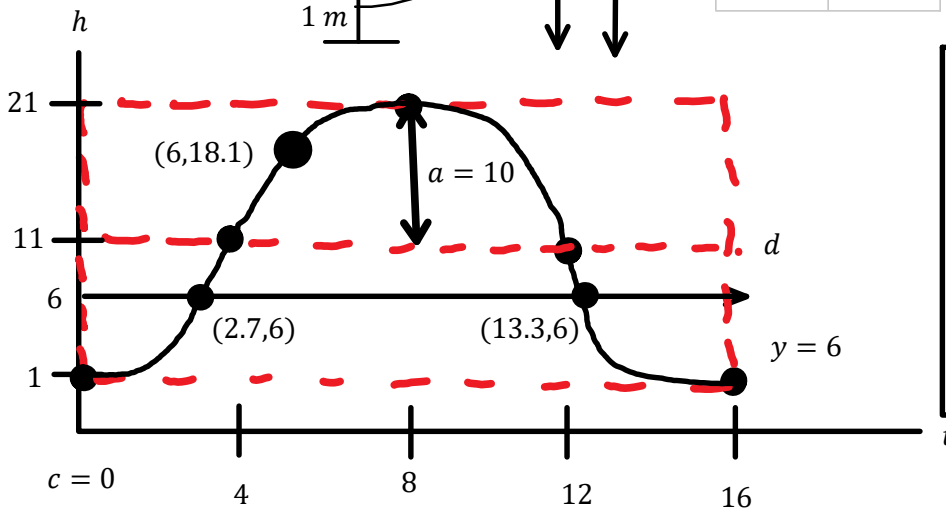# C12 - 5.5 - Ferris Wheel Notes

A Ferris wheel with radius 10 m is 1 m off the ground. It takes 16 seconds for one complete revolution. Draw a diagram of the Ferris wheel, graph the height of a passenger starting at the bottom and write the sinusoidal equation. How high 6 at second? How long above 6m in one cycle? No Calculator!

t	h
0	1
4	11
8	21
12	11
16	1

$$\frac{16}{4} = 4$$

$10m$

$1\ m$

h

21

$(6, 18.1)$

$a = 10$

11

6

$(2.7, 6)$

$(13.3, 6)$

d

$y = 6$

1

$c = 0$

4 8 12 16

t

$y = \cos x$

$y = a\cos(b(x - c)) + d$

$$p = \frac{2\pi}{b}$$

$$b = \frac{2\pi}{p}$$

$$b = \frac{2\pi}{16}$$

$$b = \frac{\pi}{8}$$

$p = 16\ seconds$

$$h = -10\cos\left(\frac{\pi}{8}(t)\right) + 11$$

$$h = +10\sin\left(\frac{\pi}{8}(t - 4)\right) + 11$$

$$h = -10\cos\left(\frac{\pi}{8}(6)\right) + 11$$

$h = 18.1m$

Sub 6 in for t. Or. Graph and 2nd Calc Value

$$\frac{10 + 11\sqrt{2}}{\sqrt{2}} = 18.1 \quad Exact\ Value$$

$$y_1 = -10\cos\left(\frac{\pi}{8}(t)\right) + 11$$

$$y_2 = 6$$

$10.7\ seconds$

Find Intersection, and Subtract, (or Algebra and Inverse)

$13.333 - 2.666 = 10.666$

$$6 = -10\cos\left(\frac{\pi}{8}(t)\right) + 11$$

$$cosm = \frac{1}{2} \qquad m = \frac{\pi t}{8}$$

$$t = \frac{8}{3}, \frac{40}{3} \quad Exact\ Value$$

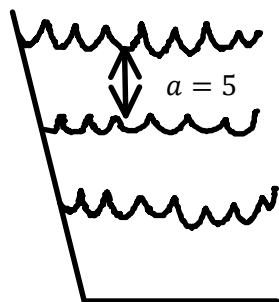$$\frac{24min}{60min} = 0.4\ hr$$

Graph and find Equation. High tide depth 18m at 8 am. Low tide depth 8 m at 1:24 pm.

(8,18)   (13.4,8)

$d = 18\ m$

$a = 5$

$d = 13$

$d = 8\ m$

t	h
8	18
10.7	13
13.4	8
16.1	13
18.8	18

$$\frac{8 + 13.4}{2} = 10.7 \qquad \frac{8 + 18}{2} = 13$$
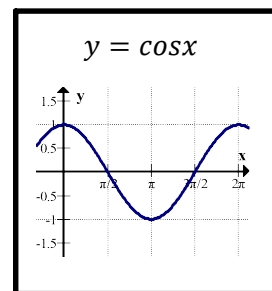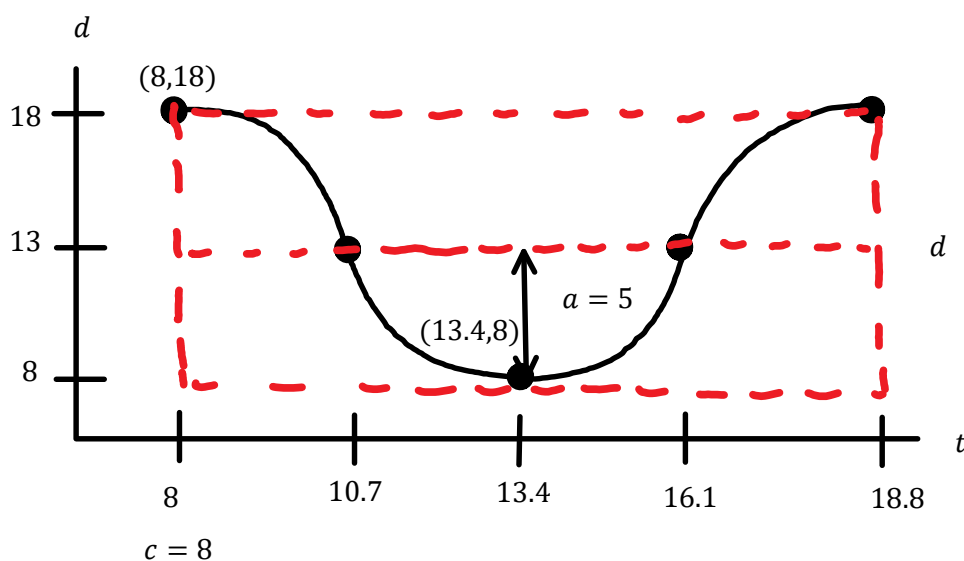
$$\frac{13.4 - 8}{2} = 2.7$$

$$\frac{18 - 8}{2} = 5$$

$$8 + 2.7 = 10.7$$
$$13.4 + 2.7 = 16.1 \qquad 18 - 5 = 13$$
$$16.1 + 2.7 = 18.8 \qquad 8 + 5 = 13$$

d

(8,18)

18

13

$a = 5$

(13.4,8)

8

d

$y = cos x$

8   10.7   13.4   16.1   18.8

t

$c = 8$

$$y = a\cos\big(b(x - c)\big) + d$$

$$d = +5\cos\left(\frac{\pi}{5.4}(x - 8)\right) + 13$$

$$d = +5\cos\left(\frac{2\pi}{10.8}(x - 8)\right) + 13$$

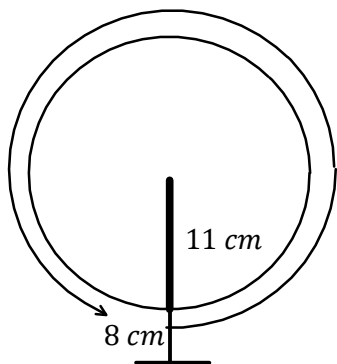$$8 \le y < 18$$

$$p = \frac{2\pi}{b}$$
$$b = \frac{2\pi}{p}$$
$$b = \frac{2\pi}{10.8}$$
$$b = \frac{\pi}{5.4}$$
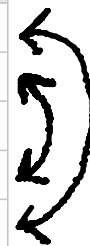
$$p = 18.8 - 8 = 10.8$$
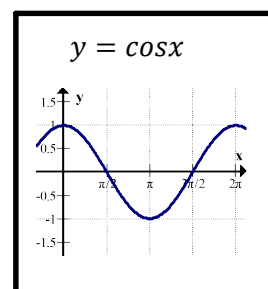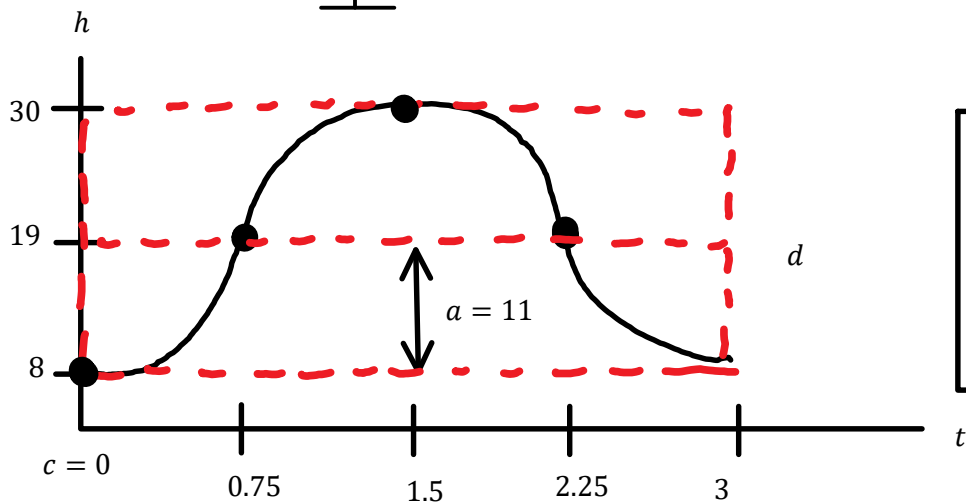
C12 - 5.5 - Bike Pedal Notes

A bicycle pedal does 20 revolutions per minute and has a radius of 11 cm and the 8 cm off the ground at its lowest point. Find the sinusoidal equation.

t	h
0	8
0.75	19
1.5	30
2.25	19
3	8

$$\frac{3}{4} = 0.75$$

$11\ cm$

$8\ cm$

h

30

19

$a = 11$

8

d

$y = \cos x$

$c = 0$

0.75 1.5 2.25 3

t

$$y = a\cos\big(b(x - c)\big) + d$$

$$h = -11\cos\left(\frac{2\pi}{3}(t)\right) + 19$$

$$p = \frac{2\pi}{b}$$

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

$$\frac{20rev}{min} = \frac{20rev}{60s} = \frac{1rev}{3s}$$

$$Period = 3s$$

$$x$$

$$6000$$

$$\theta$$

$$x$$

$$1$$

$$1 \quad \sqrt{2}$$

θ	x
0	0
$\frac{\pi}{4}$	6000
$\frac{\pi}{8}$	2485
$3\frac{\pi}{8}$	14485

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

$$\tan\theta = \frac{o}{a}$$

$$6000\tan\frac{\pi}{4} = \frac{x}{6000}$$

$$x = 6000$$

$$x$$

$$6000$$

$$\frac{\pi}{4} \quad \frac{\pi}{2}$$

$$\theta$$