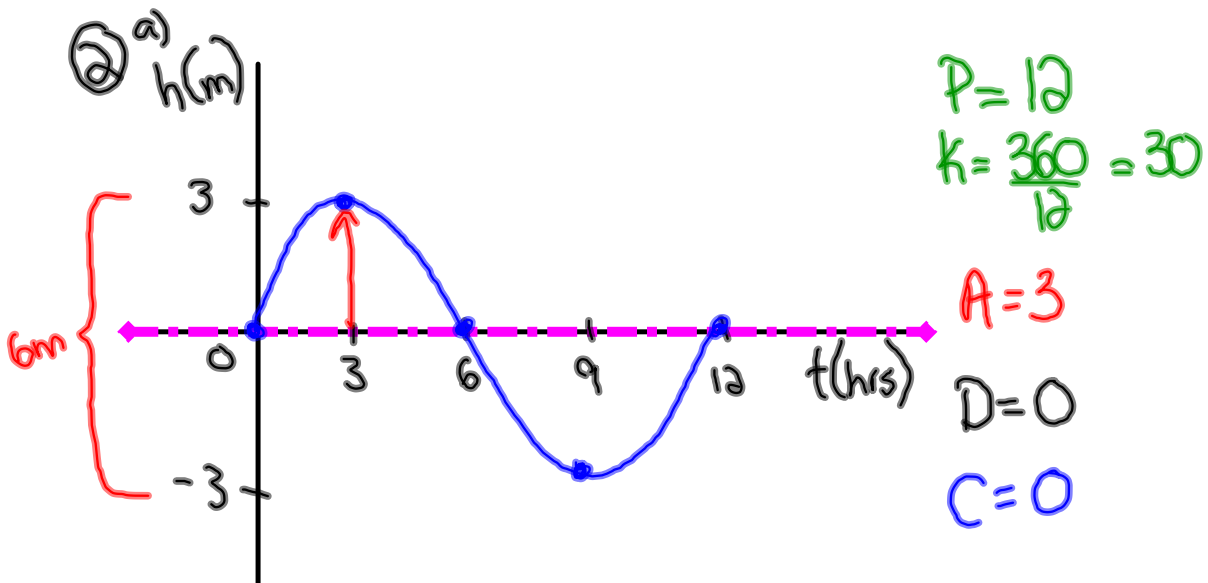


## Questions from homework!



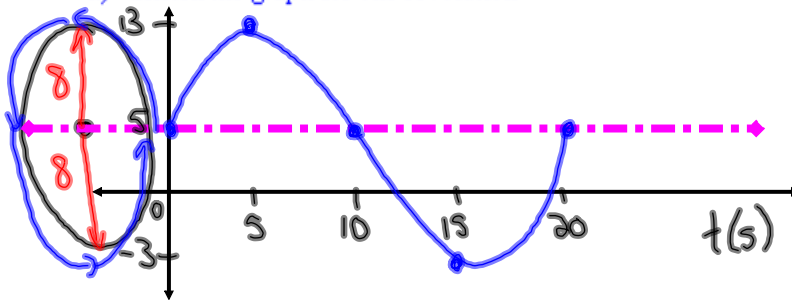
b)  $y = 3 \sin[30(x)]$

## Applications of Sinusoidal Functions

A water wheel with a radius of 8m makes one complete revolution every 20 seconds. If 3m of the wheel is submerged and the bucket starts on the sinusoidal axis and goes up, find the following information:

- a) Amplitude = 8      c)  $k = \frac{360}{20} = 18$       e) Max Height = 13  
 b) Period = 20      d) Vertical Translation = 5      f) Min Height = -3  
 g) Equation of the graph:  $y = 8\sin[18(x)] + 5$

h) Sketch the graph for one revolution



i) How high will the bucket be at the following times:

- (i) 15 seconds = -3m  
 (ii) 1 minute = 5m  
 (iii) 4 minutes and 25 seconds (265s)

$$y = 8\sin[18(x)] + 5$$

$$y = 8\sin[18(265)] + 5$$

$y = 13\text{m}$

j) At what time will the bucket be 10m high? (hint substitute 10 in for y and solve)

$$y = 8\sin[18(x)] + 5$$

$$10 = 8\sin[18(x)] + 5$$

$$\frac{5}{8} = \frac{8\sin[18(x)]}{8}$$

$$* 0.625 = \sin[18(x)] *$$

$$\sin^{-1}(0.625) = 18x$$

$$\frac{38.68}{18} = \frac{18x}{18}$$

$2.15\text{s} = x$

∴ After 2.15s the bucket is 10m high

A water wheel is defined by the equation  ~~$y = 5 \cos(x) + 3$~~  Find:

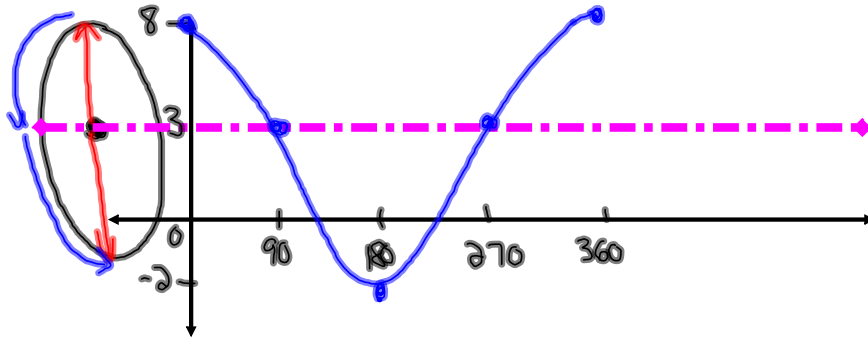
a) Period =  $\frac{360}{1} = 360$

b) Amplitude = 5

$$y = 5 \cos(x) + 3$$

$\uparrow$   $k=1$        $\uparrow$   $D=3$

c) Sketch the graph if the bucket starts at the top of the wheel and goes down



d) What is the Radius of the wheel = 5

e) How much of the wheel is submerged? = 2m

f) How high will the bucket be after 270 degrees? = 3m

g) After how many degrees will the bucket be 7m high?

$$y = 5 \cos(x) + 3$$

$$7 = 5 \cos(x) + 3$$

$$\frac{4}{5} = \frac{5 \cos(x)}{5}$$

$$* 0.8 = \cos(x) *$$

$$\cos^{-1}(0.8) = x$$

$$\boxed{36.87^\circ = x}$$

∴ The bucket will be 7m high at 36.87°

# Homework