Applications with Equation Given

Example: Given that the number of hours of sunlight, h, can
be modeled by the equation:

Amp → $\frac{1}{4}(h-10) = \sin(30(t-3))°$

SA, $\frac{360}{12} = 30$, PS

Where t is the number of months since Jan 1st

$\frac{360}{30} = 12$

$\left(h = 4\sin(30(t-3)) + 10 \right)$

functional form

so t = 0, Jan 1st $P = 12$

t = 1, Feb 1st

t = 2, Mar 1st

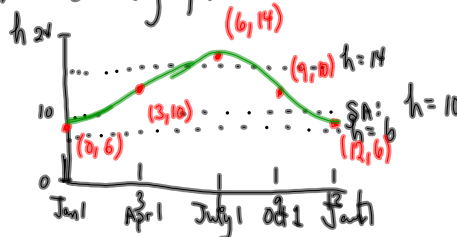a) Determine the parameters:

Amp: 4

SA: y = 10

period: 12   (jump: $\frac{12}{4} = 3$)

PS: 3

b) Sketch the graph:

c) From the graph, how many hours of sunlight on
Apr 1 (t = 3)?

10 hours

d) Determine the number of hours of sunlight on
Sept 1 (t = 8)?

$h = 4\sin(30(t-3)) + 10$

$h = 4\sin(30(8-3)) + 10$

$h = 4\sin(30(5)) + 10$

$h = 4\sin 150 + 10$

$h = 12 \text{ hours}$

Example

The depth of water, in metres, at a Wharf is given by:

$$\frac{1}{3}(y-4) = \sin(30(t-2))$$

Where t is the time since noon and y is the water depth.

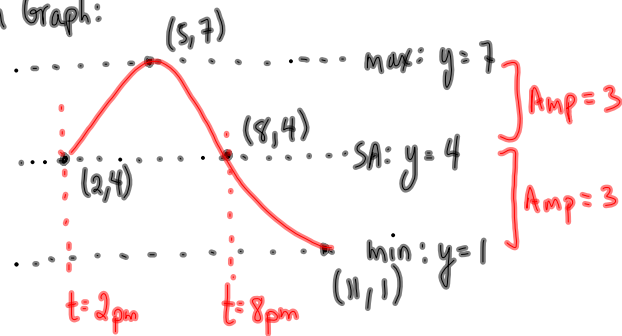a) Parameters:

    Amp: 3

    SA: $y=4$

    Period: 12 $\left(\text{jump } \frac{12}{4} = 3\right)$

    PS: 2

$$\frac{360}{P} = 30$$

$$\frac{360}{30} = P$$

b) Sketch Graph:

max: $y = 7$ ⎤ Amp = 3

(5,7)

(8,4)

SA: $y = 4$ ⎤ Amp = 3

(2,4)

min: $y = 1$

(11,1)

$t = 2pm$ $t = 8pm$

c) What's the height at 3pm? $(x = 3)$

$$y = 3\sin(30(x-2)) + 4$$
$$y = 3\sin(30(3-2)) + 4$$
$$y = 3\sin 30 + 4$$
$$\boxed{y = 5.5m \text{ deep}}$$

d) What's the height at 4am? $(t = 16)$

$$y = 3\sin(30(16-2)) + 4$$
$$y = 3\sin(30(14)) + 4$$
$$y = 3\sin 420 + 4$$
$$\boxed{y = 6.6m \text{ deep}}$$