What's Going On?

Checking In

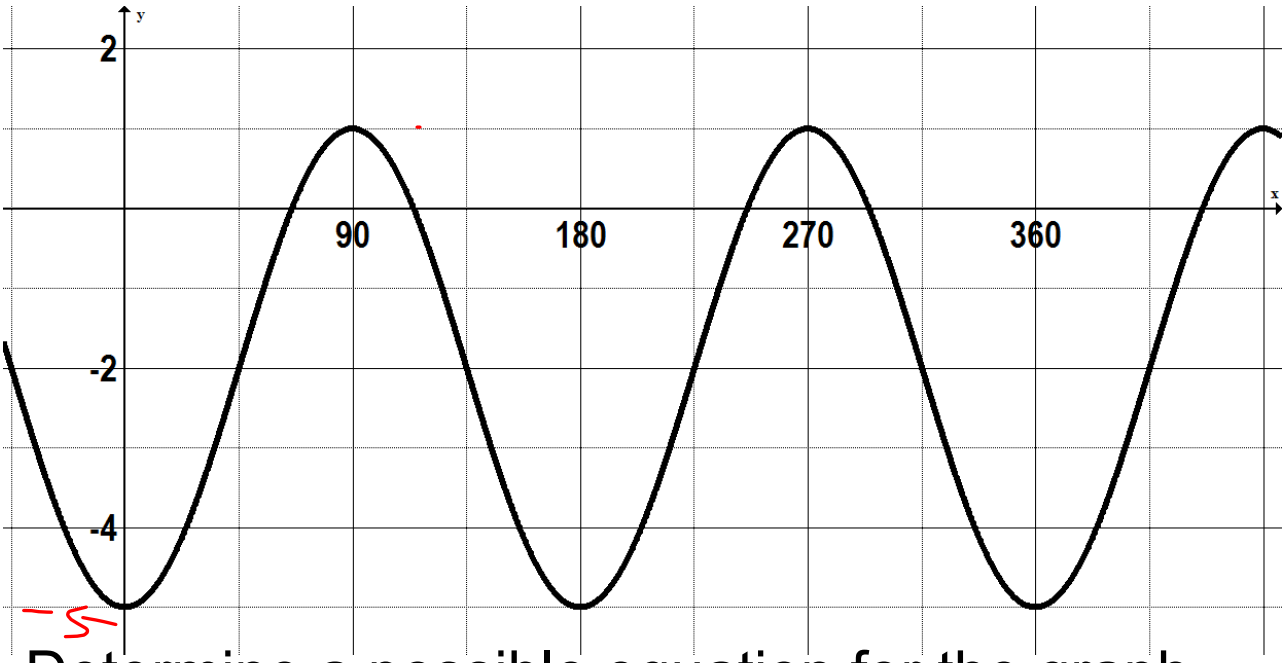
Minds on sin or cos?

Action! Modelling Sinusoidal Functions

Consolidation Phases of the Moon

Learning Goal - I will be able to model sinusoidal functions.

LGL



-5

Determine a possible equation for the graph above.

$f(x) = 3\sin(2(x-45)) - 2$

Axis: -2

Amplitude: 3

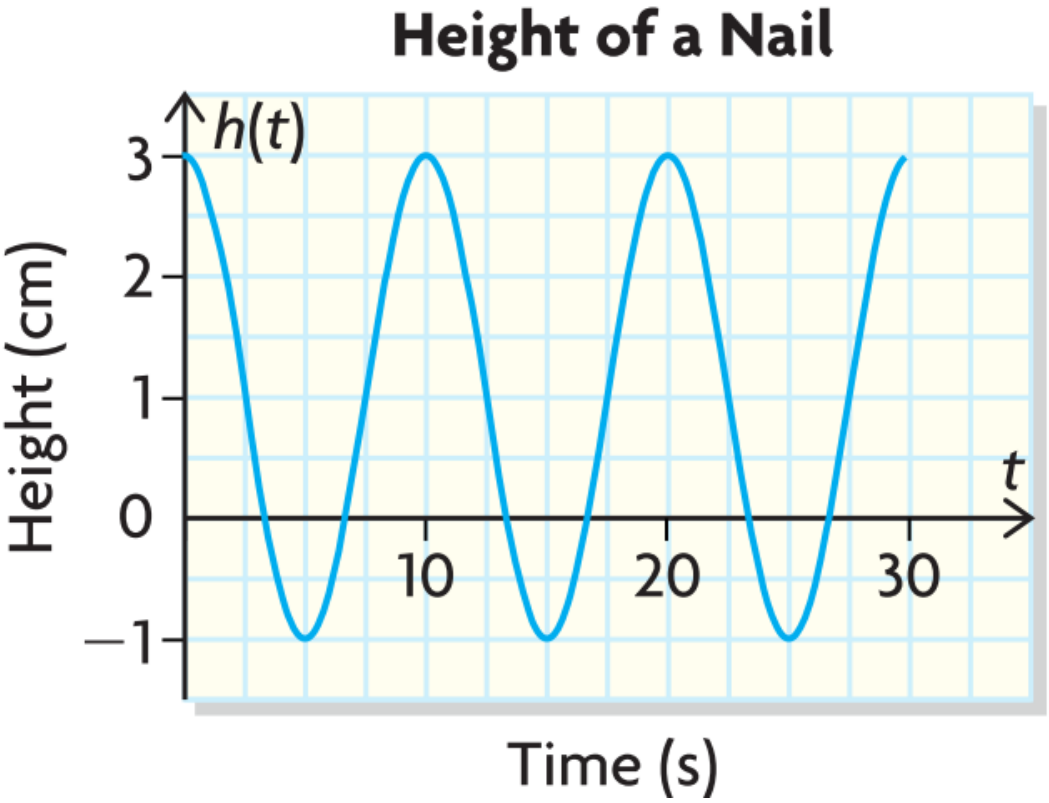
Period: 180°

$\text{Period} = \frac{360}{k}$ $k = \frac{360}{\text{Period}}$

Shift:

Minds on

sin or cos?



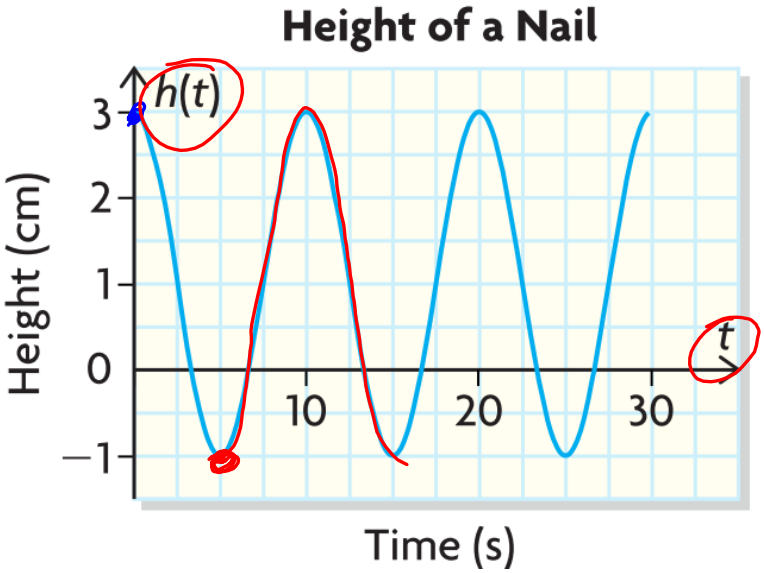
Most easily represented by cos.

Starts at the peak and moves downwards

Action!

Modelling

Determine an equation for the following graph:



axis = 1

amplitude = 2

period = 10 s

$k = \frac{360}{10} = 36$

$h(t) = 2\cos(36t) + 1$

Is there another equation that could be used?

$h(t) = 2\cos(36t) + 1$

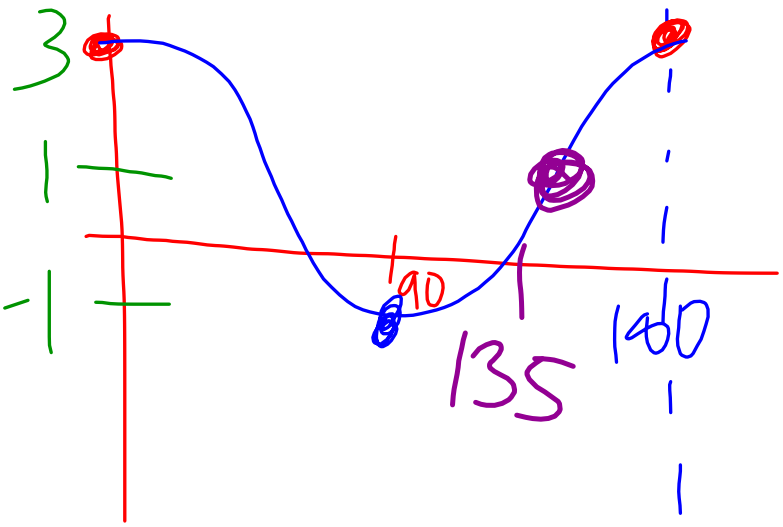
$h(t) = 2\sin(36(t-7.5)) + 1$

Hector says that the equation is actually $h(t) = -2\sin[36t - 90] + 1$, but Julie says that the equation should be $h(t) = -2\cos[36(t - 5)] + 1$. Who is correct? ***Explain.***

$$h(t) = -2\sin(36t - 90) + 1$$

$$= -2\sin(36(t - 2.5)) + 1$$

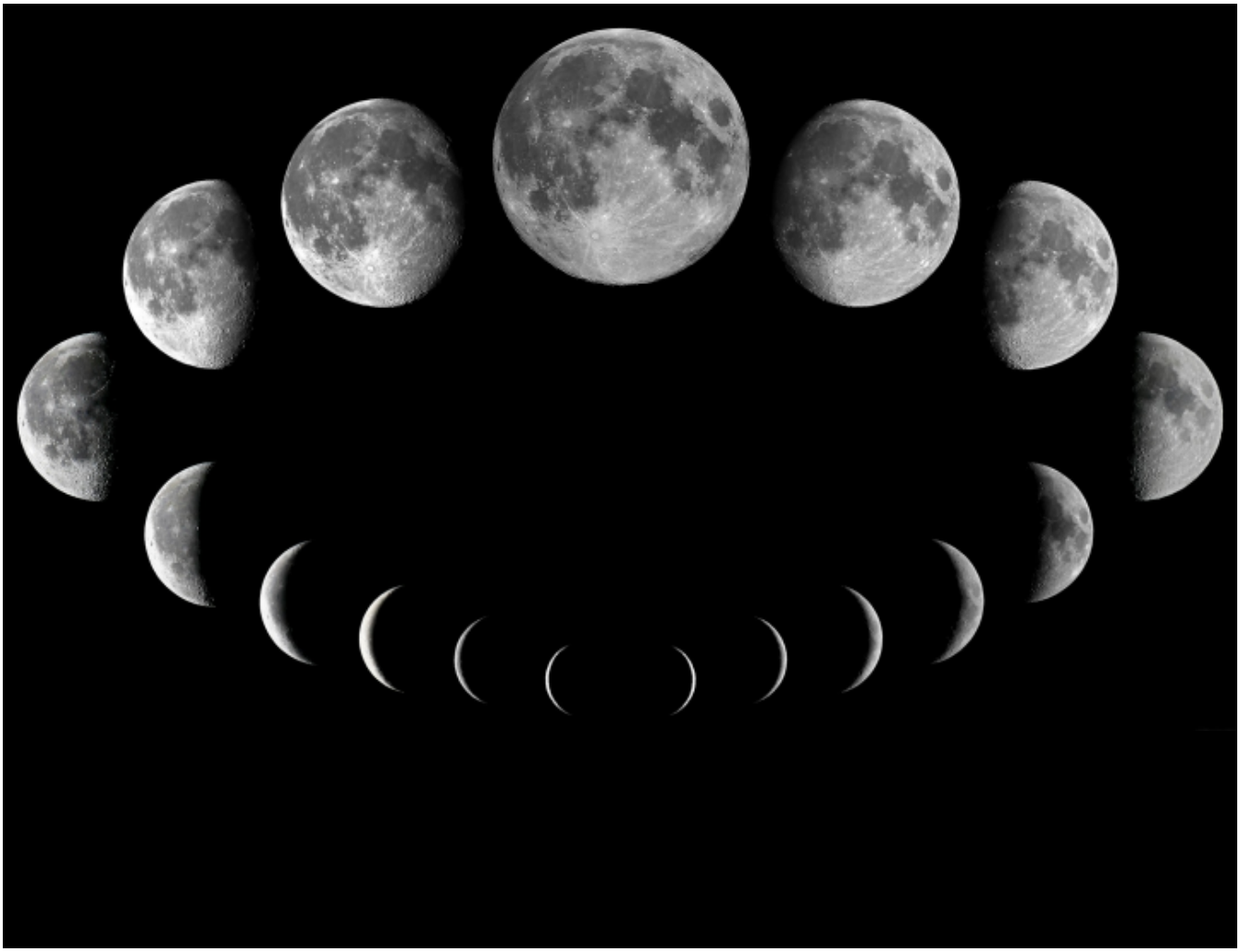
A sinusoidal function has an amplitude of 2 units, a period of 180°, and a maximum at (0, 3). Represent the function with an equation in two different ways.



$k = \frac{360}{180}$

$f(x) = 2\cos(2x) + 1$

$f(x) = 2\sin(2(x-135)) + 1$



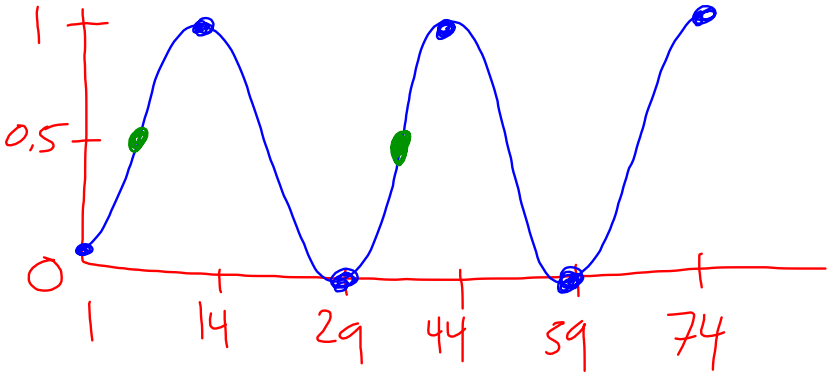
Consolidation

Phases of the Moon

Day of Year	1	4	7	10	14	20	24	29	34
Proportion of Moon Visible	0.02	0.22	0.55	0.83	1.00	0.73	0.34	0.00	0.28

Day of Year	41	44	48	53	56	59	63	70	74
Proportion of Moon Visible	0.92	1.00	0.86	0.41	0.12	0.00	0.23	0.88	1.00

1. Create a function to model the phases of the moon for an entire year.



Period: 30 $k = 12$

Axis: 0.5

Amplitude: 0.5

$$f(x) = 0.5\cos(12(x-14)) + 0.5$$

OR

$$f(x) = 0.5\sin(12(x-36.5)) + 0.5$$

Consolidation

Phases of the Moon

Day of Year	1	4	7	10	14	20	24	29	34
Proportion of Moon Visible	0.02	0.22	0.55	0.83	1.00	0.73	0.34	0.00	0.28

Day of Year	41	44	48	53	56	59	63	70	74
Proportion of Moon Visible	0.92	1.00	0.86	0.41	0.12	0.00	0.23	0.88	1.00

2. What is the period of your function?

   What significance does it have in terms of our calendar?

Consolidation

Phases of the Moon

Day of Year	1	4	7	10	14	20	24	29	34
Proportion of Moon Visible	0.02	0.22	0.55	0.83	1.00	0.73	0.34	0.00	0.28

Day of Year	41	44	48	53	56	59	63	70	74
Proportion of Moon Visible	0.92	1.00	0.86	0.41	0.12	0.00	0.23	0.88	1.00

3. List the **dates** when the moon is full.

Consolidation

Phases of the Moon

Day of Year	1	4	7	10	14	20	24	29	34
Proportion of Moon Visible	0.02	0.22	0.55	0.83	1.00	0.73	0.34	0.00	0.28

Day of Year	41	44	48	53	56	59	63	70	74
Proportion of Moon Visible	0.92	1.00	0.86	0.41	0.12	0.00	0.23	0.88	1.00

Use your function to determine how much of the moon would have been visible on May 8th of the given year.