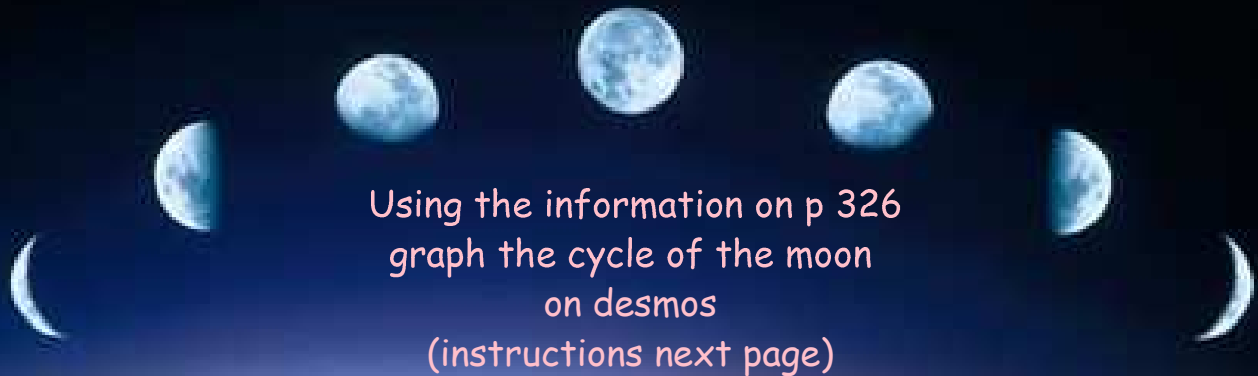


5.6 Sinusoidal Models

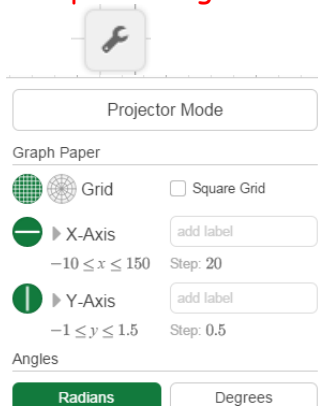
Waxing and Waning of the Moon



Using the information on p 326
graph the cycle of the moon
on desmos
(instructions next page)

Once you have your graph determine what portion of the moon is
visible on day 130

1. Click on wrench to change Graph settings

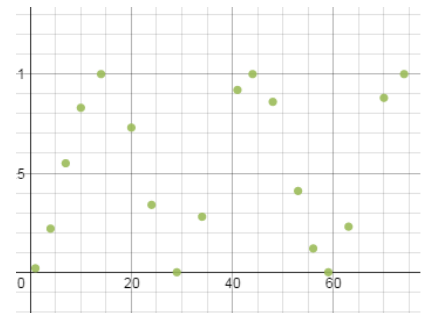


for this example we will be using Radians

2. Input the data from p 326 into a table

$f(x)$ expression
 note
 table
 folder
 image

x_1	y_1
1	.02
4	.22
7	.55
10	.83
14	1
20	.73
24	.34
29	0
34	.28
41	.92
44	1
48	.86
53	.41
56	.12
59	0
63	.23
70	.88
74	1



Desmos

3. find the curve of best fit (note: click **ABC** to find ~

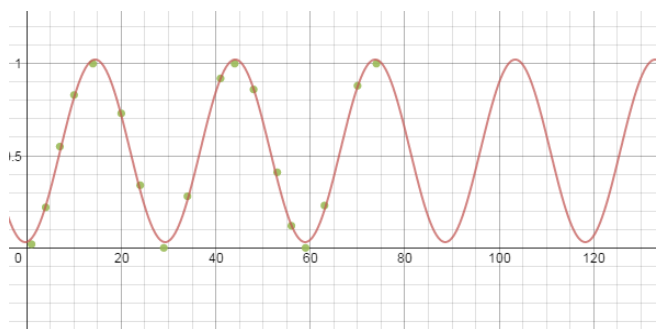
$$y_1 \sim a \sin(k(x_1 - c)) + d$$

STATISTICS
 $R^2 = 0.996$

RESIDUALS
 e_1

PARAMETERS
 $a = -0.49564$
 $c = 1414.9$

$k = 0.21199$
 $d = 0.5268$



State your equation:

$$y = -0.5 \sin(0.2(x - 1414.9)) + 0.5$$

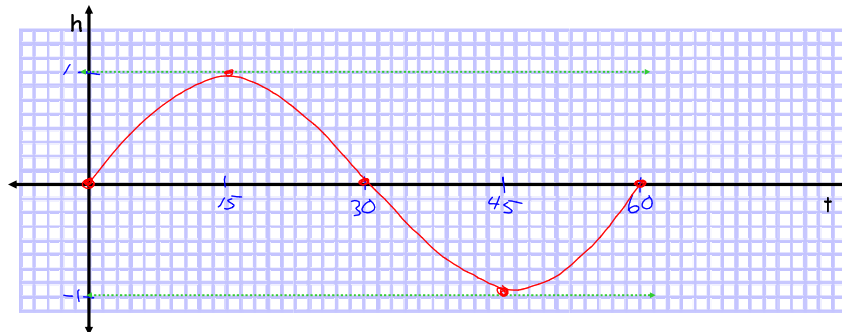
Ex 2 The height of a basket on a water wheel at time t can be modelled by $h(t) = \sin(6t)^\circ$, where t is in seconds and $h(t)$ is in meters.

Graph the following

t	0	15	30	45	60
h	0	1	0	-1	0

MAX: 1
MIN: -1
Per: 60s

$\rightarrow \sin(6 \cdot 0)$ $\rightarrow \sin(6 \cdot 60)$



b) How long does it take the wheel to make a complete revolution?
Explain how you know 60s

time elapsed before pattern repeats

Could you find this value by looking at the equation?

Hint it takes 360° to make a full revolution $\rightarrow y = \sin(6t)^\circ$
 $per = \frac{360}{k}$
 $= \frac{360}{6}$

Now you have a "k" in your equation

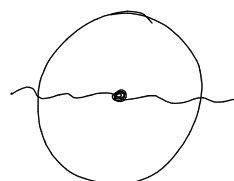
vert stretch/compress move left/rt move up/down

$f(x) = a \sin(k(x-d)) + c$

Changes pd (horizontal stretch or compression) brackets here are important to see the true left/right shift

c) What is the radius of the wheel? Explain how you know.
1m - amplitude

d) Where is the centre of the wheel located relative to the water level?
Explain how you know.



It is at water level
($h=0$)

Hmwk

p 343 # 11, 12

p 349 # 5

p 352 # 9, 11-15

p 376 # 19, 20

Be sure to look at questions
previously assigned

p 351 # 8

p 375 # 15, 16