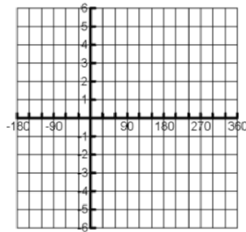


Warm - Up

Warm-Up

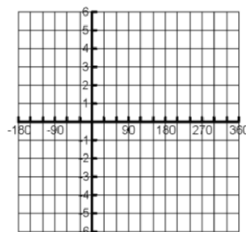
#1
Graph the Base Function
Graph ALL transformation
in the correct order.

$$g(x) = 4 \cos x - 2$$



#2
Graph the Base Function
A table has been created of the key points of the sine curve.
Transform these points using a Table
Graph the final curve

$$h(x) = 2\sin(3x + 180) + 4$$



#3
Describe the characteristics of

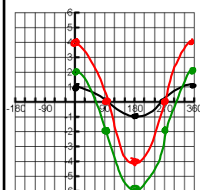
$$h(x) = 2\sin(3x + 180) + 4$$

$f(x) = \sin x$		
(0, 0)		
(90, 1)		
(180, 0)		
(270, -1)		
(360, 0)		

Warm - Up - Solutions

#1
Graph the Base Function
and then graph ALL
transformations in the correct
order.

$$g(x) = 4 \cos x - 2$$



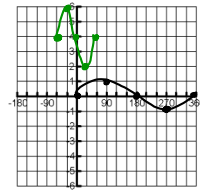
$$y = \cos x$$

$$y = 4 \cos x$$

$$y = 4 \cos x - 2$$

#2
a) Graph the Base Function
b) Create a table using the key points
c) Transform these points using a Table
d) Graph the final curve.

$$h(x) = 2\sin(3x + 180) + 4$$



$$y = 2 \sin 3(x + 60) + 4$$

$$a = 2$$

$$k = 3$$

$$d = -60$$

$$c = 4$$

(x, y)	$(\frac{x}{k}, ay)$	$(\frac{x}{k} + d, ay + c)$
(x, y)	$(\frac{x}{3}, 2y)$	$(\frac{x}{3} - 60, 2y + 4)$
(0, 0)	(0, 0)	(-60, 4)
(90, 1)	(30, 2)	(-30, 6)
(180, 0)	(60, 0)	(0, 4)
(270, -1)	(90, -2)	(30, 2)
(360, 0)	(120, 0)	(60, 4)

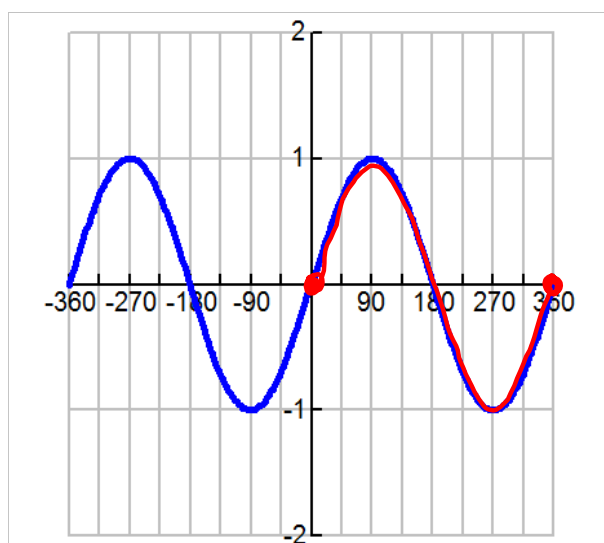
#3 Describe the characteristics of

$$g(x) = 2\sin(3x + 180) + 4$$
$$= 2\sin(3(x + 60)) + 4$$

- ✓ sine curve
- ✓ amplitude = 2
- ✓ Period = 120°
- ✓ Phase Shift = Left + 60
- ✓ Axis of curve = $y = 4$

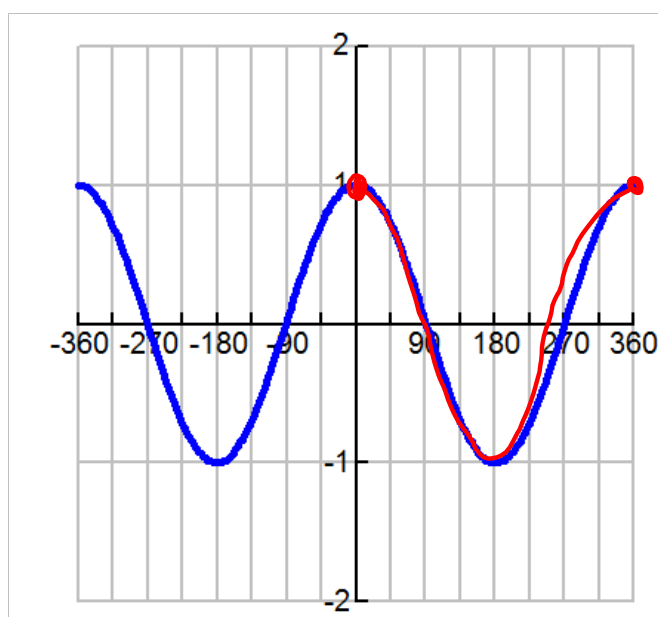
Turn on the video

Key Points on the Sine Curve



$(0^\circ, 0), (90^\circ, 1), (180^\circ, 0), (270^\circ, -1), (360^\circ, 0)$

Key Points on the Cosine Curve

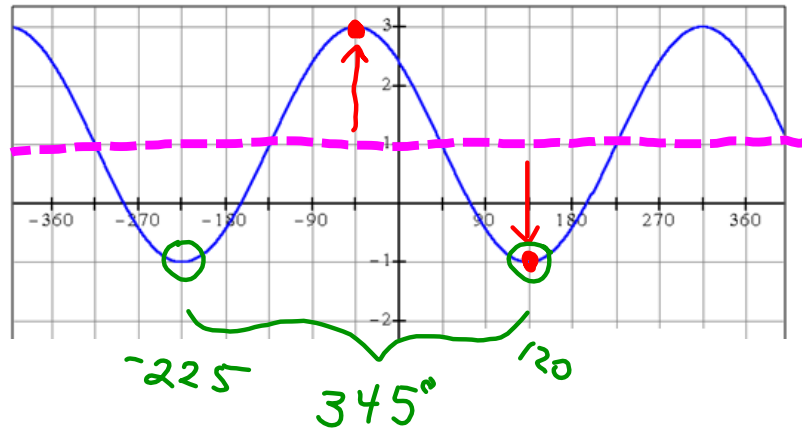


$(0^\circ, 1), (90^\circ, 0), (180^\circ, -1), (270^\circ, 0), (360^\circ, 1)$

By the end of class you will have developed systematic approach to come up with the **equation** of this function.

What is the Amplitude ? **2**
 What is the Period ? **345°**
 What is the Axis of the Curve ? **y = 1**

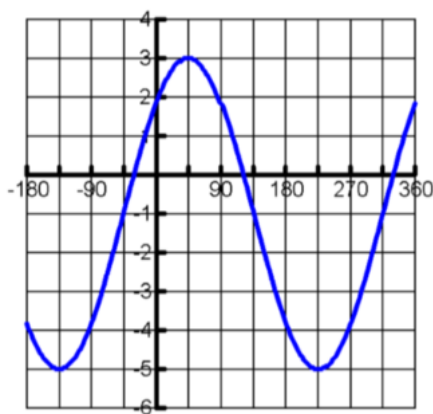
What is the Phase Shift ?



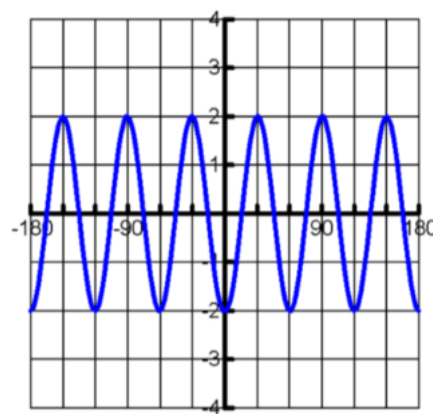
Some Examples

Transformations of Sine

Determine the equation of the following sine curves:



1. Amplitude:
2. Period:
3. Vertical Translation:
4. Phase Shift:
5. Equation:



- Amplitude:
 Period:
 Vertical Translation:
 Phase Shift:
 Equation:

Transformations of Sine -45° 315°

Determine the equation of the following sine curves:

- Pick graph
- Determine
 - Amplitude 4
 - Period
 - Vertical Translation $y = -1$

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

$$= 4 \sin(1(x+45)) - 1$$

$$4 \sin(1(x-315)) - 1$$

$$-4 \cos(1(x+135)) - 1$$

- Amplitude:
- Period:
- Vertical Translation:
- Phase Shift:
- Equation:

- Amplitude:
- Period:
- Vertical Translation:
- Phase Shift:
- Equation:

- Amplitude: Period
- Period:
- Vertical Translation:
- Phase Shift:
- Equation:

Explained on video

Transformations of Sine

Determine the equation of the following sine curves:

- Pick graph
- Determine
 - Amplitude 2
 - Period 60°
 - Vertical Translation $y = 0$

$$a \cos(k(x-d)) + c$$

$$2 \cos(6(x-0)) + 0$$

$$k = \frac{360^\circ}{60^\circ} = 6$$

Amplitude: 2
Period: 60°
Vertical Translation: $y = 0$
Phase Shift:
Equation:

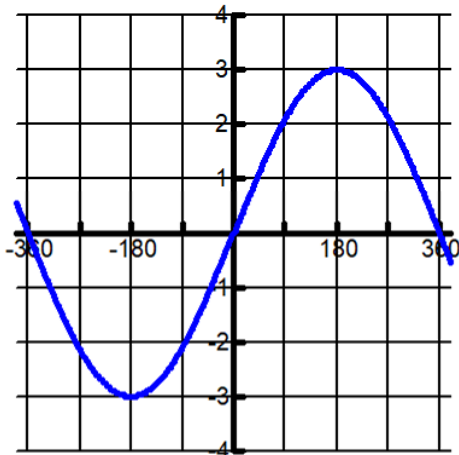
$$2 \cos(6(x-90^\circ)) + 0$$

Amplitude:
Period:
Vertical Translation:
Phase Shift:
Equation:

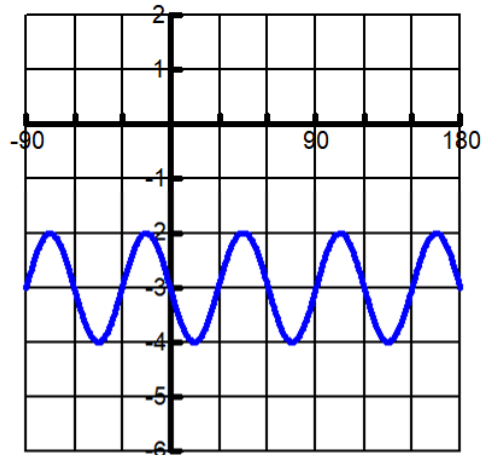
$$2 \sin(6(x-15^\circ)) + 0$$

Amplitude:
Period:
Vertical Translation:
Phase Shift:
Equation:

Try On Your Own #1

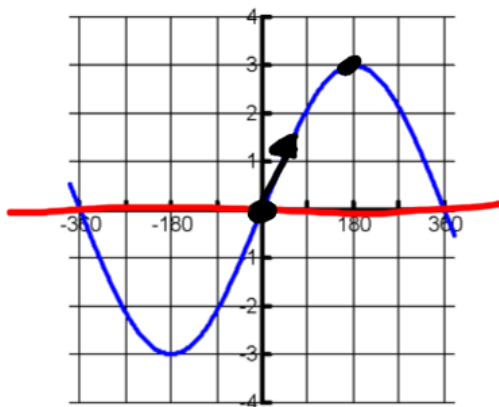


1. Amplitude:
2. Period:
3. Vertical Translation:
4. Phase Shift:
5. Equation:



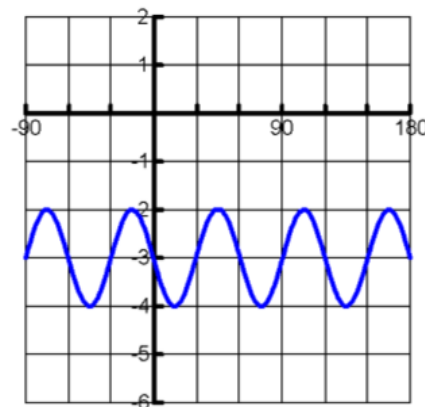
- Amplitude:
- Period:
- Vertical Translation:
- Phase Shift:
- Equation:

Try On Your Own #1



1. Amplitude: $3 \rightarrow a=3$
2. Period: $720^\circ \rightarrow k=\frac{1}{2}$
3. Vertical Translation: $0 \rightarrow c=0$
4. Phase Shift: *no shift !!*
5. Equation:

$$y = 3\sin \frac{1}{2}x$$



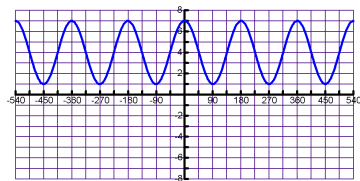
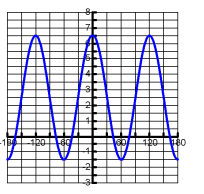
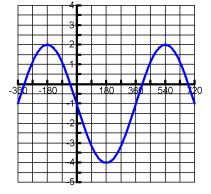
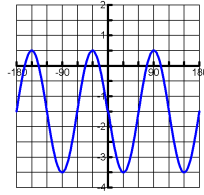
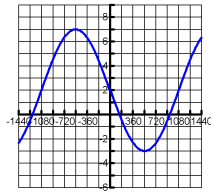
- Amplitude:
- Period:
- Vertical Translation:
- Phase Shift:
- Equation:

$$y = \sin 6(x-30) - 3$$

$$y = \sin (6(x+30)) - 3$$

$$y = -\sin 6x - 3$$

Try On Your Own #2



Some Practise

Try On Your Own #2 Solutions

Check your answer on the Nspire by setting the window match the graph

$-5 \sin \frac{1}{6}x + 2$

$5 \cos \frac{1}{6}(x+540) + 2$

$5 \sin (\frac{1}{6}(x+1080)) + 2$

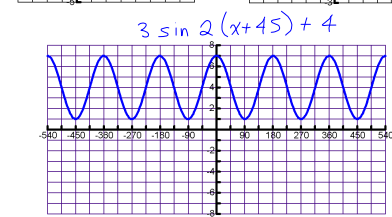
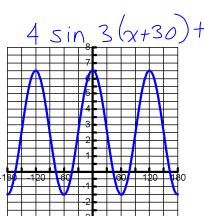
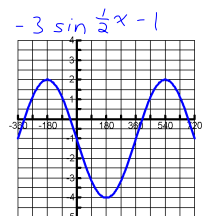
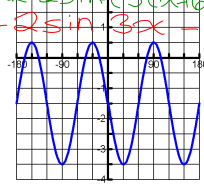
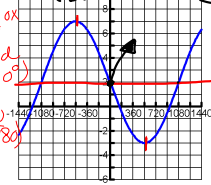
$5 \sin (\frac{1}{6}(x-1080)) + 2$

$2 \sin (3(x+60)) - 1.5$

$2 \sin (3(x+60)) - 1.5$

$-2 \sin (3x) - 1.5$

each box
180°
Period
(12)(180°)
K = $\frac{360}{(12)(180)}$
K = $\frac{1}{6}$



Additional Practice

P.391 # 1, 4, 5ab, 6

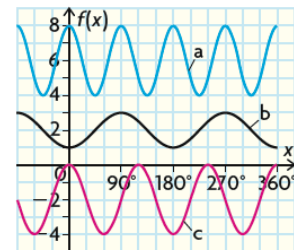
P.352 #8 - determine equation

CHECK Your Understanding

- Determine an equation for each sinusoidal function at the right.
- Determine the function that models the data in the table and does not involve a horizontal translation.

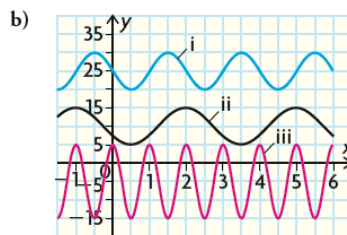
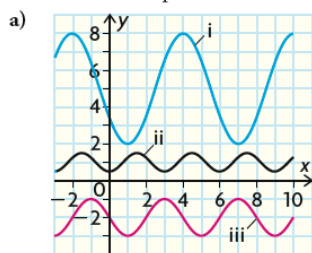
x	0°	45°	90°	135°	180°	225°	270°
y	9	7	5	7	9	7	5

- A sinusoidal function has an amplitude of 4 units, a period of 120° , and a maximum at $(0, 9)$. Determine the equation of the function.



PRACTISING

- Determine the equation for each sinusoidal function.

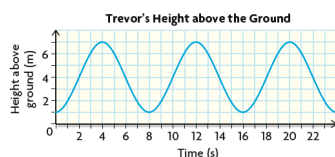


6. Determine the equation of the cosine function whose graph has each of the following features.

	Amplitude	Period	Equation of the Axis	Horizontal Translation
a)	3	360°	$y = 11$	0°
b)	4	180°	$y = 15$	30°
c)	2	40°	$y = 0$	7°
d)	0.5	720°	$y = -3$	-56°

Now determine the equation

8. While riding on a Ferris wheel, Trevor's height above the ground in terms of time can be represented by the graph shown.



- What is the period of this function, and what does it represent?
- What is the equation of the axis?
- What is the amplitude?
- What is the range of the function?
- After 24 s, when will Trevor be at the lowest height again?
- At what times is Trevor at the top of the wheel?
- When will his height be 4 m between 24 s and 30 s?

Attachments

sinusoidal transformations.pptx