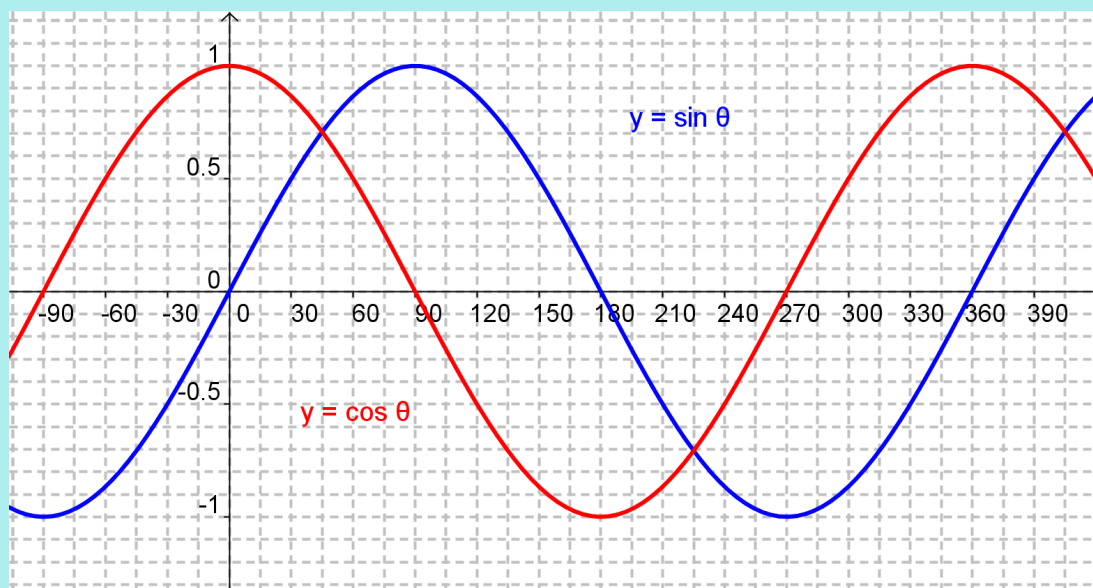


Recall:



May 21-8:27 PM

Graphing Transformations of Trig Functions, Part 2

Given:

$$y = a \sin [k(x - p)] + q$$

or

$$y = a \cos [k(x - p)] + q$$

a gives vertical reflection and scaling
 k gives horizontal reflection and scaling
 p gives horizontal translation or shift
 q gives vertical translation or shift

$$(x, y) \rightarrow (x, ay) \rightarrow \left(\frac{x}{k}, ay\right) \rightarrow \left(\frac{x}{k} + p, ay\right) \rightarrow \left(\frac{x}{k} + p, ay + q\right)$$

May 17-9:17 AM

Graphing Transformations of Trig Functions, Part 2 May 23/2012

The standard transformations (a, k, p, q) can be expressed in terms of key properties for periodic functions and used to graph the function.

a: vertical scaling, determines the amplitude

k: horizontal scaling, determines the period

$$period = \frac{360^\circ}{k}$$

p: horizontal shift, also known as phase shift, determines the starting position of the graph

q: vertical shift, determines the axis of the curve

May 17-9:17 AM

To graph using key features:

- (1) Draw the axis of the curve (q-value)
- (2) Draw an 'envelope' for the amplitude (a-value)
- (3) Determine the period (k-value) and choose a scale that allows both the parent (360) and transformed function. Divide into 4 equal sections.
- (4) Use the phase shift to determine the starting point for the graph.
- (5) Choose direction to draw (up/down and left/right) by considering any vertical or horizontal reflections.

May 23-11:32 AM

Ex.1 Determine transformations & key properties,
then graph $y = -2\sin[3(x - 30^\circ)] + 1$

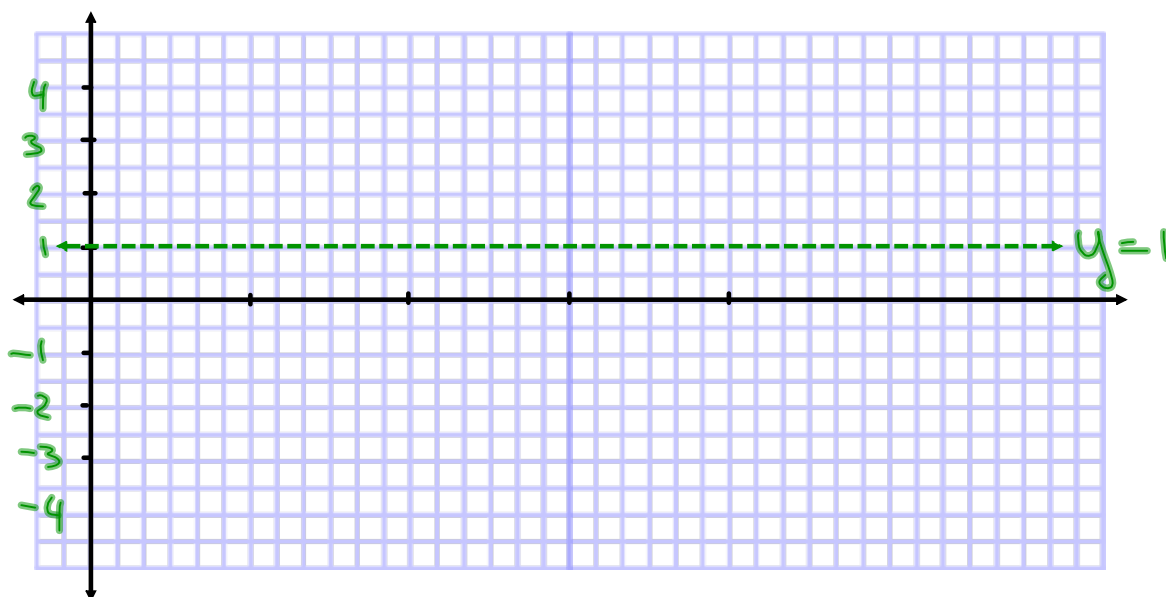
- ① v. reflection
- ② v. stretch by 2 \rightarrow amplitude = 2
- ③ h. compress by 3 \rightarrow period = $\frac{360^\circ}{3}$
= 120°
- ④ h. shift right 30° \rightarrow phase shift = 30°
- ⑤ v. shift up by 1 \rightarrow axis of curve $y = 1$

May 17-9:19 AM

Ex.1 Determine key properties and graph

$$y = -2\sin[3(x - 30^\circ)] + 1$$

(1) draw axis of the curve

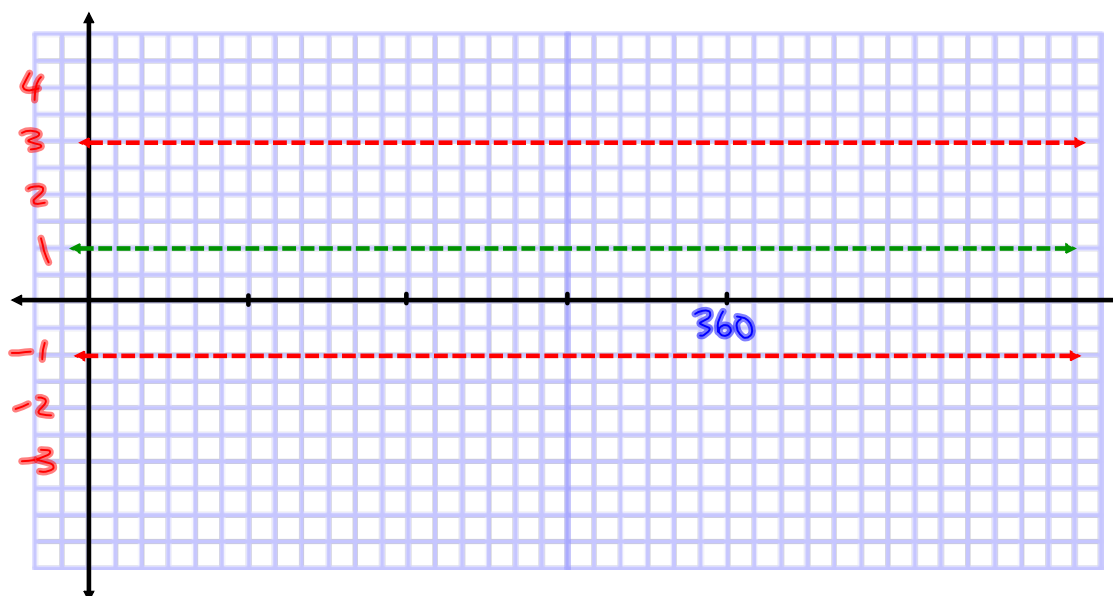


May 17-9:19 AM

Ex.1 Determine key properties and graph

$$y = -2 \sin [3(x - 30^\circ)] + 1$$

(2) envelope for amplitude

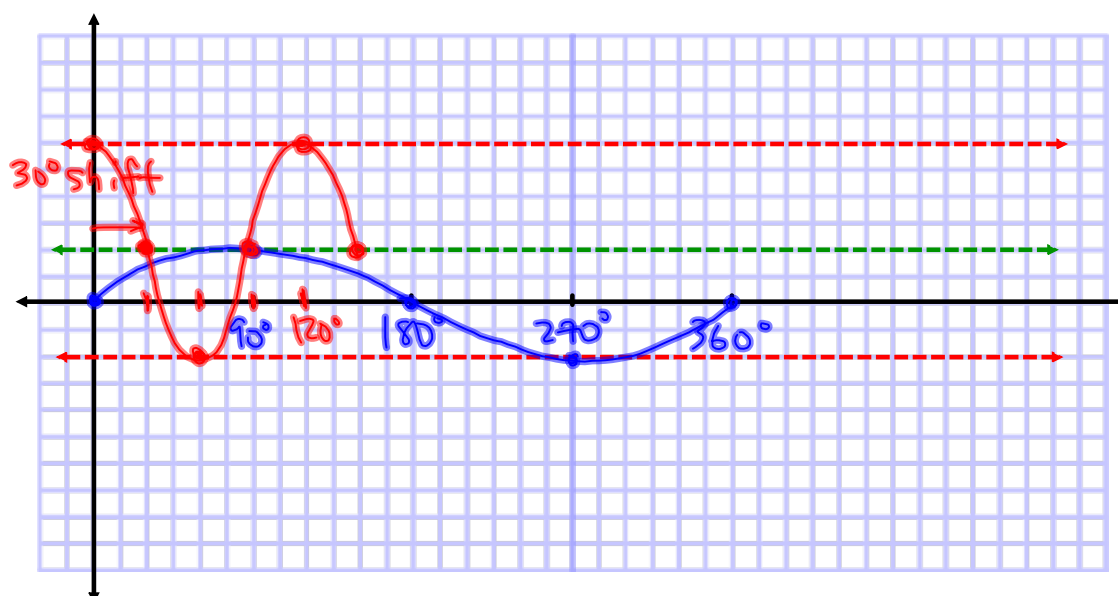


May 17-9:19 AM

Ex.1 Determine key properties and graph

$$y = -2 \sin [3(x - 30^\circ)] + 1$$

(3) period and scale

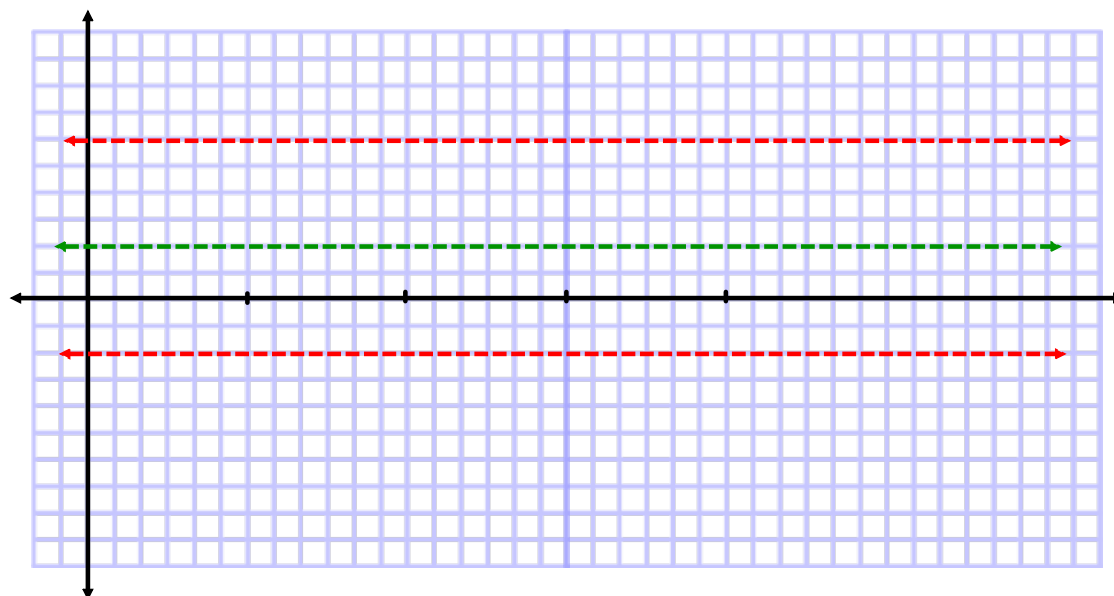


May 17-9:19 AM

Ex.1 Determine key properties and graph

$$y = -2 \sin [3(x - 30^\circ)] + 1$$

(4) period and scale

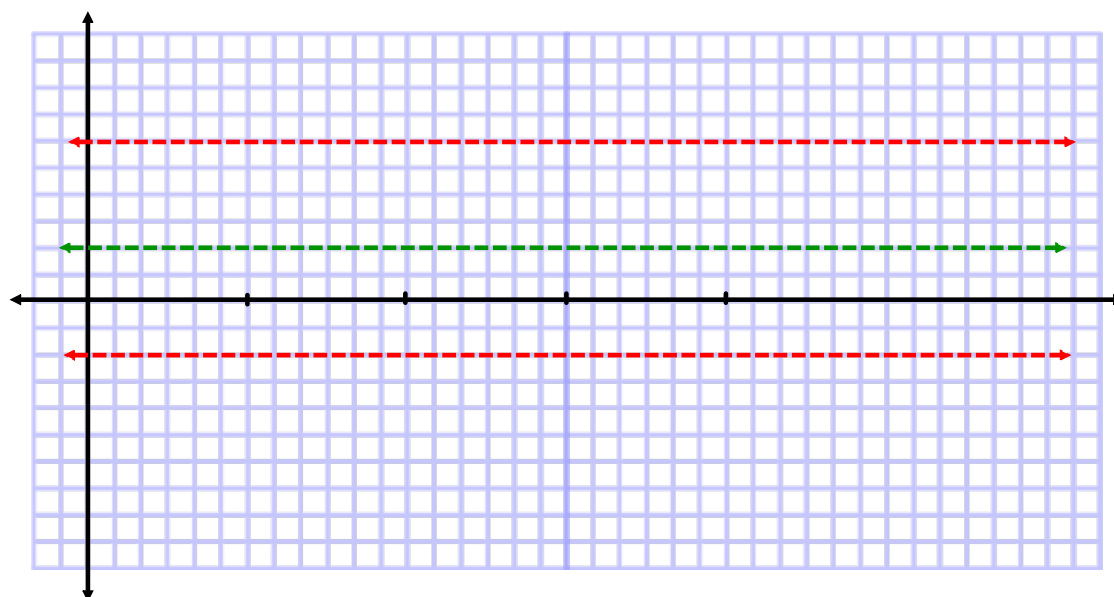


May 17-9:19 AM

Ex.1 Determine key properties and graph

$$y = -2 \sin [3(x - 30^\circ)] + 1$$

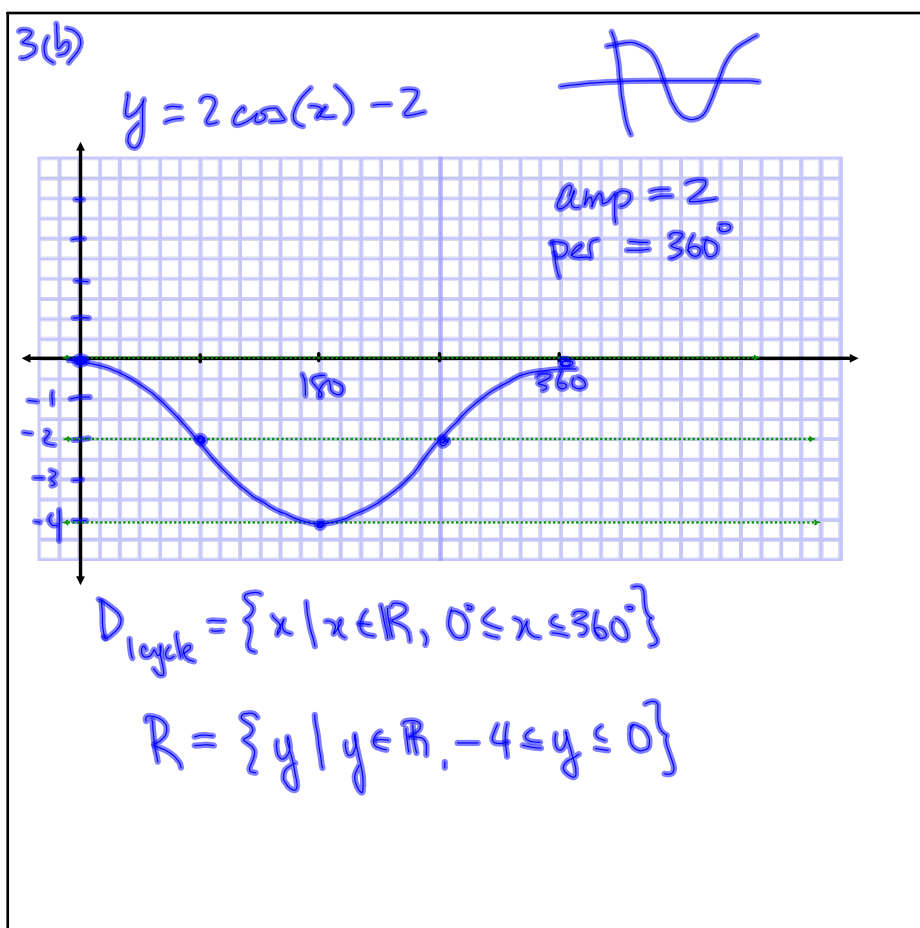
(5) draw curve, incorporating reflections



May 17-9:19 AM

p.387 # 1abceh, 2abdeg, 3bd, 5abc, 6ab

May 22-8:28 AM



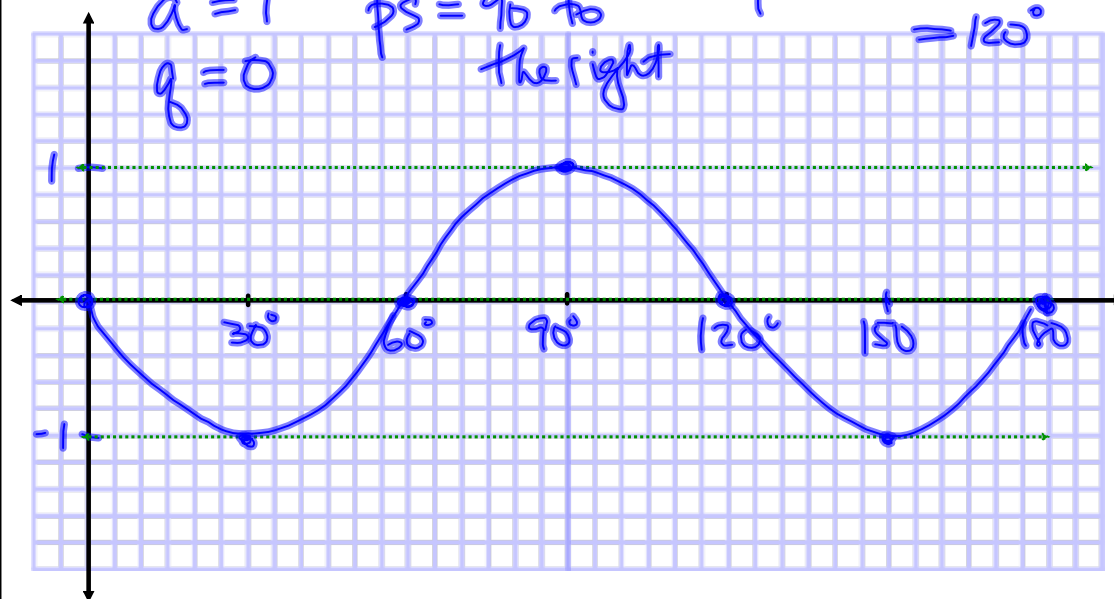
May 16-9:08 AM

$$6(b) \quad y = \cos[3(x - 90^\circ)] + 0$$

$$a = 1$$
$$q = 0$$

ps = 90° to
the right

$$\text{period} = \frac{360^\circ}{3}$$
$$= 120^\circ$$



May 16-9:08 AM