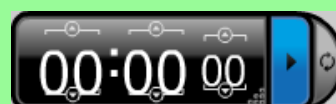
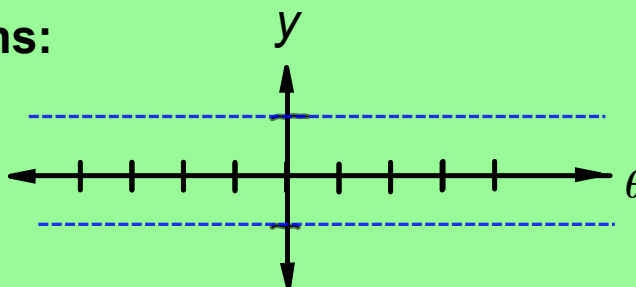


## Do Now:

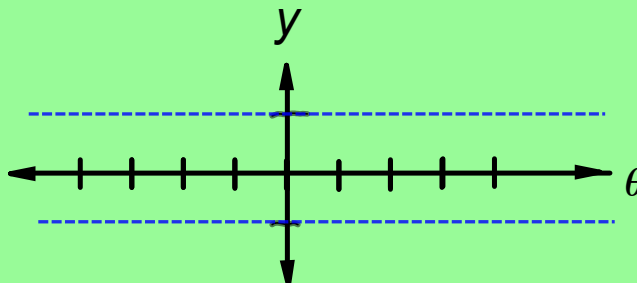


Sketch The Functions:

1)  $y = \sin \theta$



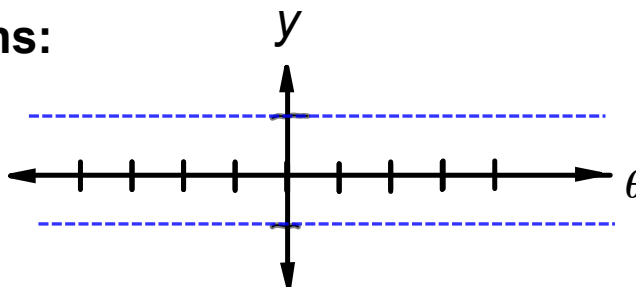
2)  $y = \cos \theta$



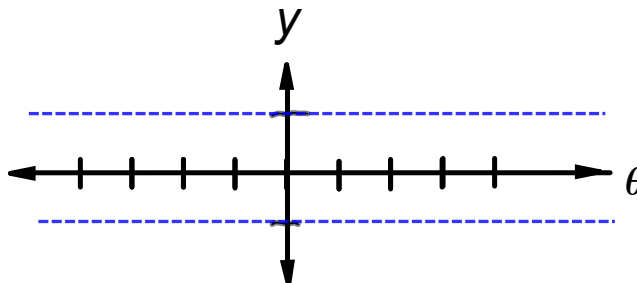
## Do Now:

Sketch The Functions:

1)  $y = \sin \theta$



2)  $y = \cos \theta$

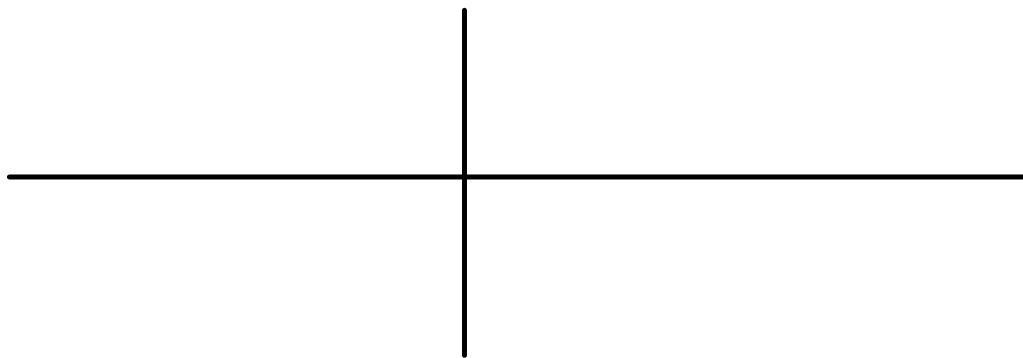


6.5 SHIFTING SINE & COSINE

**Review of Sinusoidal Functions**

6.5 SHIFTING SINE & COSINE

$$y = A \sin k\theta$$



## 6.5 SHIFTING SINE & COSINE

$$y = A \sin k\theta$$

↑  
AMPLITUDE

↑  
|A|

↓  
|A|

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin k\theta$$

↑  
AMPLITUDE

↖ AFFECTS THE PERIOD

↑  
|A|

↓  
|A|

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin k\theta$$

↑  
AMPLITUDE

↑  
|A|

↓  
|A|

↖ AFFECTS THE PERIOD

$$P_A = \frac{2\pi}{k}$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

↑  
AMPLITUDE

↖ AFFECTS THE PERIOD

$$P_A = \frac{2\pi}{k}$$

↑  
|A|

↓  
|A|



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

A blue arrow points from the text "AFFECTS PHASE" to the constant  $c$  in the equation. Another blue arrow points from the text "AFFECTS THE PERIOD" to the coefficient  $k$ .

↑  
AMPLITUDE

↑ AFFECTS THE PERIOD

$$P_A = \frac{2\pi}{k}$$

↑  
 $|A|$

↓  
 $|A|$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

Annotations:  
-  $A$ : AMPLITUDE (indicated by an upward arrow)  
-  $k$ : AFFECTS THE PERIOD (indicated by a red arrow)  
-  $c$ : AFFECTS PHASE (indicated by a blue arrow)

$$-\frac{c}{k}$$

$$P_A = \frac{2\pi}{k}$$

$|A| \uparrow$

$|A| \downarrow$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c)$$

Annotations:  
-  $A$ : AMPLITUDE (indicated by an upward arrow)  
-  $k$ : AFFECTS THE PERIOD (indicated by a red arrow)  
-  $+h$ : VERTICAL (indicated by a green arrow pointing up)  
-  $c$ : AFFECTS PHASE (indicated by a blue arrow pointing to the right)

$|A| \uparrow$

$|A| \downarrow$

$$P_A = \frac{2\pi}{k}$$

$$-\frac{c}{k}$$

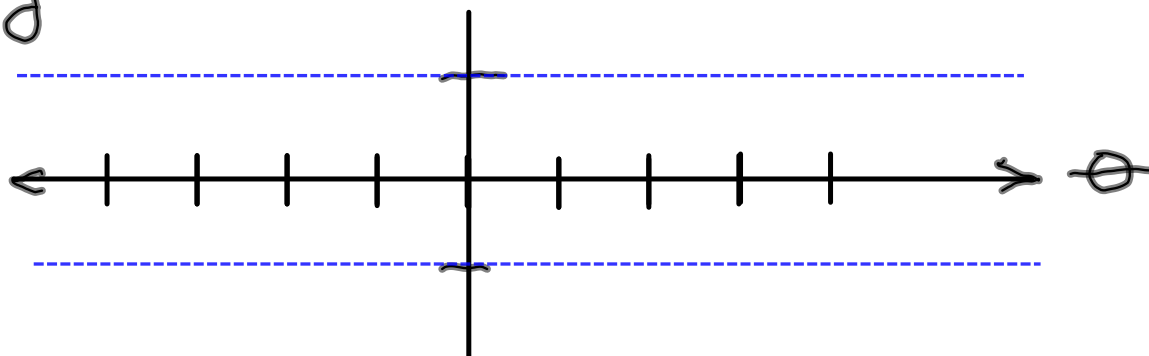
## Graphing Basic Sine and Cosine Function

$$y = A \sin (k\theta + c) + h$$

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

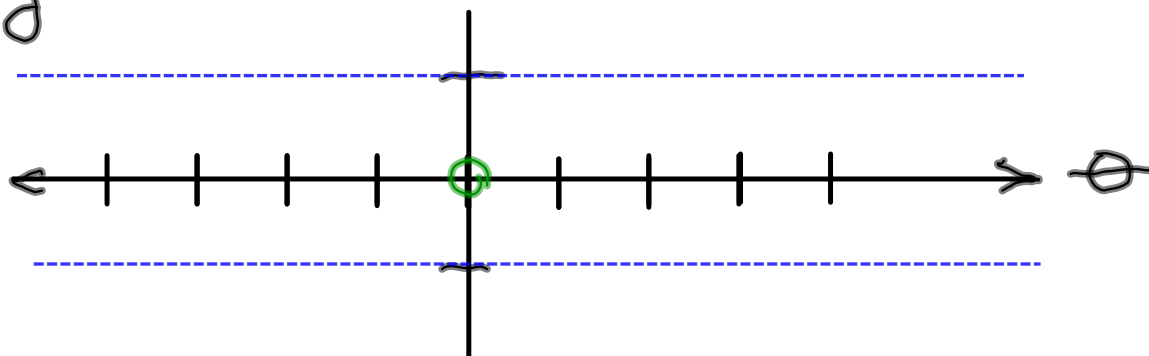
$$y = \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

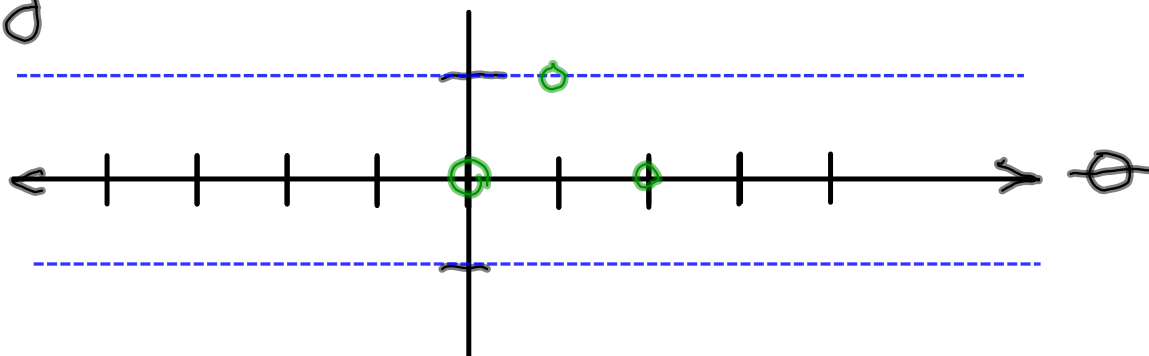
$$y = \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

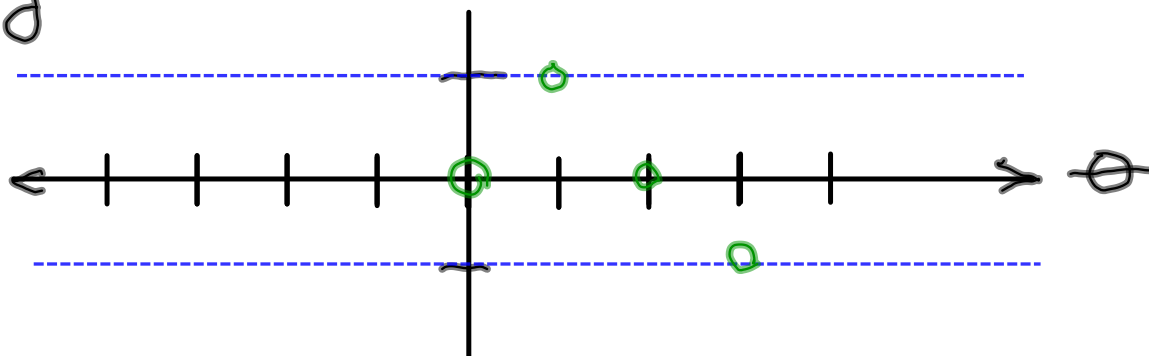
$$y = \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$

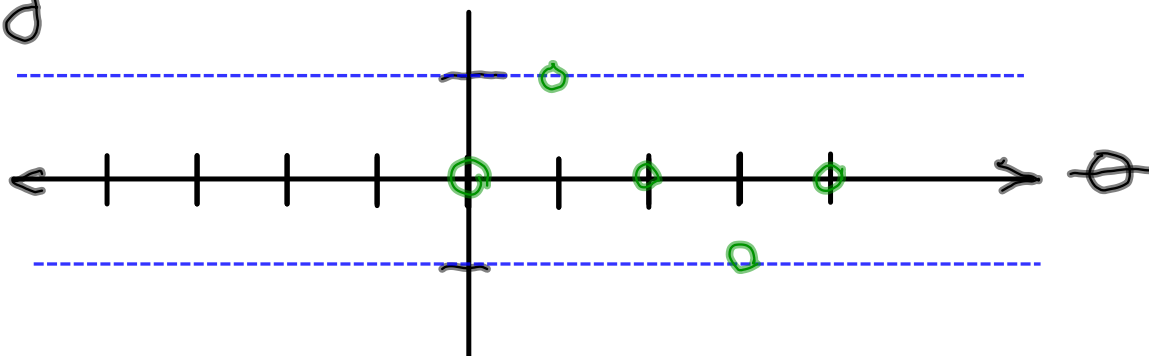




### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

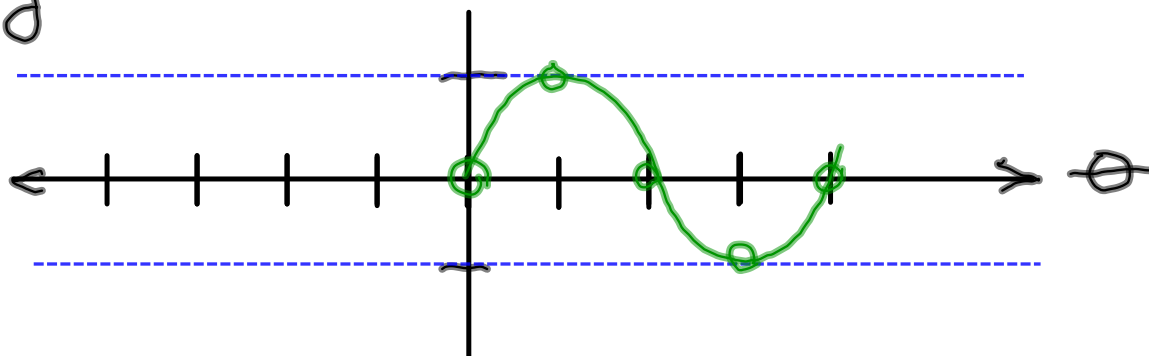
$$y = \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

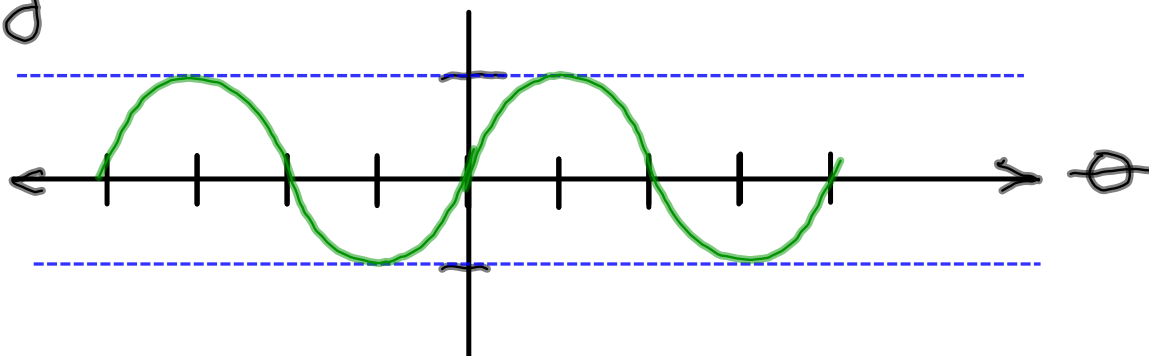
$$y = \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

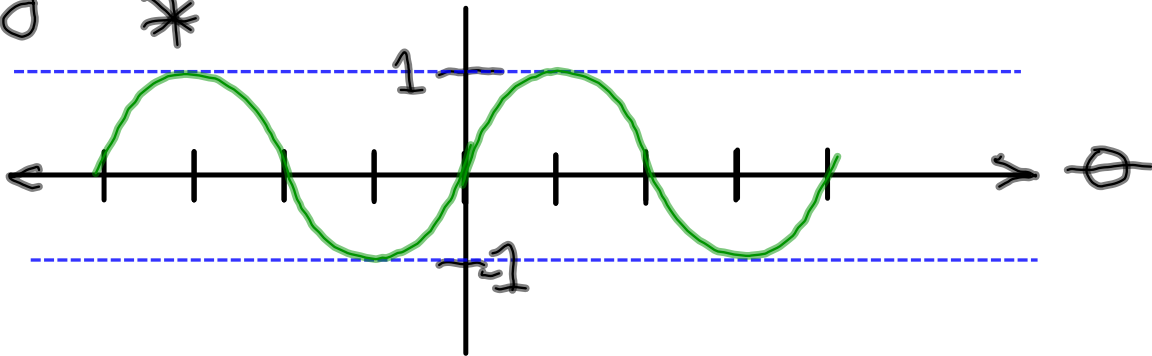
$$y = \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

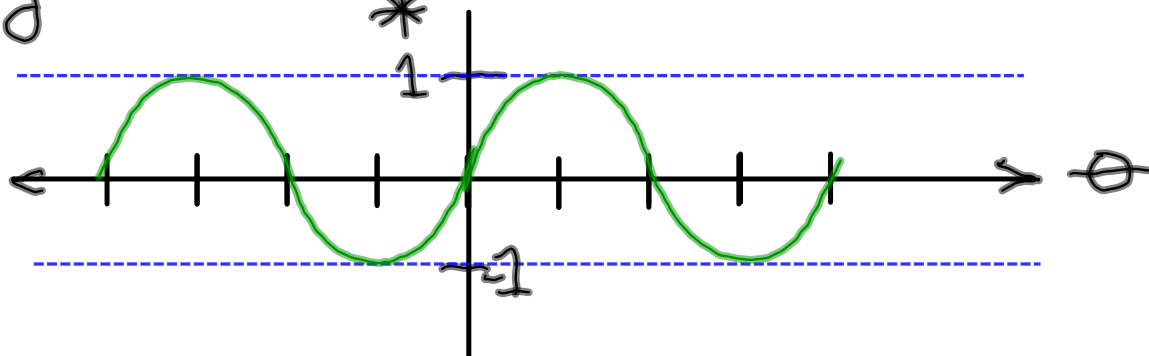
$$y = \begin{matrix} \uparrow \\ * \end{matrix} \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



### 6.5 SHIFTING SINE & COSINE

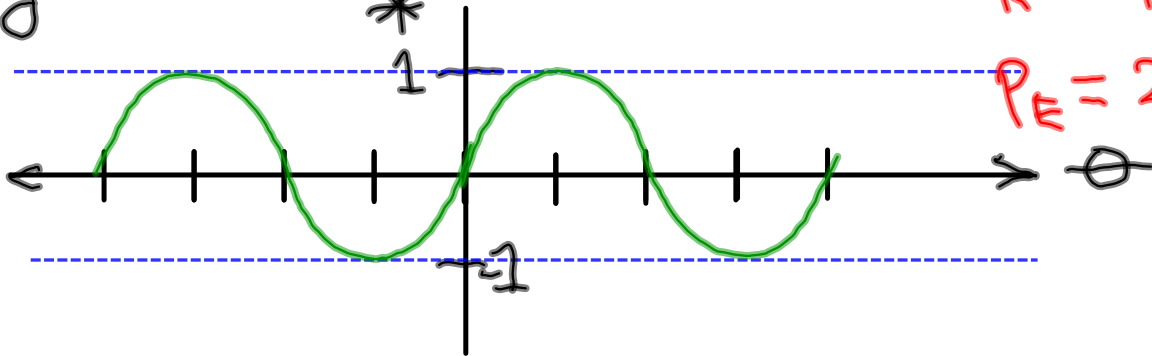
$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$

$$A = 1$$

$$k = 1$$

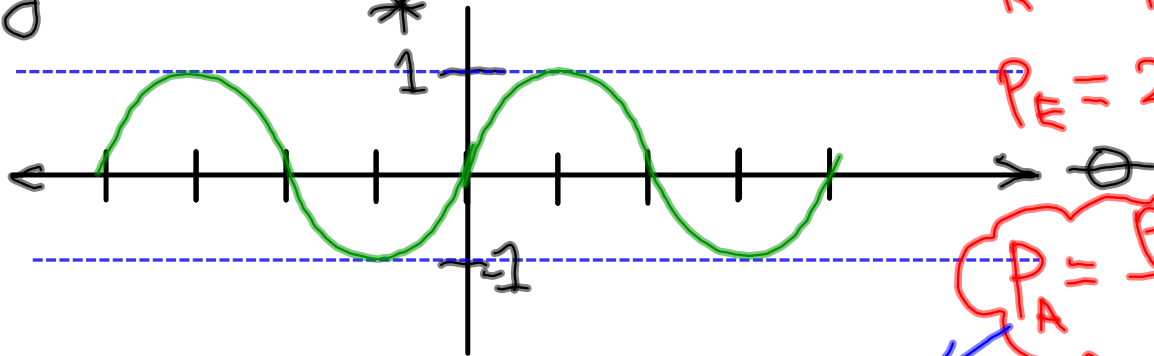
$$P_E = 2\pi$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

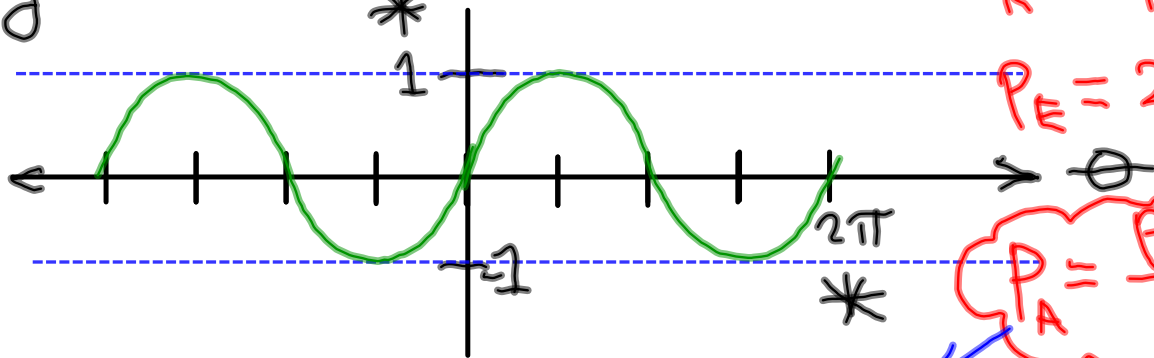
$$P_A = \frac{P_E}{k}$$

$$\frac{2\pi}{1} = P_A = 2\pi$$

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

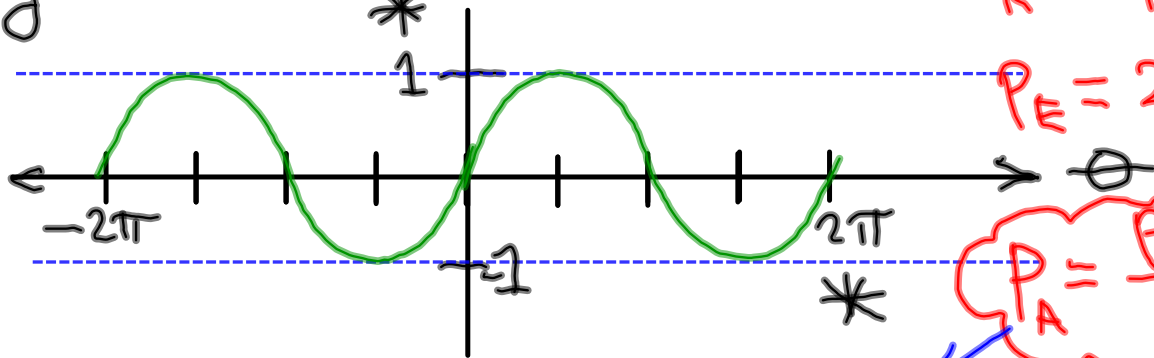
$$\frac{2\pi}{1} = P_A = 2\pi$$



### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

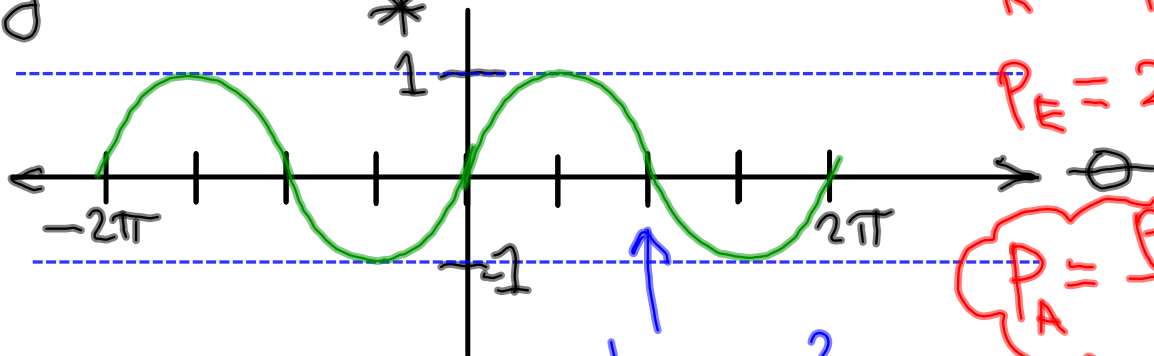
$$P_A = \frac{P_E}{k}$$

$$\frac{2\pi}{1} = P_A = 2\pi$$

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

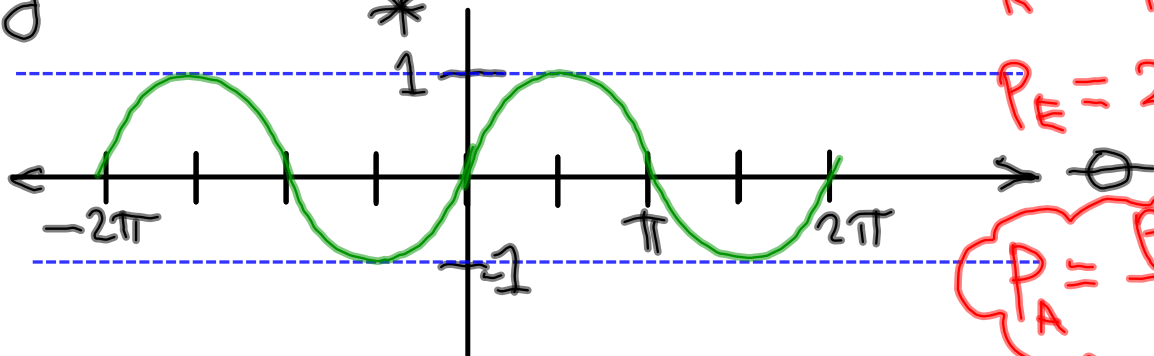
$$P_A = 2\pi$$

1/2 of 2pi?

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

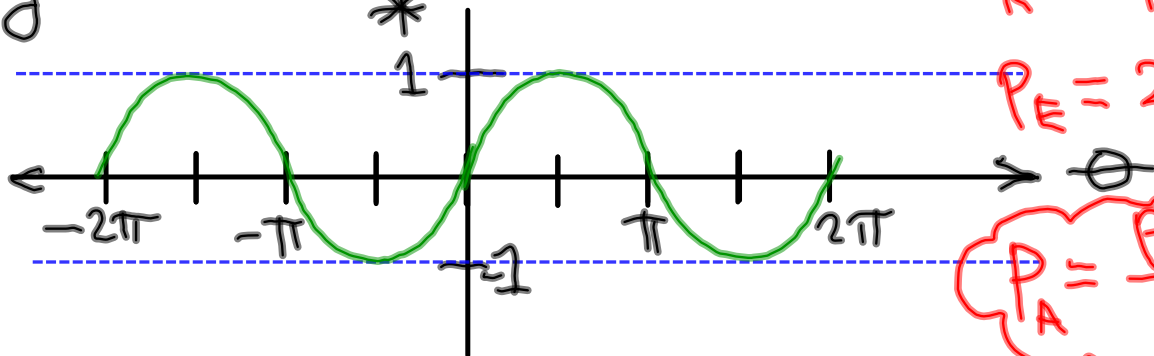
$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

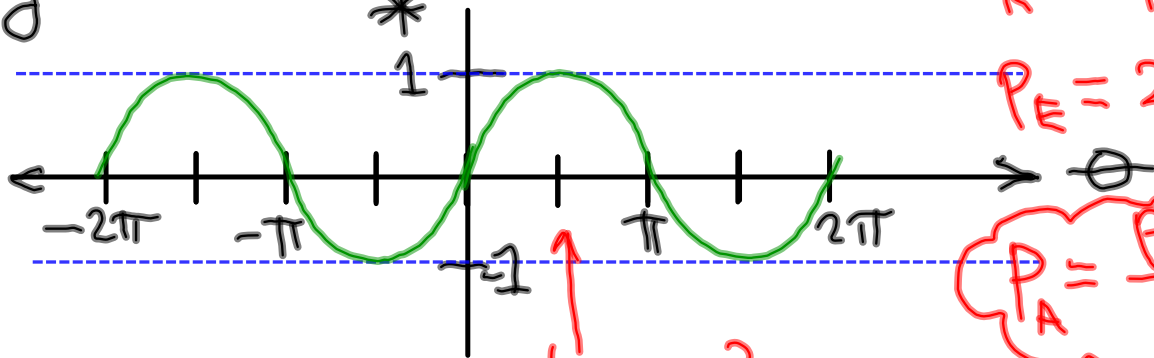
$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

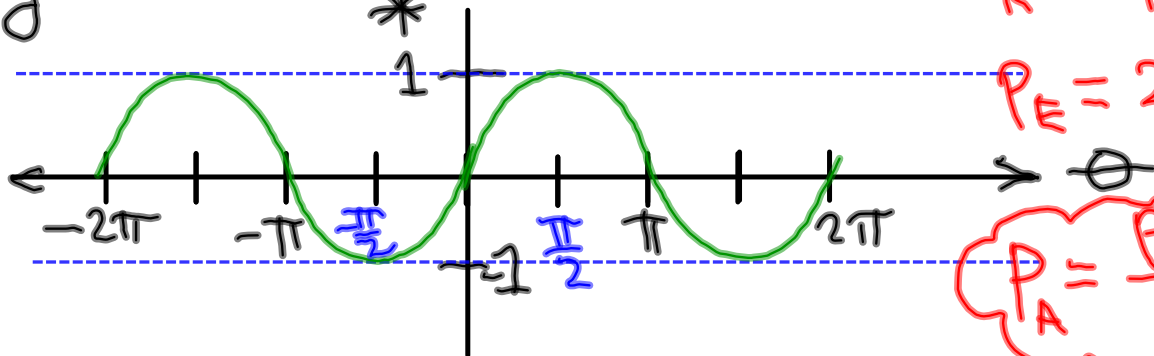
$$P_A = 2\pi$$

$\frac{1}{2}$  of  $\pi$ ?

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

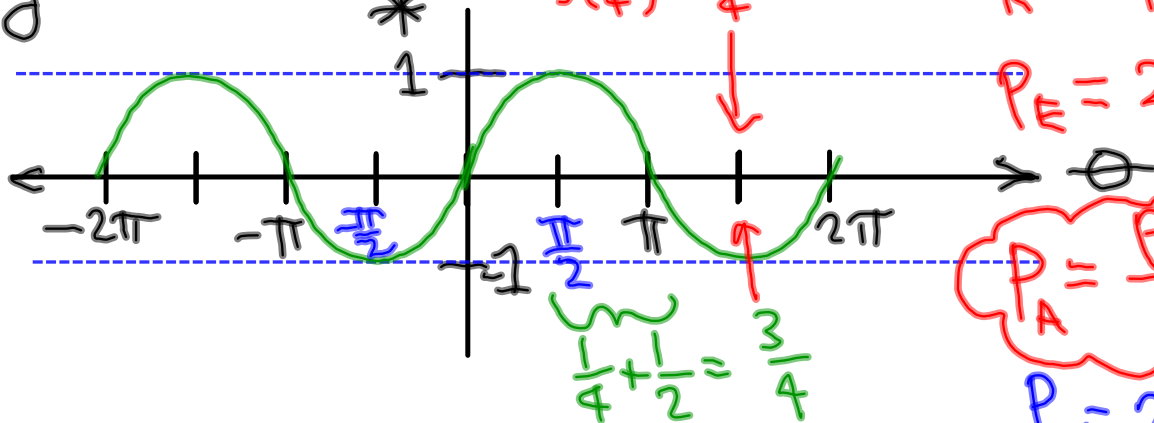
$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

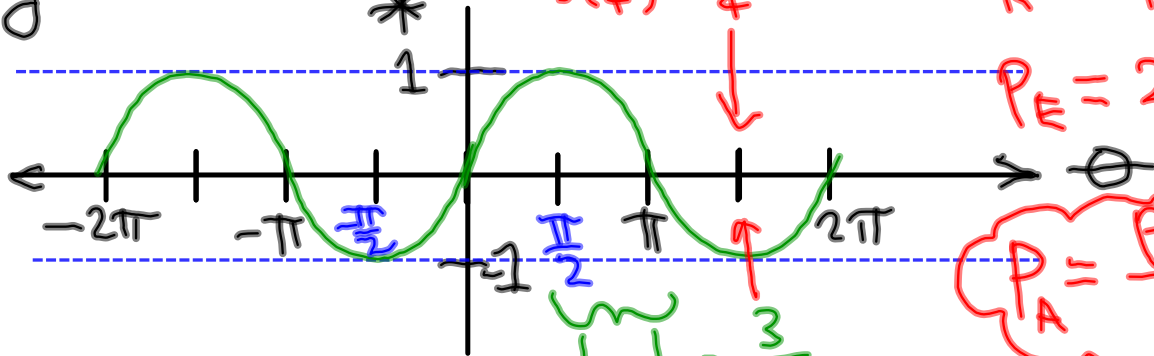
$$P_A = \frac{P_E}{K}$$

$$P_A = 2\pi$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$3\left(\frac{1}{4}\right) = \frac{3}{4}$$

$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$$

$$\frac{\pi}{2} + \pi = ?$$

$$P_A = \frac{P_E}{k}$$

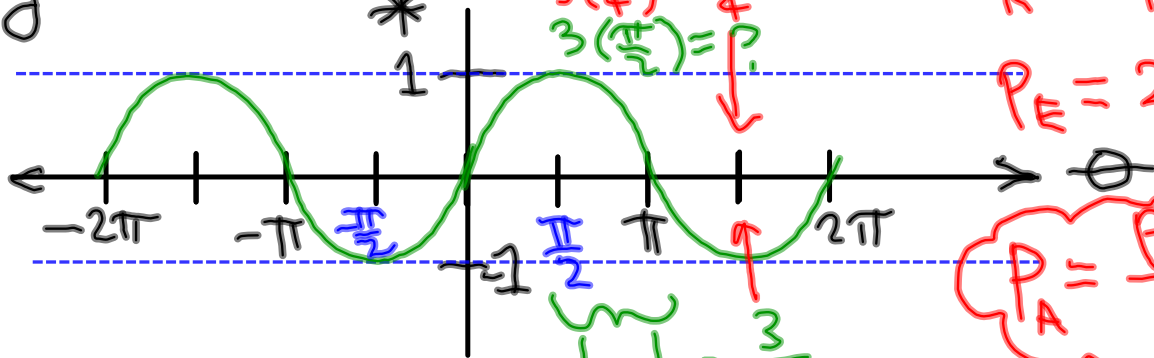
$$P_A = 2\pi$$



## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$3\left(\frac{1}{4}\right) = \frac{3}{4}$$

$$3\left(\frac{\pi}{2}\right) = ?$$

$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

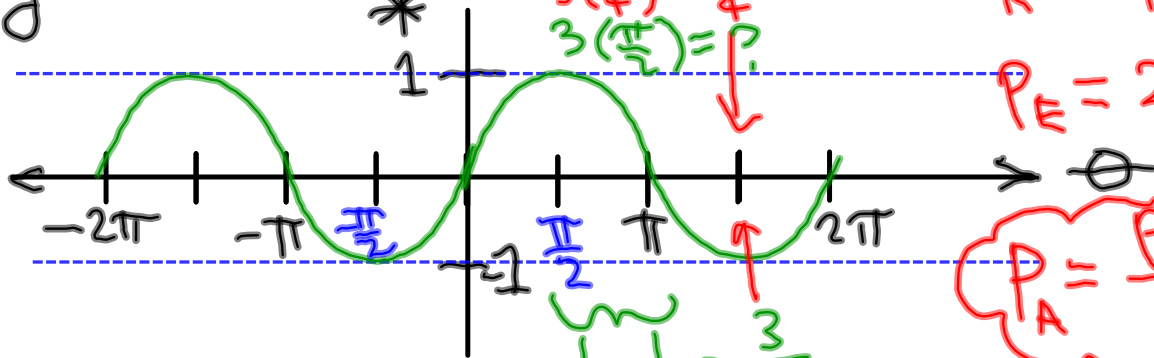
$$\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$$

$$\frac{\pi}{2} + \pi = ?$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



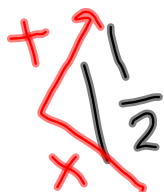
$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$



## 6.5 SHIFTING SINE & COSINE

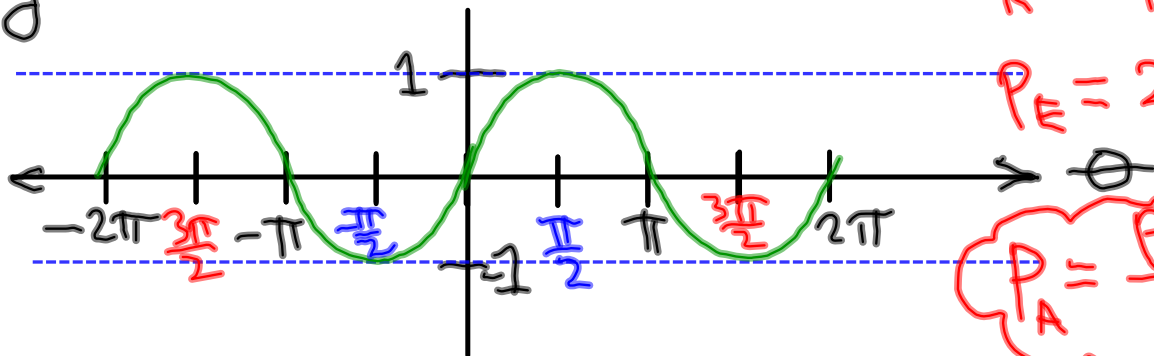
$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$

$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$



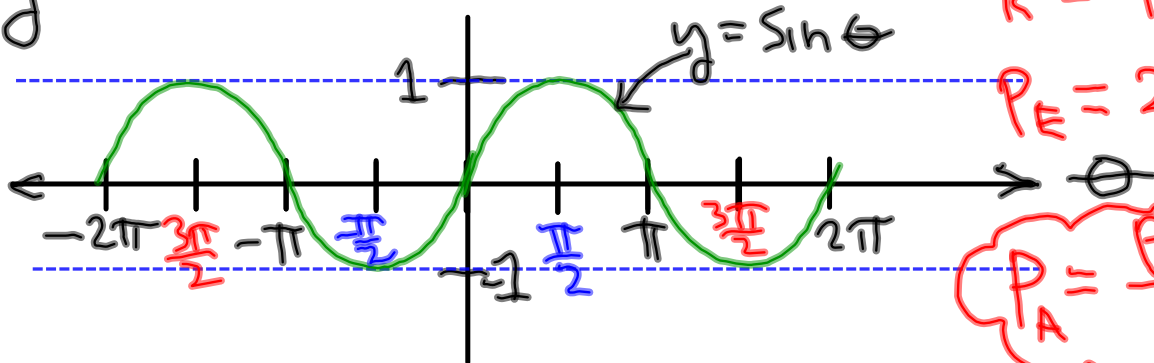
$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

## 6.5 SHIFTING SINE & COSINE

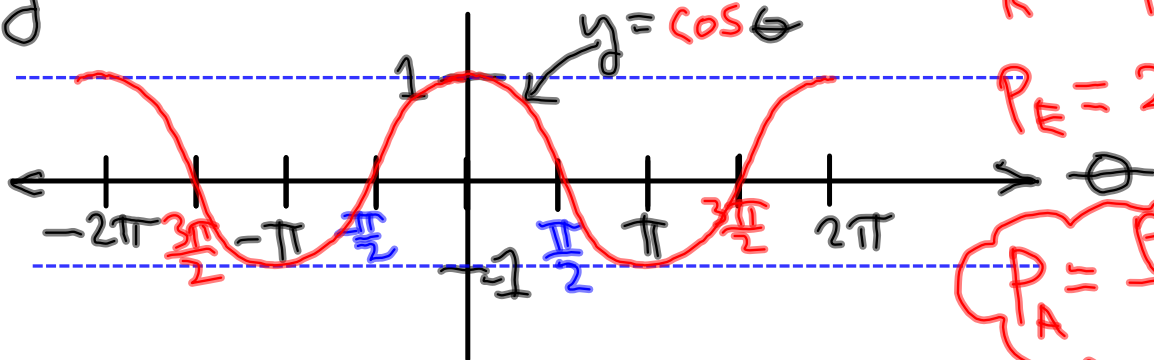
$$y = A \cos(k\theta + c) + h$$

$$y = \cos \theta$$

$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

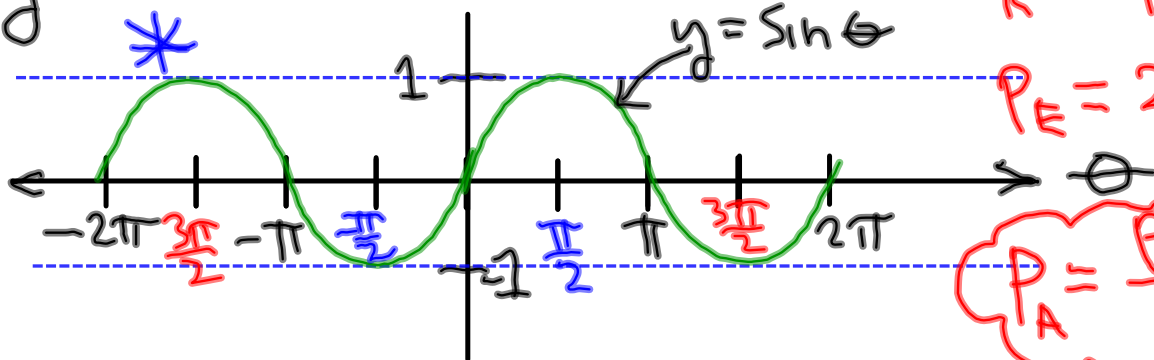
$$P_A = 2\pi$$

# Changing Amplitude

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin \theta$$



$$A = 1$$

$$k = 1$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

### 6.5 SHIFTING SINE & COSINE

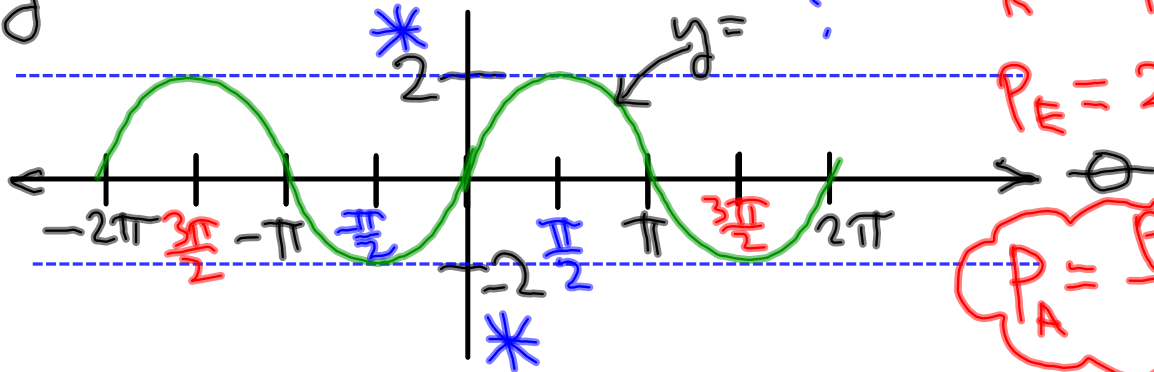
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin \theta$$

$$A = 2$$

$$k = 1$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$



### 6.5 SHIFTING SINE & COSINE

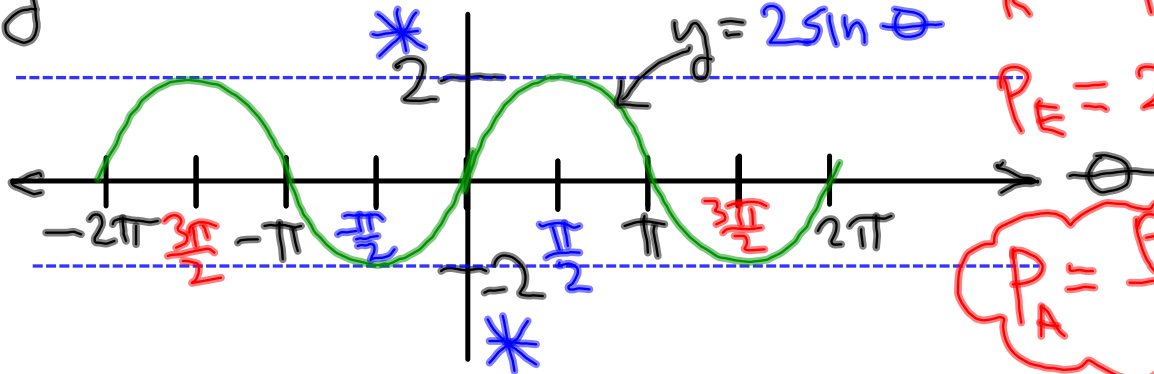
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin \theta$$

$$A = 2$$

$$k = 1$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = 2\pi$$

**Changes in "k" which changes Period**

$$P_A = \frac{P_E}{k}$$

## 6.5 SHIFTING SINE & COSINE

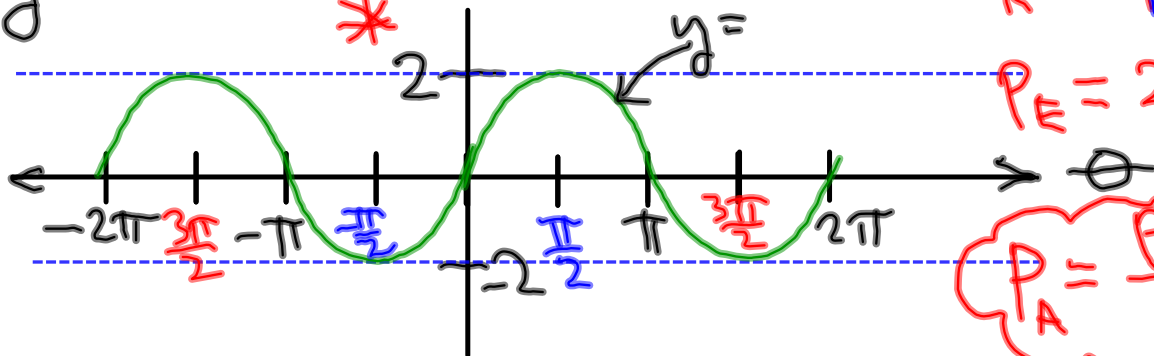
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



PERCALCULATE  ~~$P_A = 2\pi$~~

## 6.5 SHIFTING SINE & COSINE

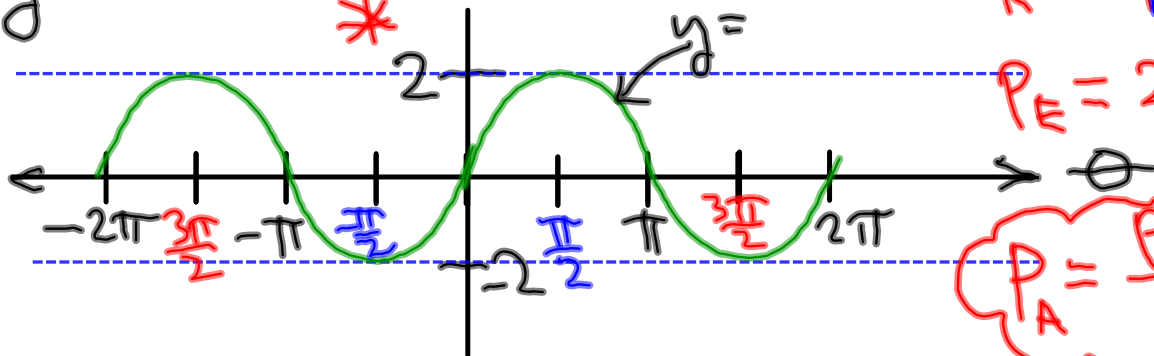
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{2\pi}{4}$$

$$P_A = \frac{P_E}{k}$$

### 6.5 SHIFTING SINE & COSINE

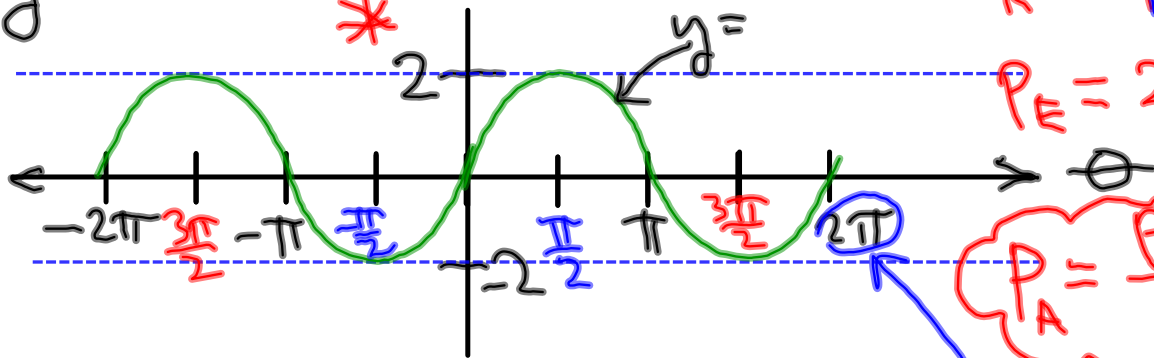
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{2\pi}{4} \therefore P_A = \pi$$

\*

### 6.5 SHIFTING SINE & COSINE

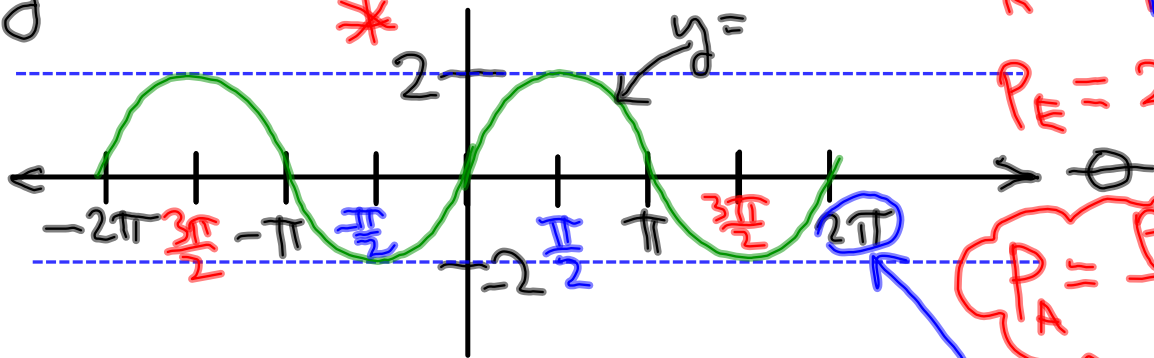
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{2\pi}{4} \therefore P_A = \frac{\pi}{2}$$

### 6.5 SHIFTING SINE & COSINE

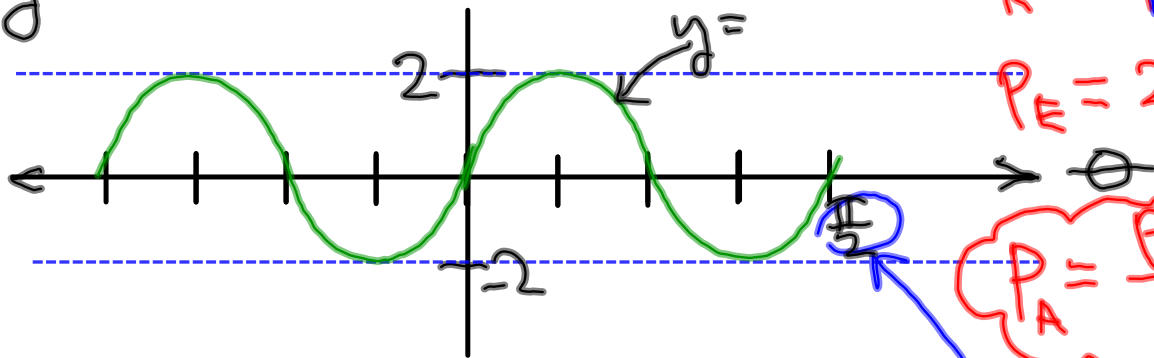
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$\therefore P_A = \frac{\pi}{2}$$

\*

### 6.5 SHIFTING SINE & COSINE

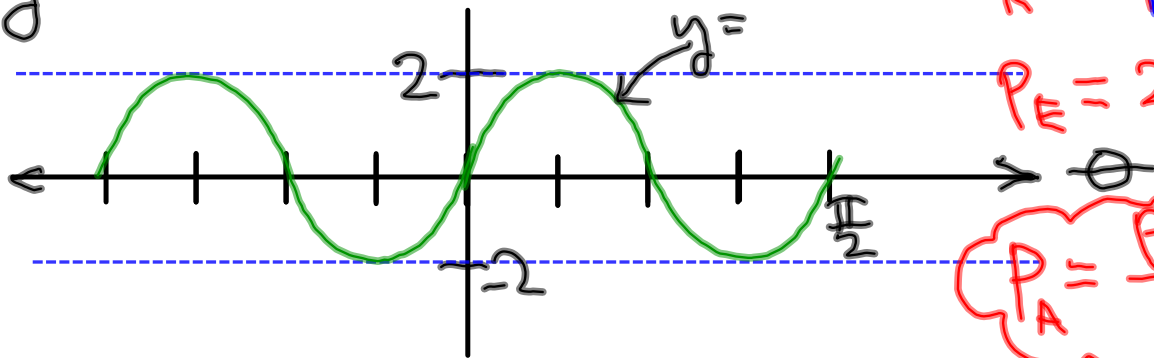
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$



## 6.5 SHIFTING SINE & COSINE

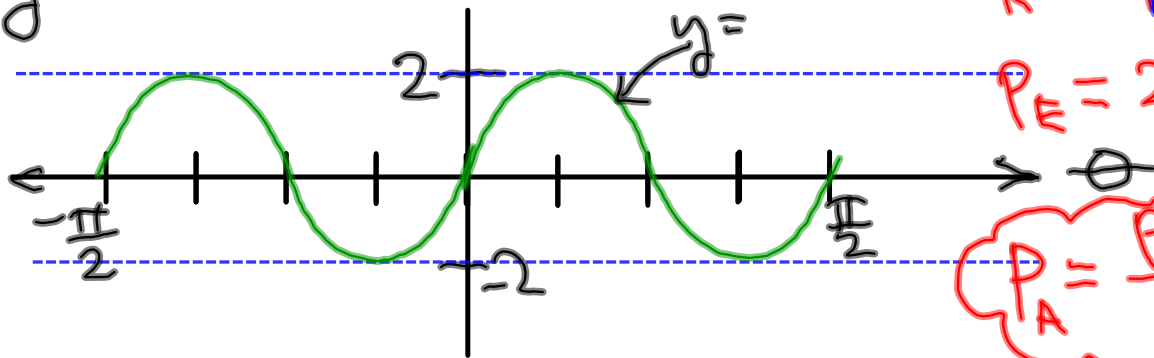
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

### 6.5 SHIFTING SINE & COSINE

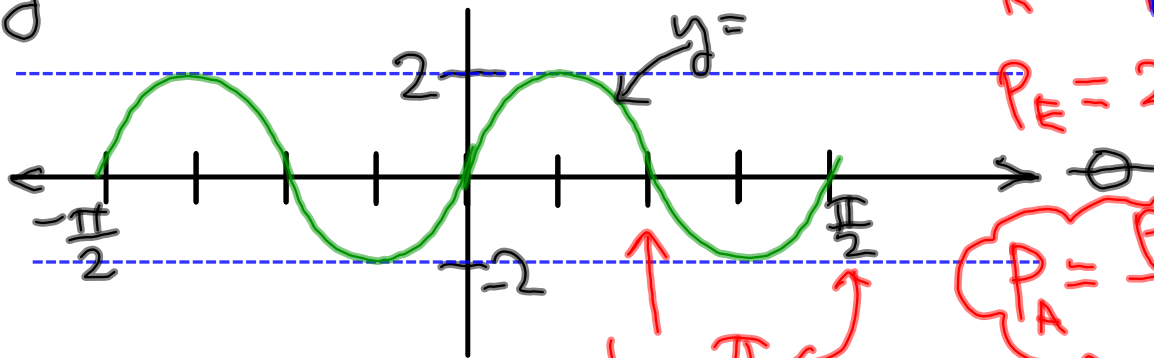
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

### 6.5 SHIFTING SINE & COSINE

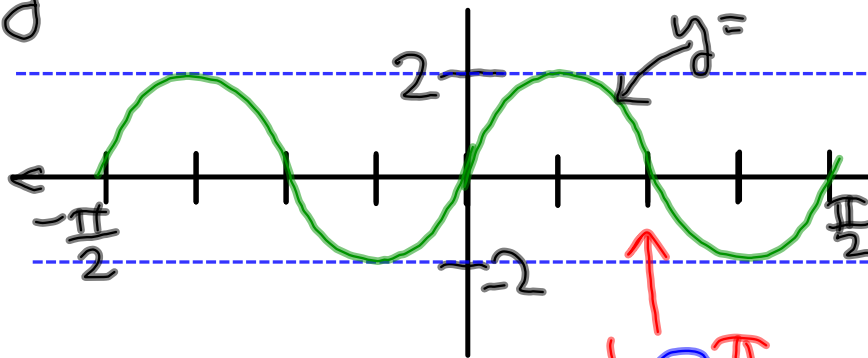
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

### 6.5 SHIFTING SINE & COSINE

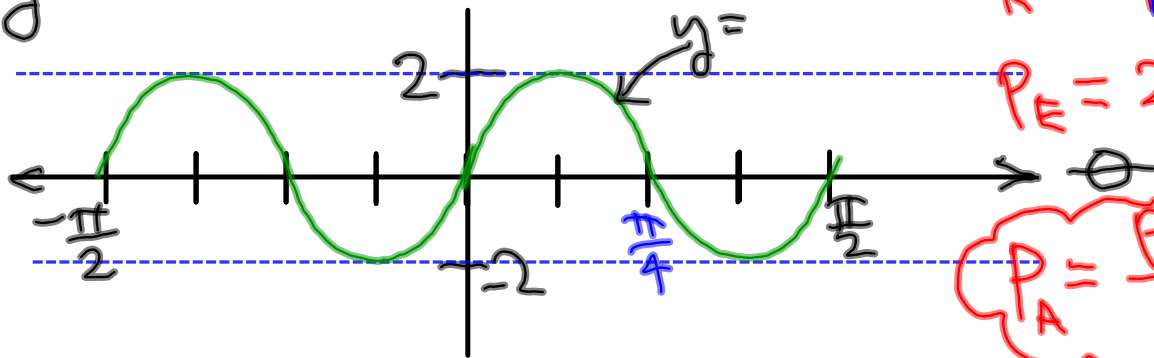
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

## 6.5 SHIFTING SINE & COSINE

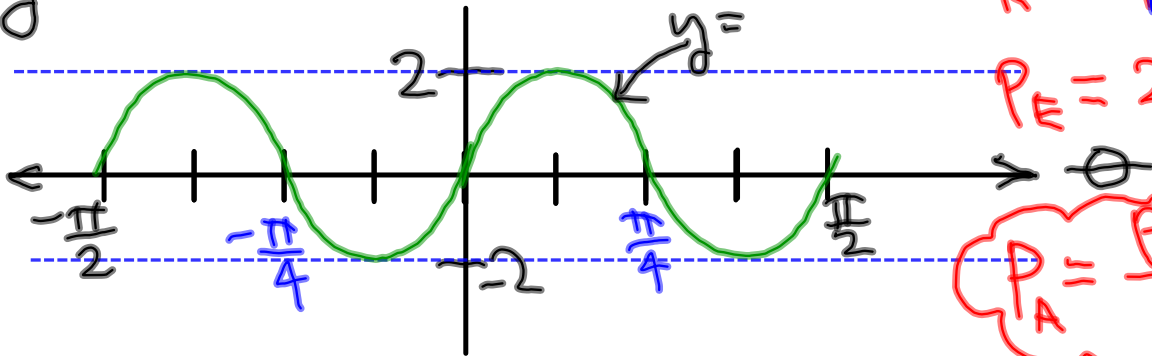
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

### 6.5 SHIFTING SINE & COSINE

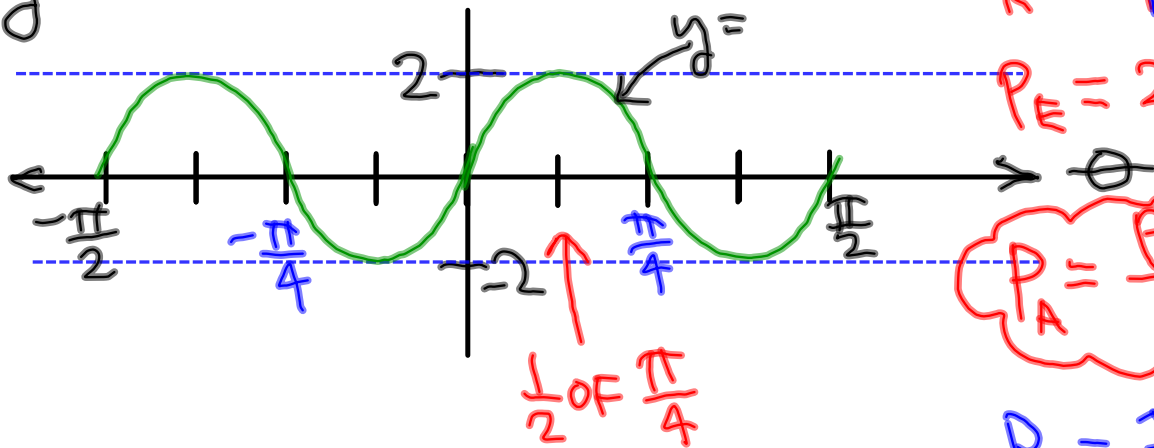
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

## 6.5 SHIFTING SINE & COSINE

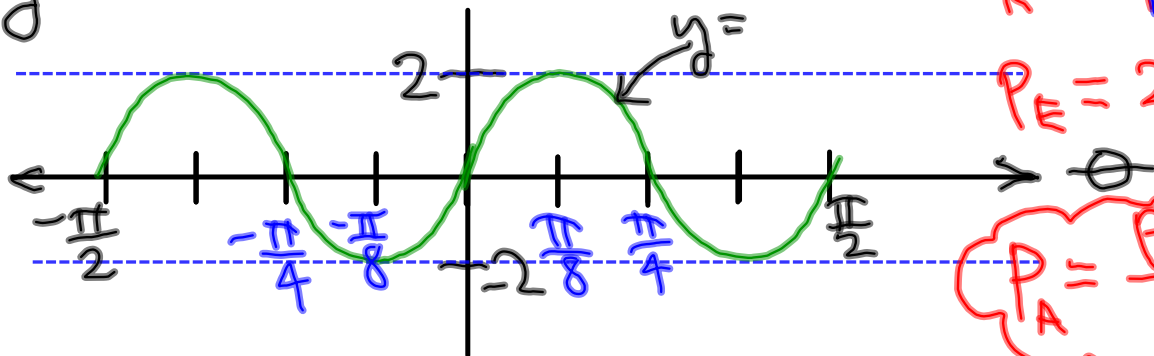
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

## 6.5 SHIFTING SINE & COSINE

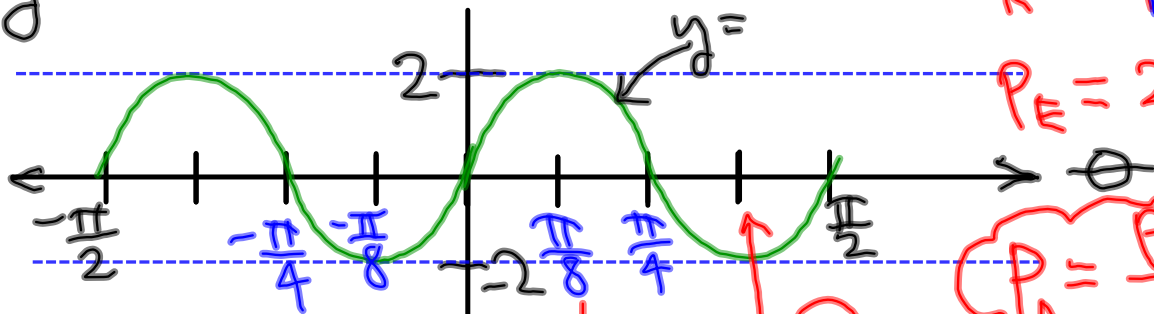
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$3\left(\frac{\pi}{8}\right) =$$

3/4 OF THE WAY

$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$



## 6.5 SHIFTING SINE & COSINE

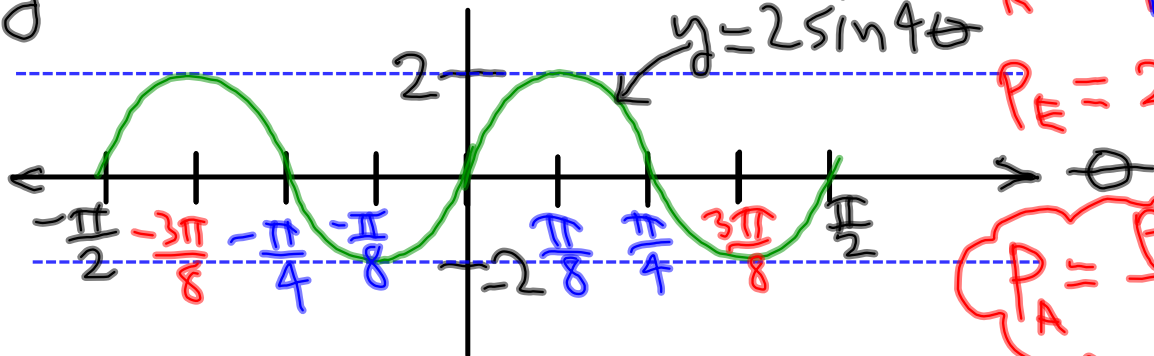
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin 4\theta$$

$$A = 2$$

$$k = 4$$

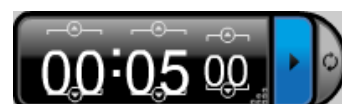
$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

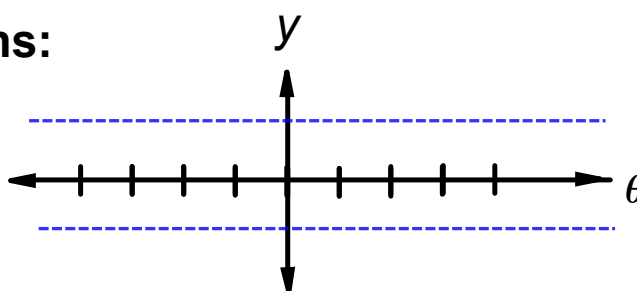
$$P_A = \frac{\pi}{2}$$

# Exit Exam

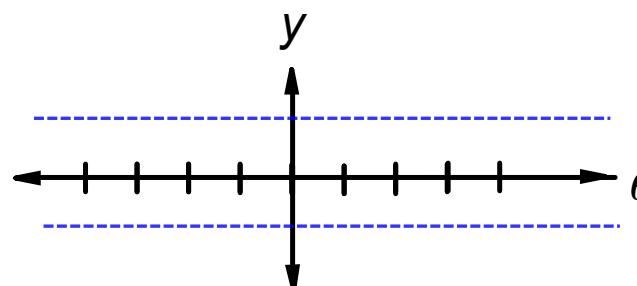


Sketch The Functions:

1)  $y = \sin \theta$



2)  $y = 3 \cos 2\theta$



## Phase Shift: Shifting Horizontally

$$- \frac{c}{k}$$

## 6.5 SHIFTING SINE & COSINE

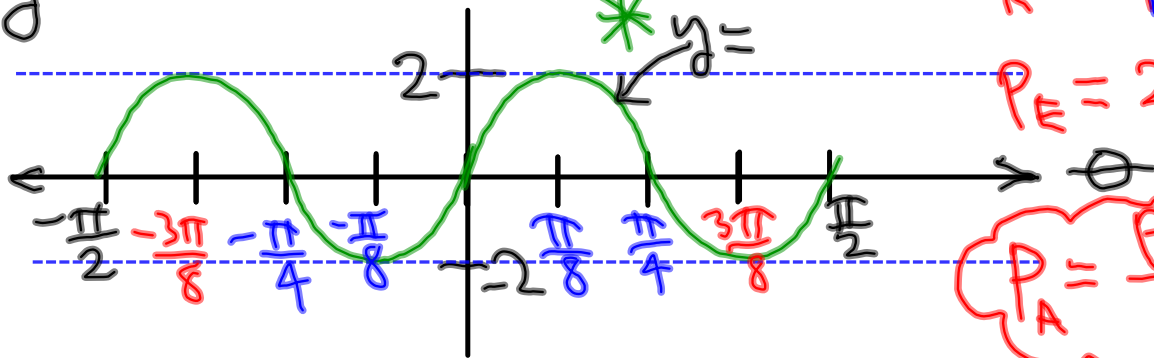
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

PHASE SHIFT  $\} * \sim \frac{c}{k}$

### 6.5 SHIFTING SINE & COSINE

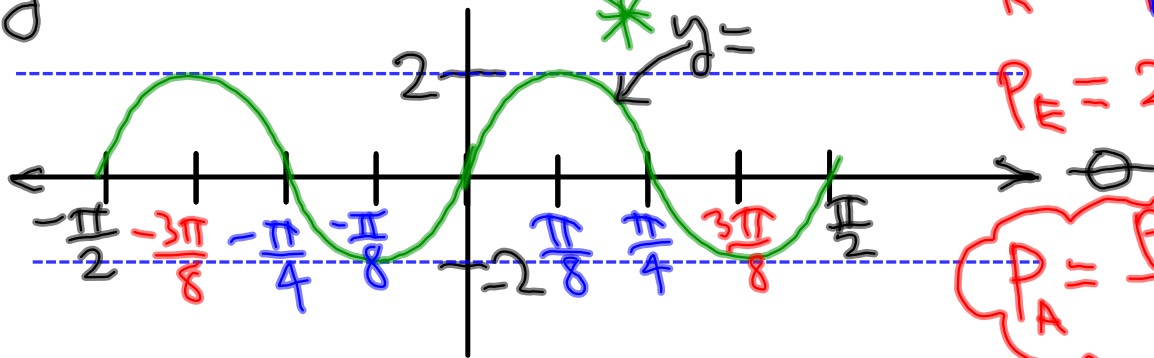
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

$$-\left(\frac{\pi}{4}\right) \text{ PHASE SHIFT } * \frac{c}{k}$$

### 6.5 SHIFTING SINE & COSINE

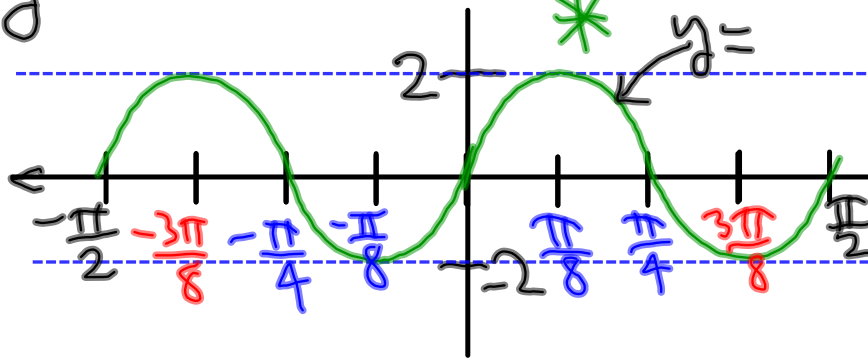
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

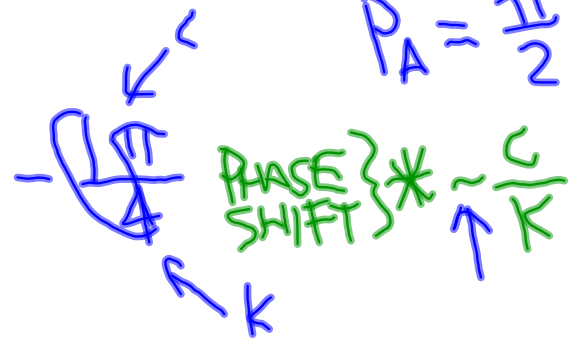
$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$



## 6.5 SHIFTING SINE & COSINE

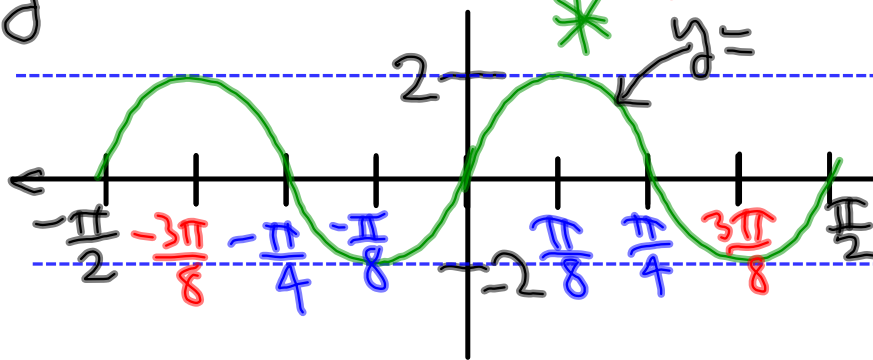
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

$$-\frac{\pi}{4} \text{ PHASE SHIFT } \left. \begin{array}{l} * \\ \uparrow \end{array} \right\} \sim \frac{c}{k}$$

## 6.5 SHIFTING SINE & COSINE

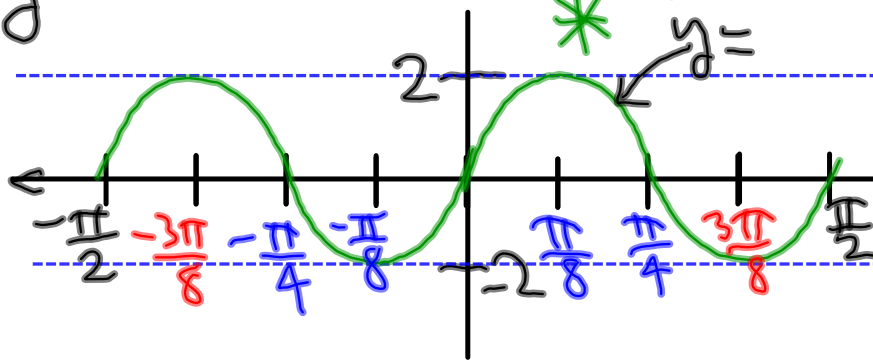
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

$$\leftarrow -\frac{\pi}{4} \text{ PHASE SHIFT } \} * \sim \frac{c}{k}$$



## 6.5 SHIFTING SINE & COSINE

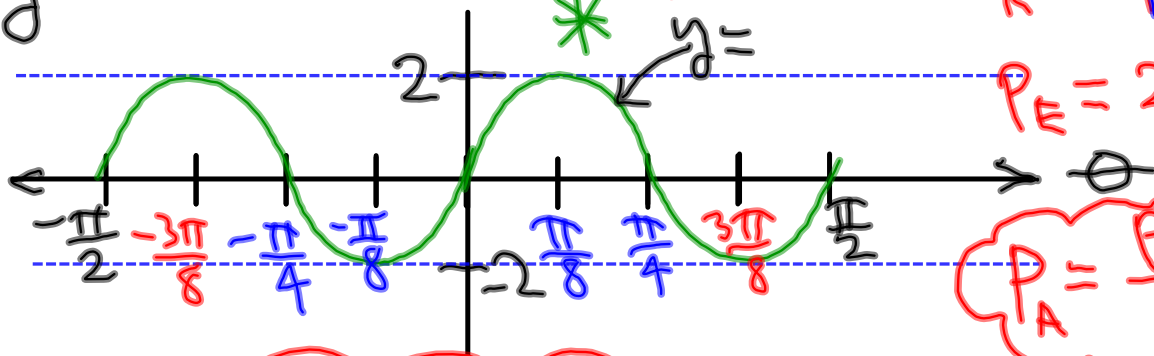
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

FIGURE OUT HOW FAR  $\frac{\pi}{2}$  IS ON THE HORIZ. AXIS

$$-\frac{\pi}{A} \text{ PHASE SHIFT } \sim \frac{c}{k}$$

## 6.5 SHIFTING SINE & COSINE

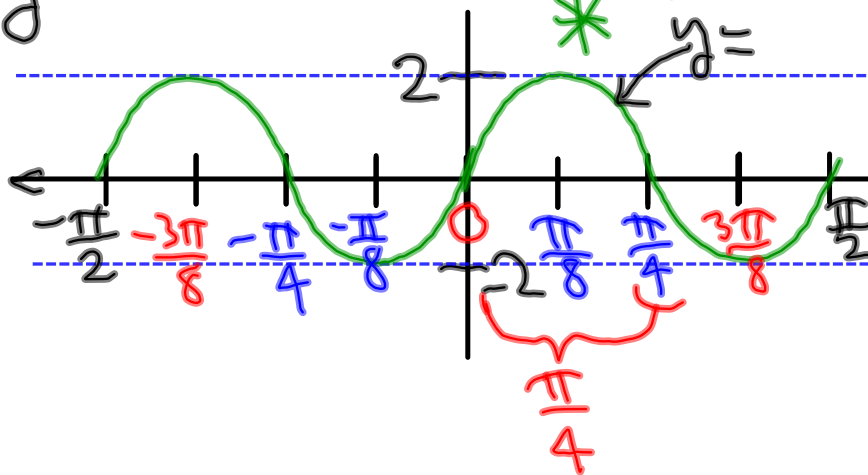
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

←  $-\frac{\pi}{4}$  PHASE SHIFT  $\} * \sim \frac{c}{k}$

## 6.5 SHIFTING SINE & COSINE

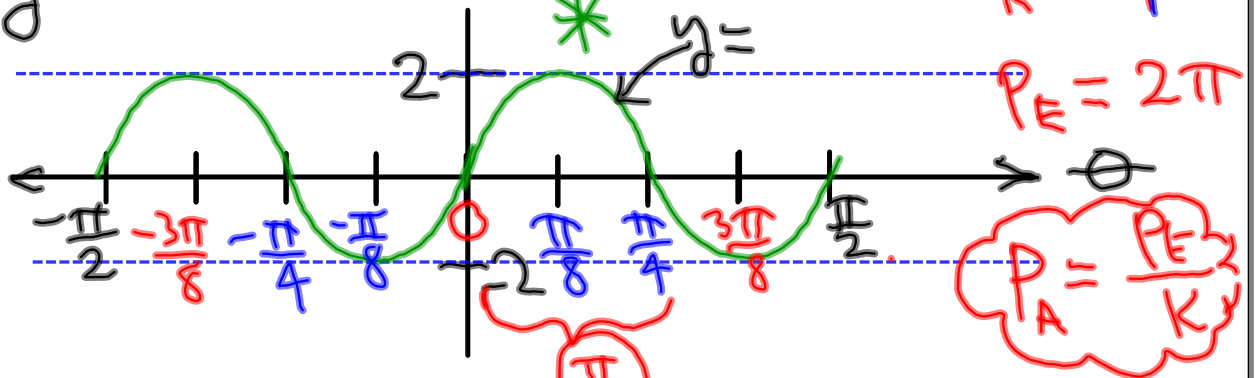
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



TAKE EVERY POINT  
OF WAVE AND MOVE  
IT THAT DISTANCE  
(IN THIS DIRECTION)

$$-\frac{\pi}{4} \text{ PHASE SHIFT } * \sim \frac{c}{k}$$

$$P_A = \frac{\pi}{2}$$

### 6.5 SHIFTING SINE & COSINE

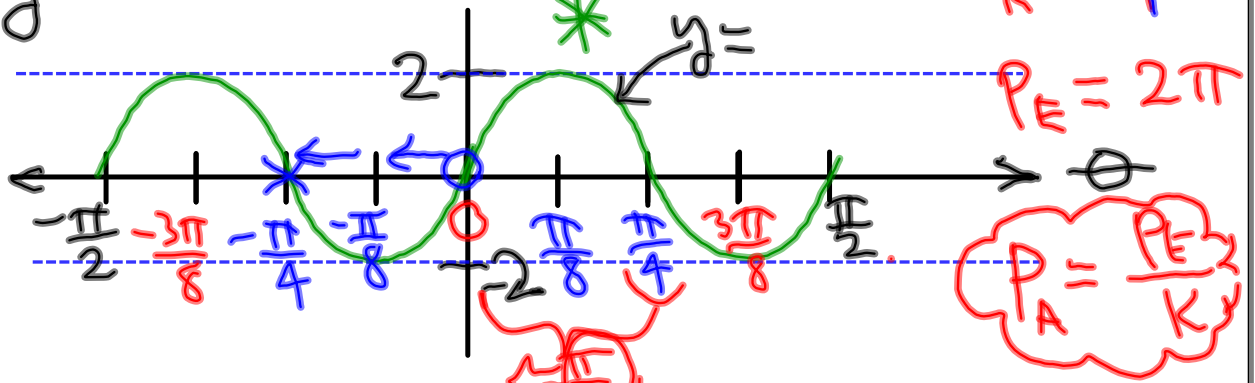
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



TAKE EVERY POINT  
OF WAVE AND MOVE  
IT THAT DISTANCE  
(IN THIS DIRECTION)

$-\frac{\pi}{4}$  PHASE SHIFT  $* \sim \frac{c}{k}$

$$P_A = \frac{\pi}{2}$$

## 6.5 SHIFTING SINE & COSINE

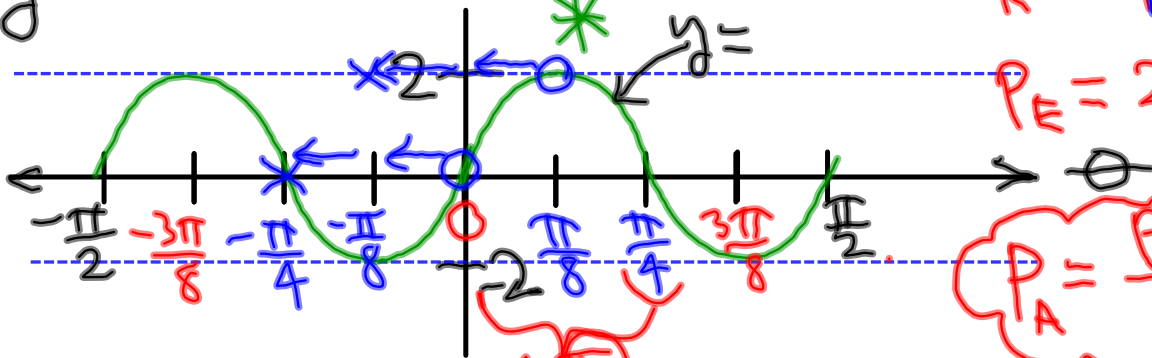
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

TAKE EVERY POINT  
OF WAVE AND MOVE  
IT THAT DISTANCE  
(IN THIS DIRECTION)

$$-\frac{\pi}{4} \text{ PHASE SHIFT } \sim \frac{c}{k}$$

## 6.5 SHIFTING SINE & COSINE

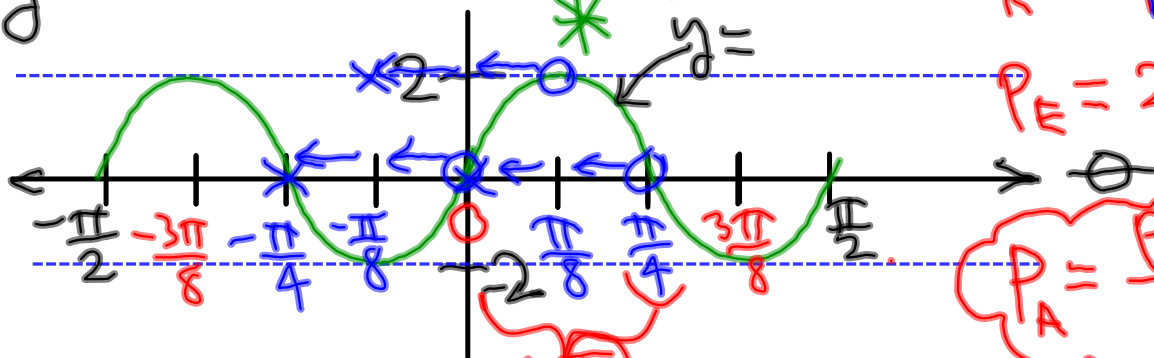
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

TAKE EVERY POINT  
OF WAVE AND MOVE  
IT THAT DISTANCE  
(IN THIS DIRECTION)

$$-\frac{\pi}{4} \text{ PHASE SHIFT } \sim \frac{c}{k}$$

## 6.5 SHIFTING SINE & COSINE

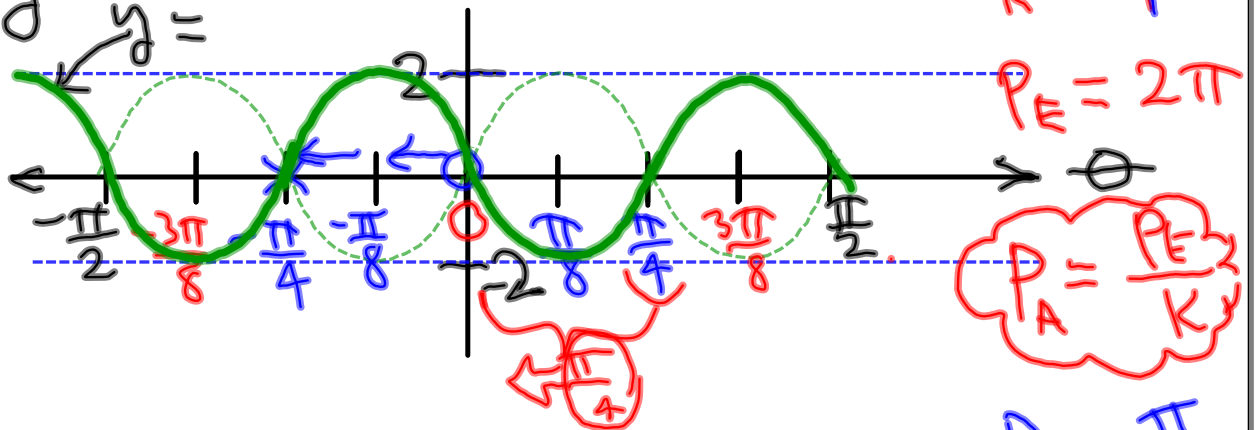
$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{\pi}{2}$$

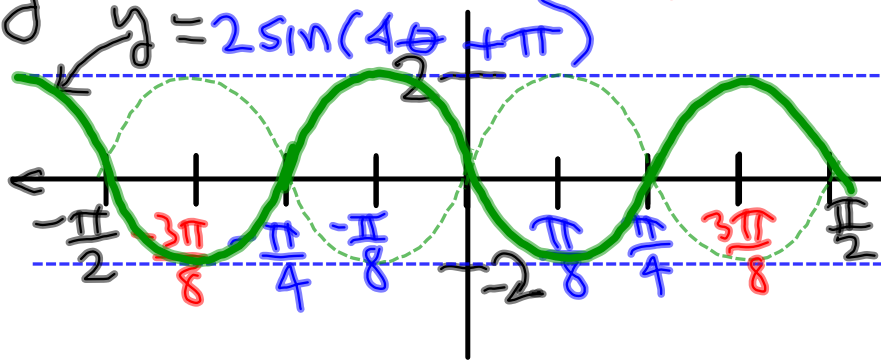
$$\leftarrow -\frac{\pi}{4} \text{ PHASE SHIFT } * \sim \frac{c}{k}$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi)$$

$$y = 2 \sin(4\theta + \pi)$$



$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{K}$$

$$P_A = \frac{\pi}{2}$$

$$\left\langle -\frac{\pi}{4} \text{ PHASE SHIFT} \right\rangle * \sim \frac{c}{k}$$



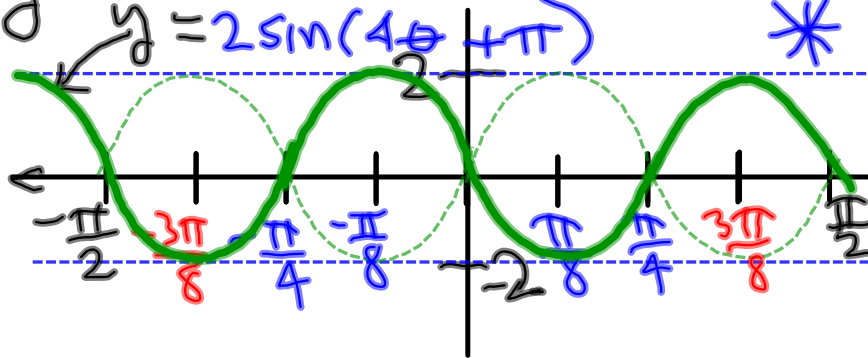
# Shifting Vertically

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi) + 5$$

$$y = 2 \sin(4\theta + \pi) \quad *$$



$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{K}$$

$$P_A = \frac{\pi}{2}$$

PHASE SHIFT } \*  $-\frac{\pi}{4}$

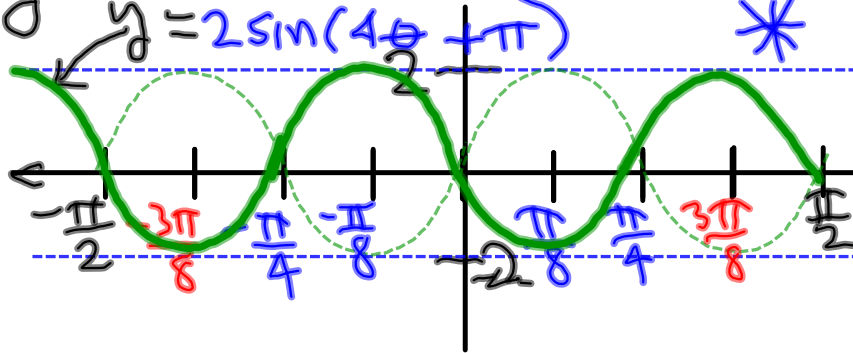
$$* h = 5$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi) + 5 \uparrow$$

$$y = 2 \sin(4\theta + \pi)$$



$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$

$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

PHASE SHIFT } \*  $-\frac{\pi}{4}$

$$* h = 5$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

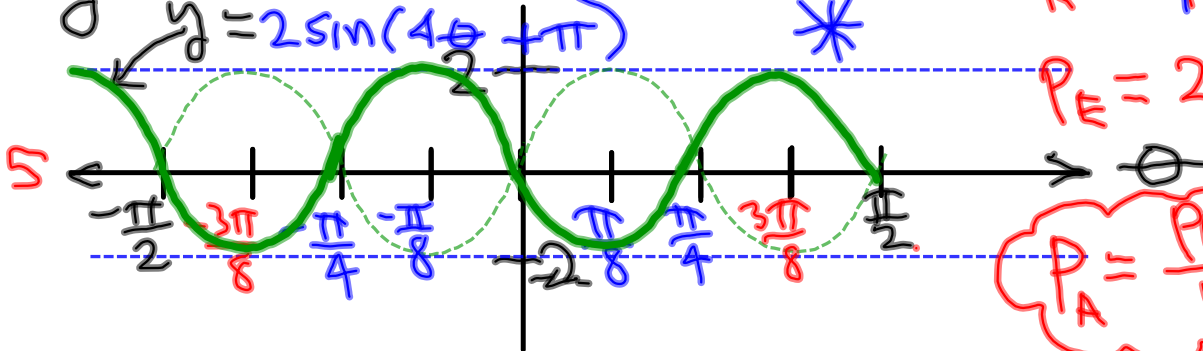
$$y = 2 \sin(4\theta + \pi) + 5 \uparrow$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

$$\text{PHASE SHIFT} \} * -\frac{\pi}{4}$$

$$* h = 5$$

## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

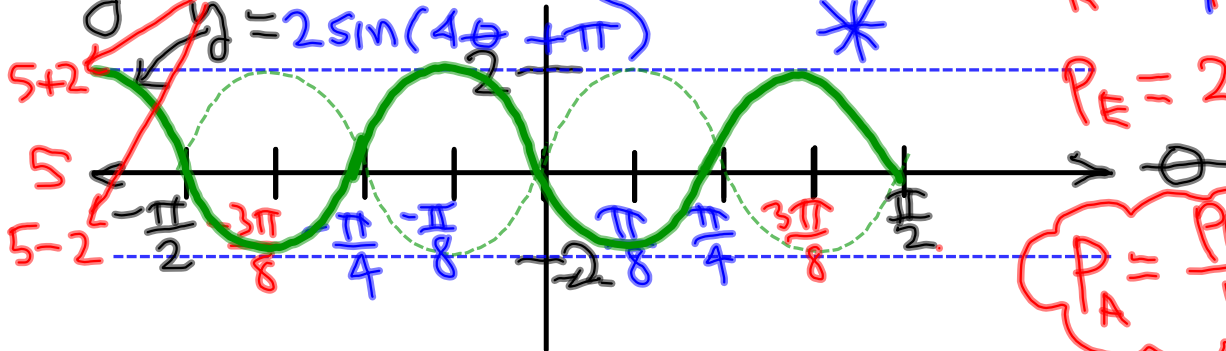
$$y = 2 \sin(4\theta + \pi) + 5$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{\pi}{2}$$

PHASE SHIFT  $\ast - \frac{\pi}{4}$

$$\ast h = 5$$

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

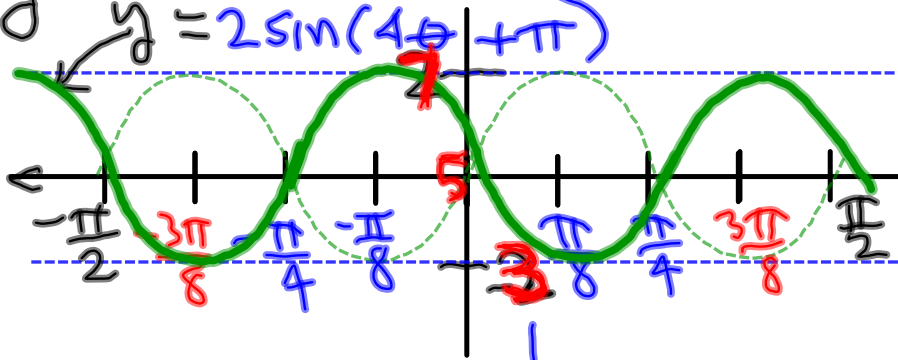
$$y = 2 \sin(4\theta + \pi) + 5$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

PHASE SHIFT  $\left\{ \begin{array}{l} * \\ - \frac{\pi}{4} \end{array} \right.$

$$h = 5$$

ZERO!

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

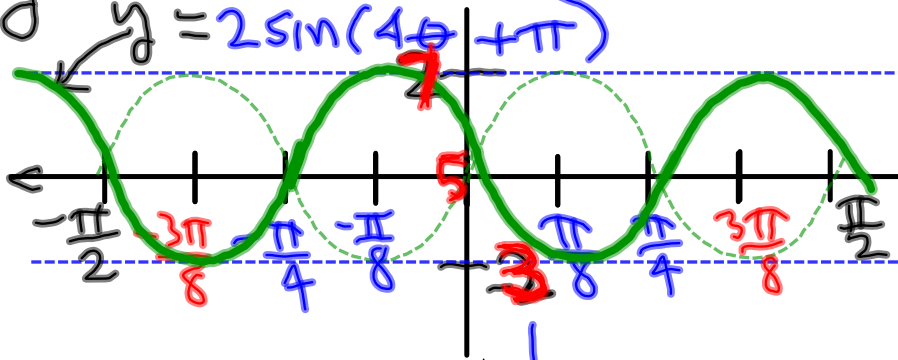
$$y = 2 \sin(4\theta + \pi) + 5$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

PHASE SHIFT \*  $-\frac{\pi}{4}$

$$h = 5$$

### 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

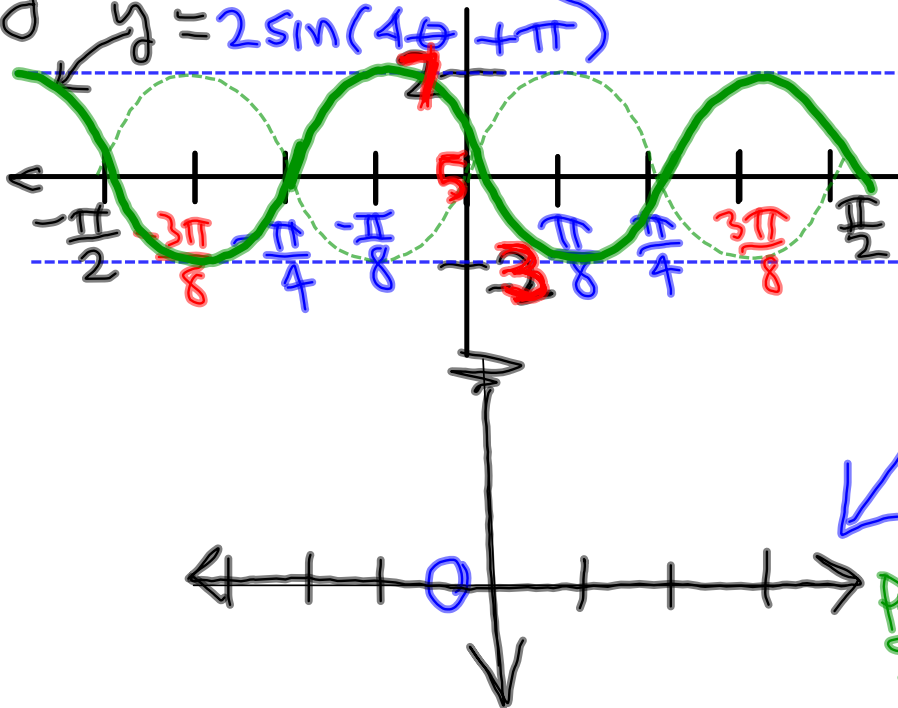
$$y = 2 \sin(4\theta + \pi) + 5$$

$$y = 2 \sin(4\theta + \pi)$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$



$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

PHASE SHIFT  $-\frac{\pi}{4}$

$$h = 5$$



## 6.5 SHIFTING SINE & COSINE

$$y = A \sin(k\theta + c) + h$$

$$y = 2 \sin(4\theta + \pi) + 5$$

$$A = 2$$

$$k = 4$$

$$P_E = 2\pi$$

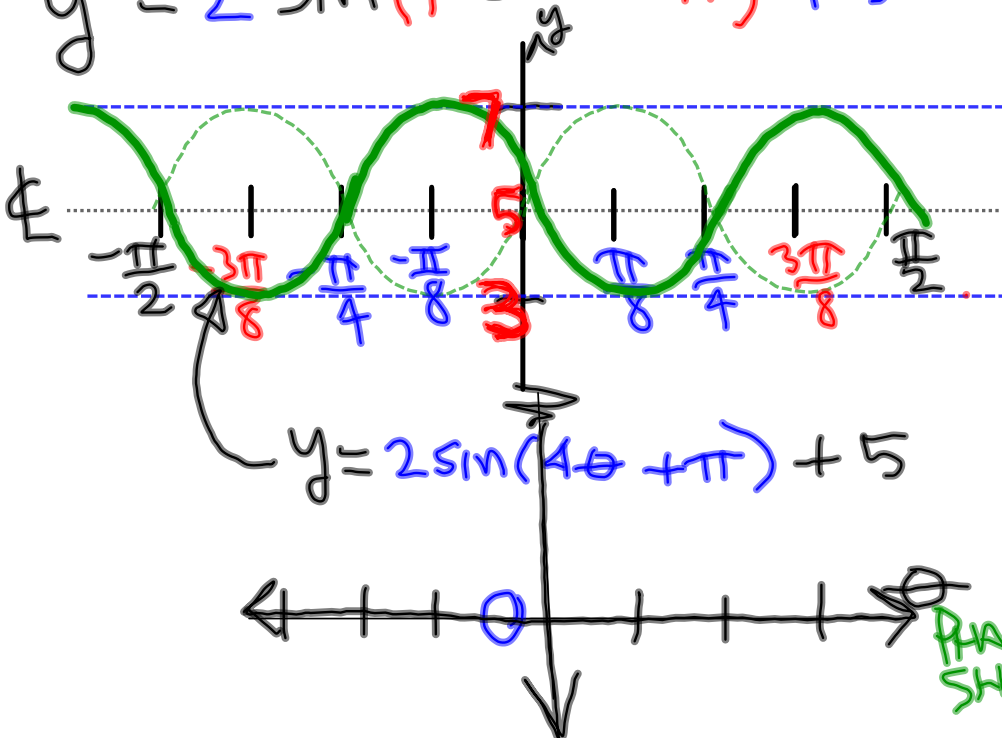
$\phi$

$$P_A = \frac{P_E}{k}$$

$$P_A = \frac{\pi}{2}$$

$$\text{PHASE SHIFT} \} * -\frac{\pi}{4}$$

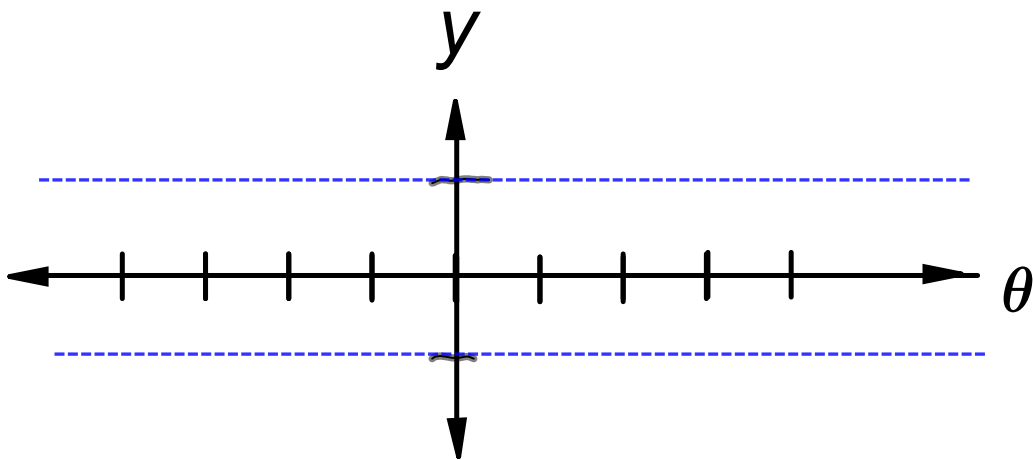
$$h = 5$$



**Practice Problem:**

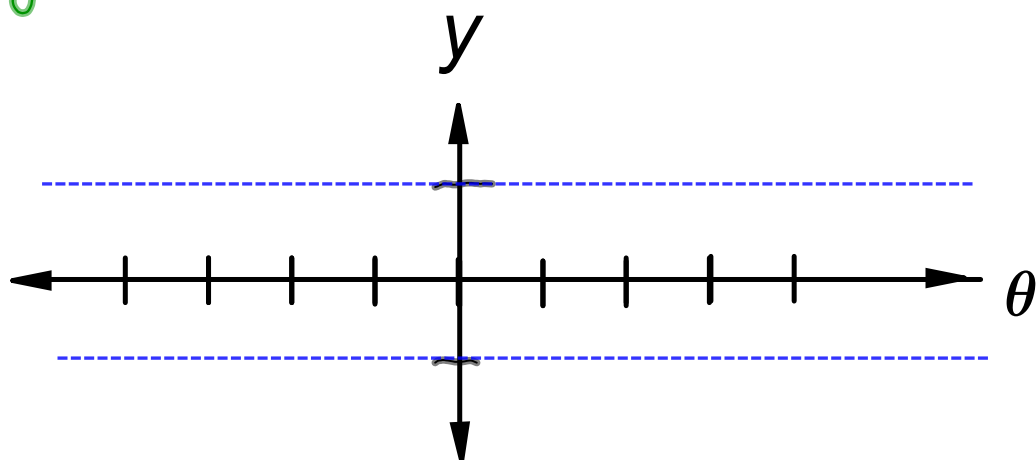
## Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$



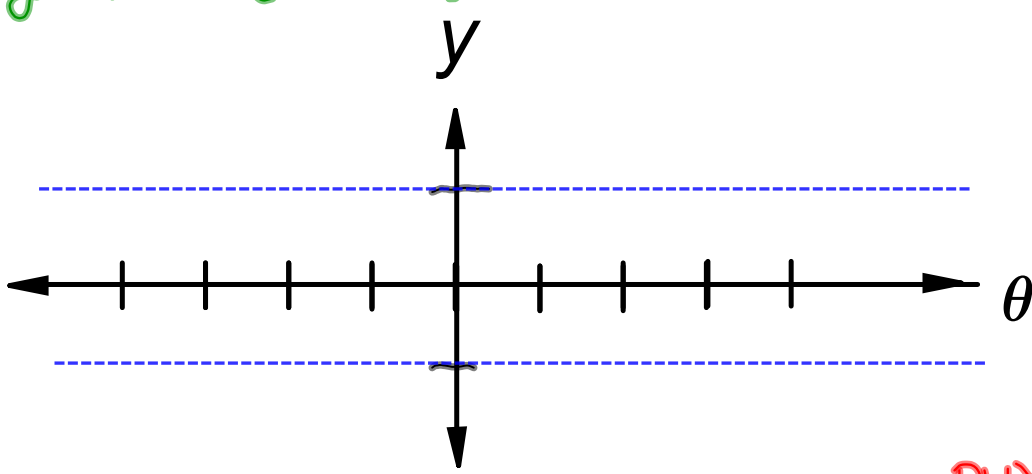
## Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$
$$y = A \cos(K\theta + c) + h$$



# Sketching Graphs of Sinusoidal Synopsis

$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$



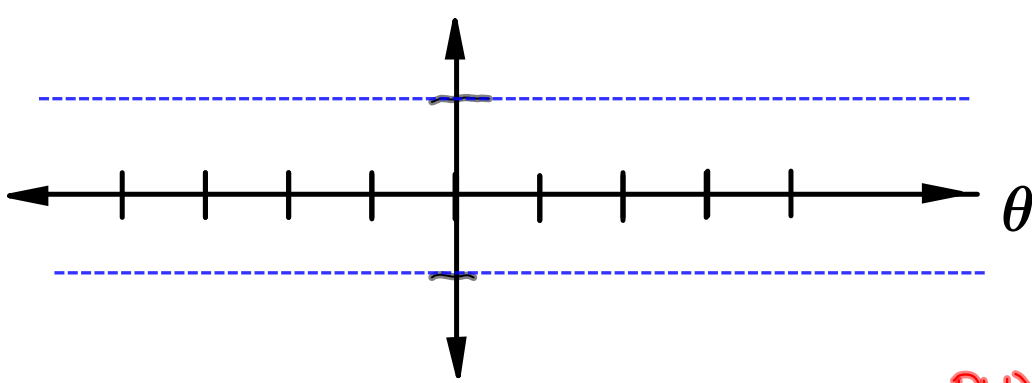
$A =$   
 $K =$   
 $P_E =$   
 $P_A =$   
 $C =$   
PHASE SHIFT:  
 $h =$

# Sketching Graphs of Sinusoidal Synopsis

$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$

$y = A \cos(K\theta + c) + h$

\*



$A = 2$

$K =$

$P_E =$

$P_A =$

$C =$

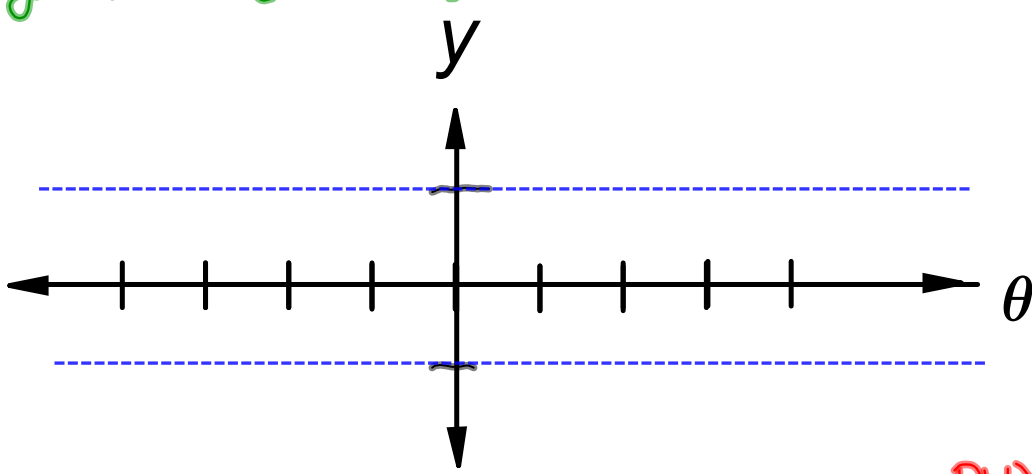
PHASE SHIFT:

$h =$

# Sketching Graphs of Sinusoidal Synopsis

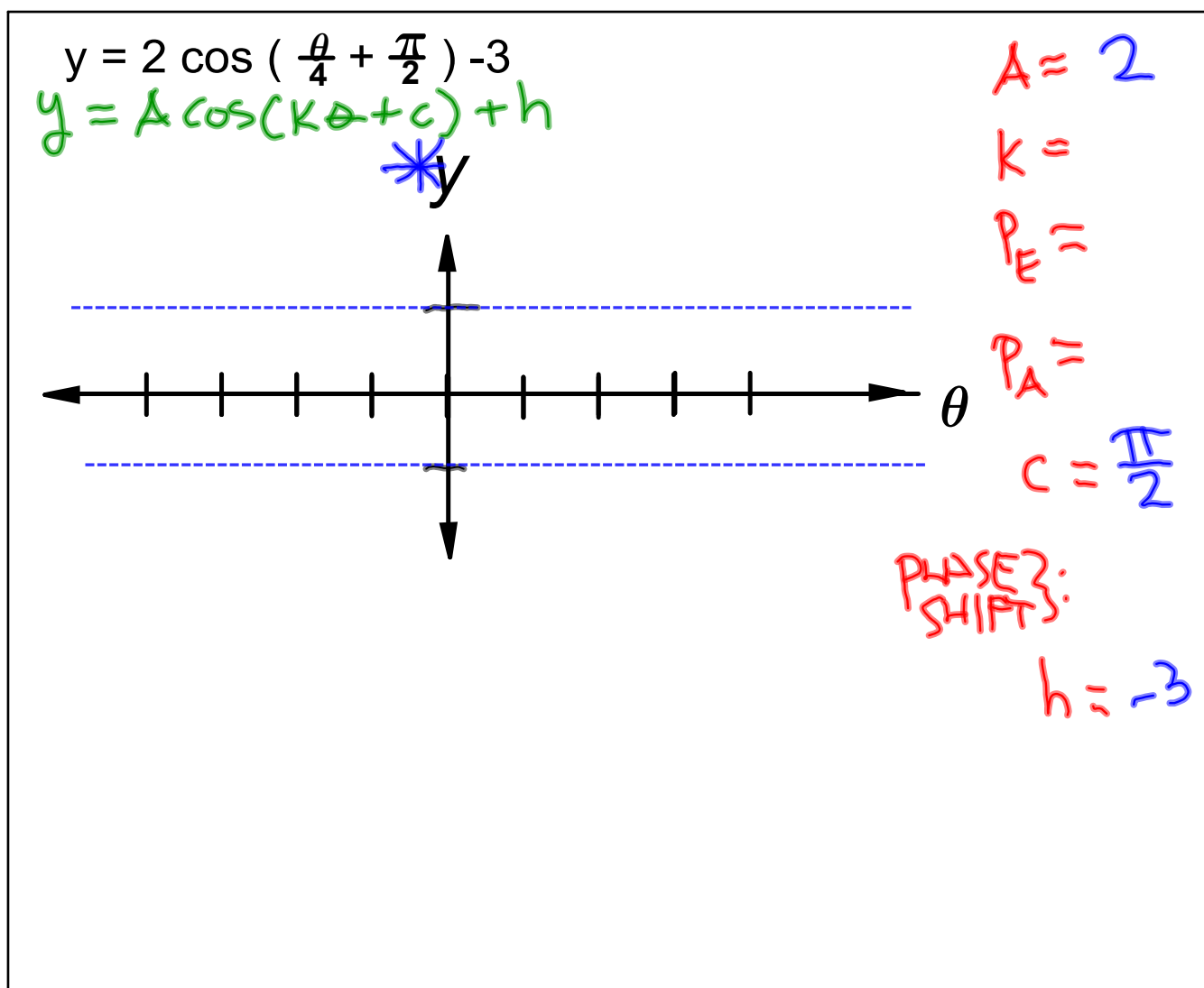
$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$  \*

$y = A \cos(K\theta + c) + h$



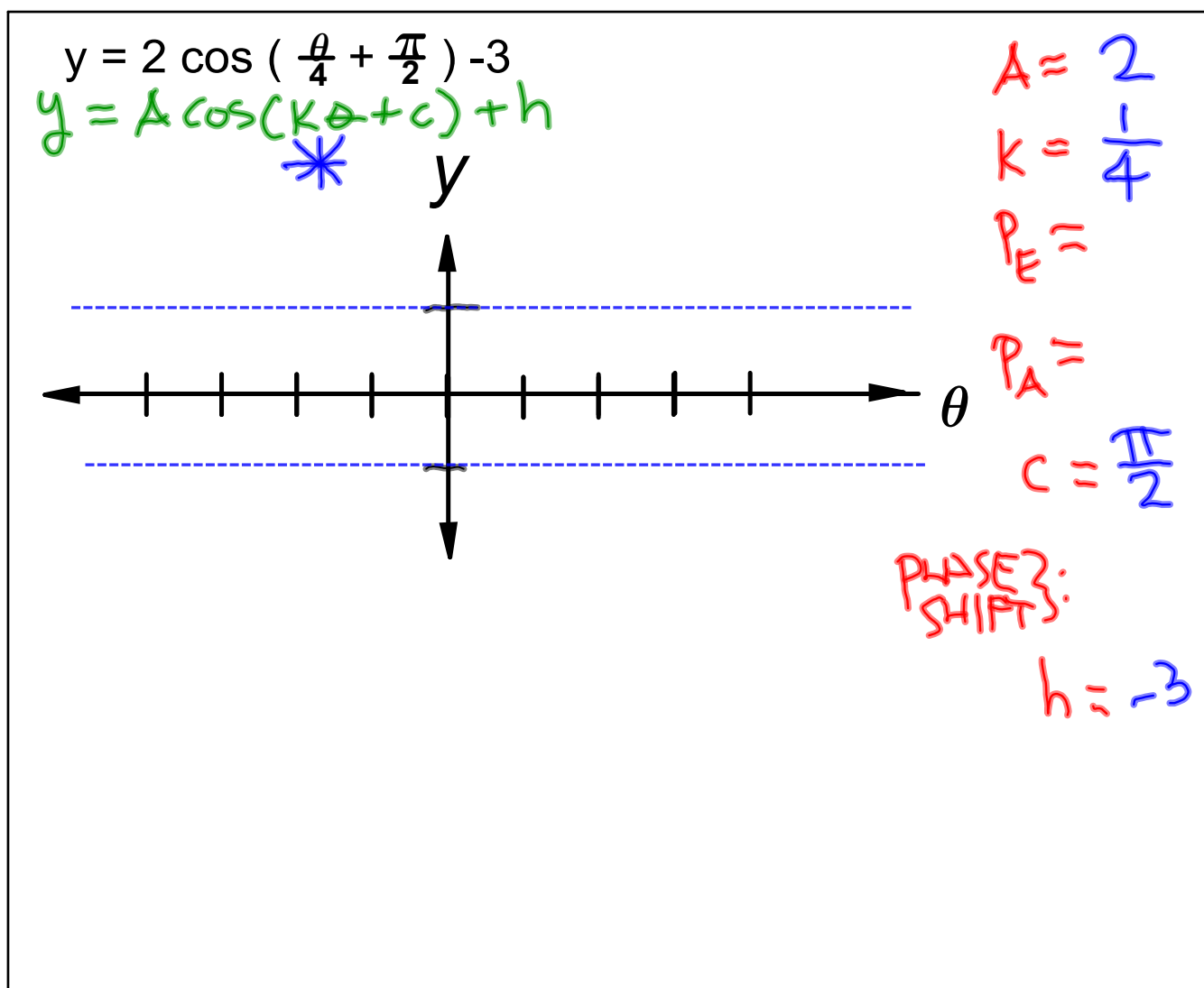
$A = 2$   
 $K =$   
 $P_E =$   
 $P_A =$   
 $C =$   
PHASE SHIFT:  
 $h = -3$

## Sketching Graphs of Sinusoidal Synopsis

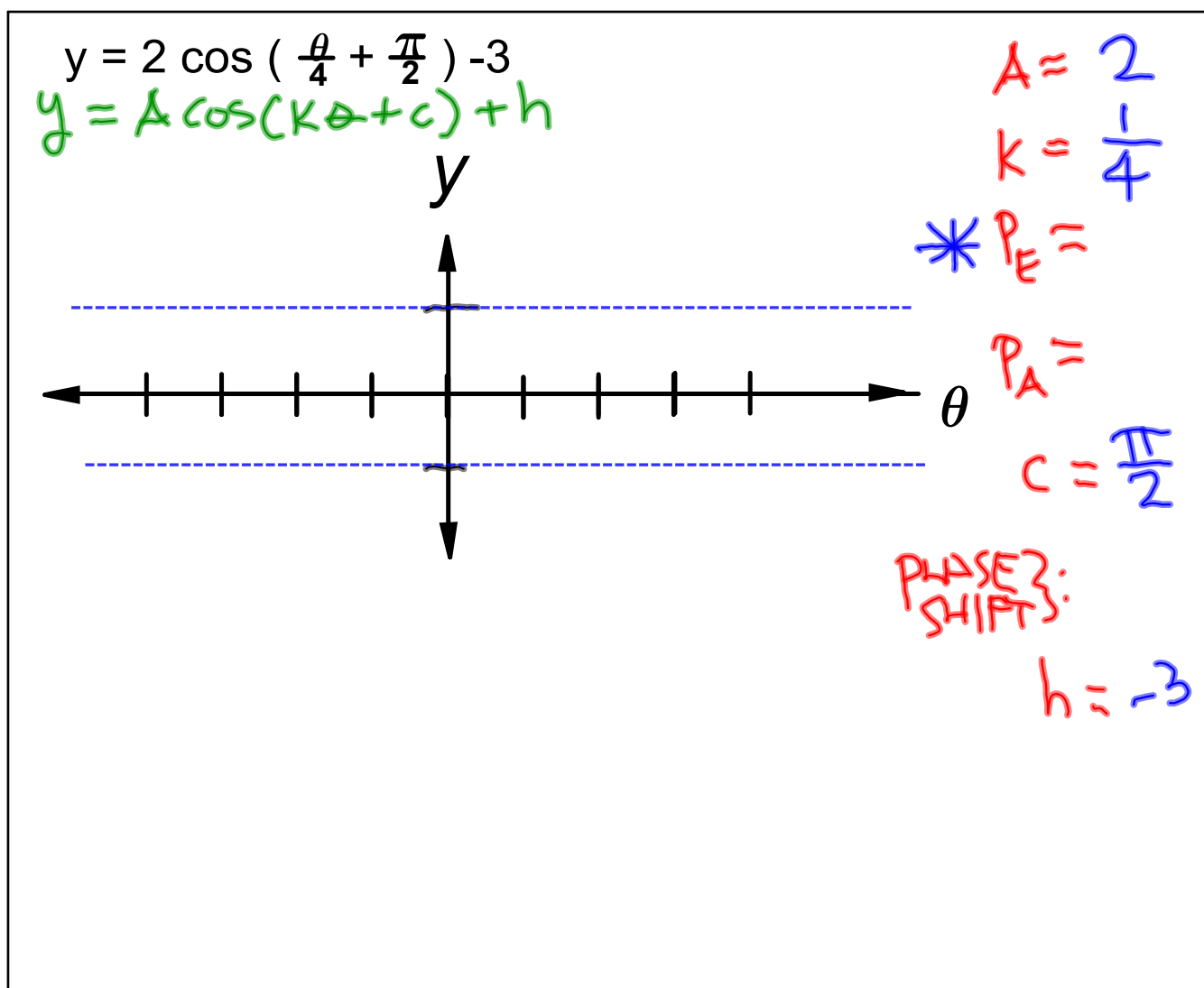




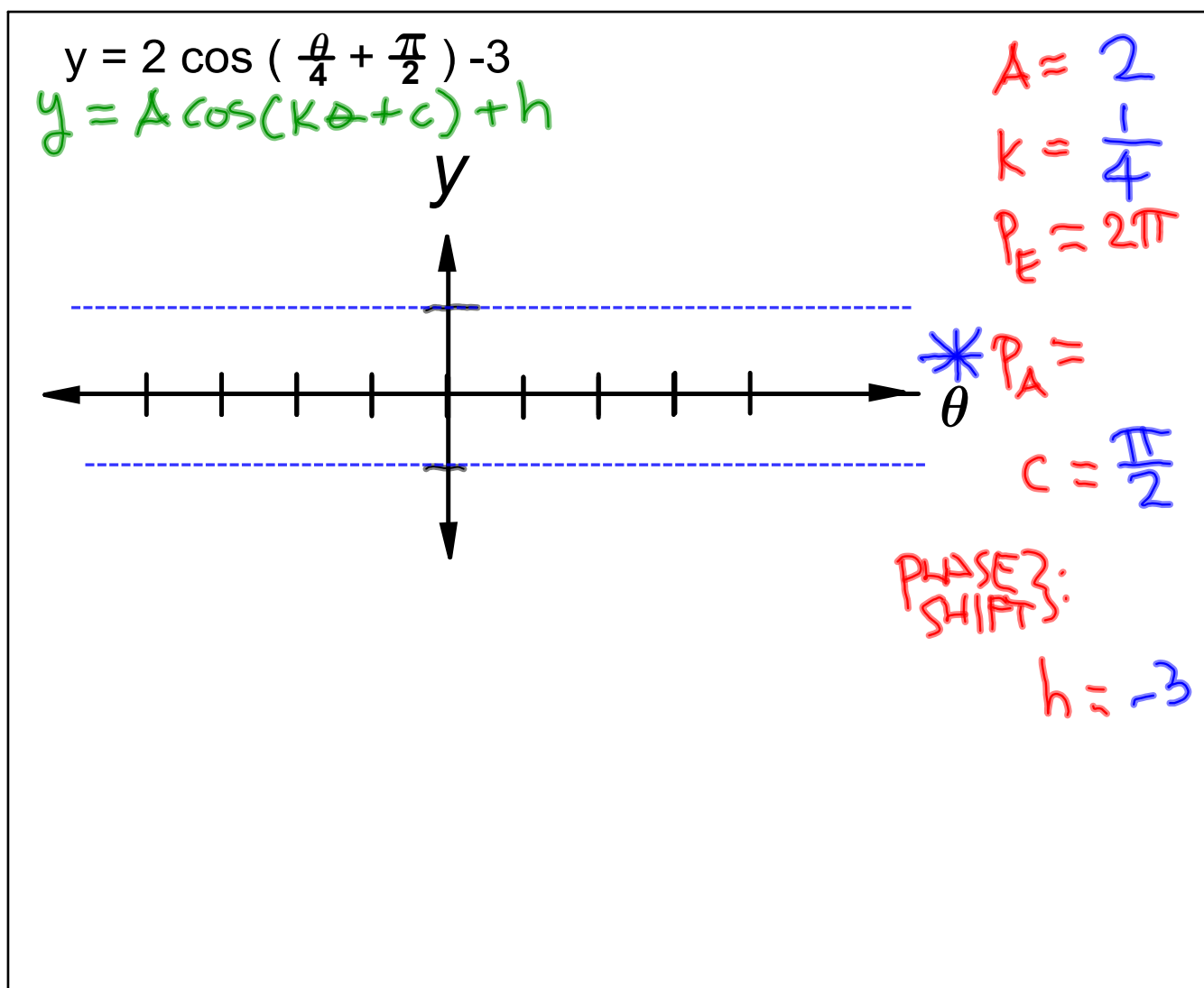
## Sketching Graphs of Sinusoidal Synopsis



## Sketching Graphs of Sinusoidal Synopsis



## Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis

$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$

$A = 2$   
 $K = \frac{1}{4}$   
 $P_E = 2\pi$   
 $P_A =$   
 $C = \frac{\pi}{2}$   
 PHASE SHIFT:  
 $h = -3$

$P_A = \frac{P_E}{K}$   
 $= \frac{2\pi}{\frac{1}{4}}$

# Sketching Graphs of Sinusoidal Synopsis

$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$

$A = 2$   
 $K = \frac{1}{4}$   
 $P_E = 2\pi$   
 $C = \frac{\pi}{2}$   
 $h = -3$

\*  $P_A = \frac{P_E}{K}$   
 $= \frac{2\pi}{\left(\frac{1}{4}\right)}$

PHASE SHIFT:

# Sketching Graphs of Sinusoidal Synopsis

$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$

$A = 2$   
 $K = \frac{1}{4}$   
 $P_E = 2\pi$   
 $P_A =$   
 $c = \frac{\pi}{2}$   
**PHASE SHIFT:**  
 $h = -3$

$P_A = \frac{P_E}{K}$   
 $= \frac{2\pi}{\left(\frac{1}{4}\right)} =$

# Sketching Graphs of Sinusoidal Synopsis

$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$

$A = 2$   
 $K = \frac{1}{4}$   
 $P_E = 2\pi$   
 $P_A = 8\pi$   
 $C = \frac{\pi}{2}$

PHASE SHIFT:  
 $h = -3$

$P_A = \frac{P_E}{K}$   
 $= \frac{2\pi}{\frac{1}{4}} = 8\pi$

# Sketching Graphs of Sinusoidal Synopsis

$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$

$A = 2$   
 $K = \frac{1}{4}$   
 $P_E = 2\pi$   
 $P_A = 8\pi$   
 $C = \frac{\pi}{2}$

PHASE SHIFT:  
 $h = -3$

$P_A = \frac{P_E}{K}$   
 $= \frac{2\pi}{\left(\frac{1}{4}\right)} = 8\pi$



# Sketching Graphs of Sinusoidal Synopsis

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# Sketching Graphs of Sinusoidal Synopsis

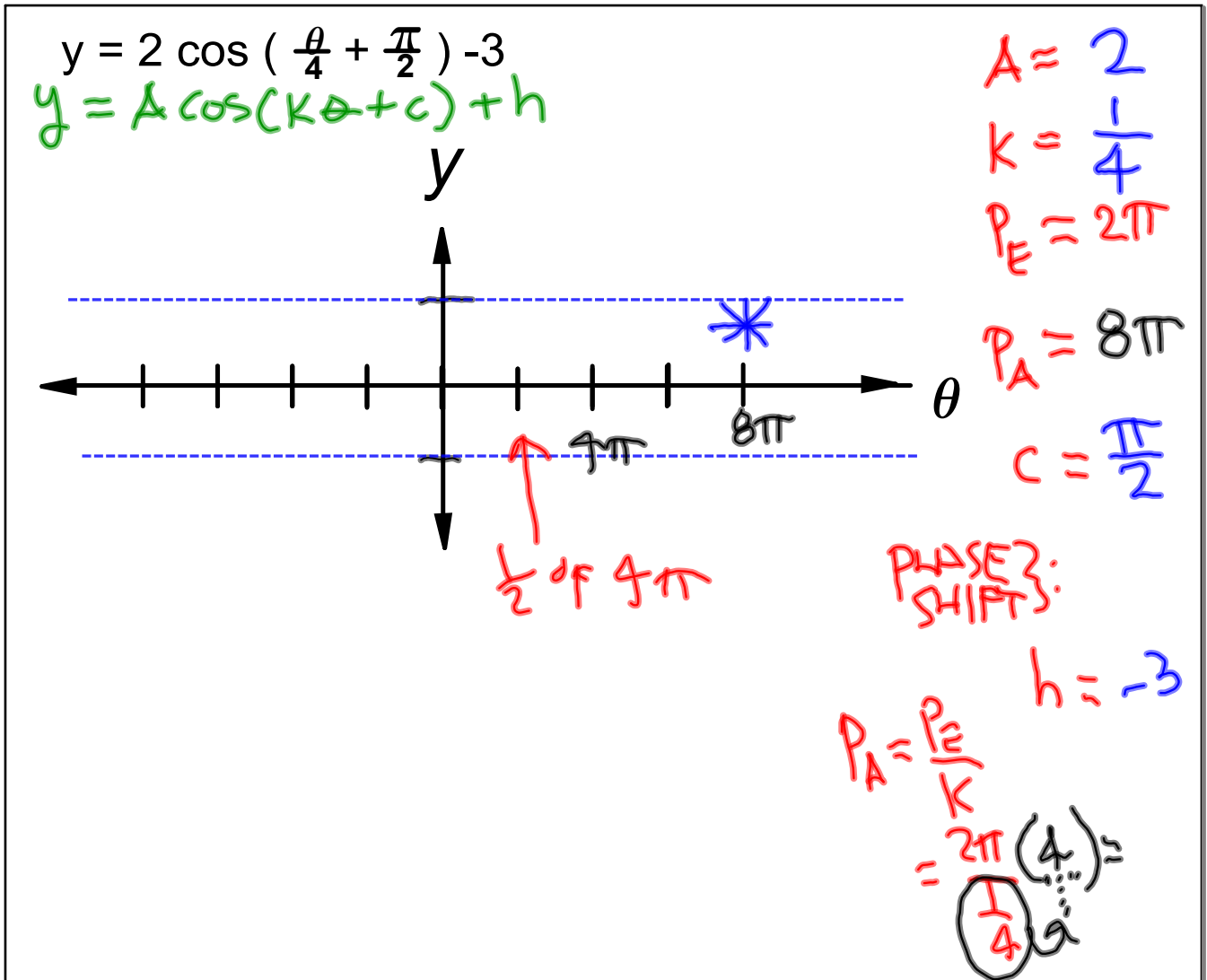
$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$

$A = 2$   
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 $P_A = 8\pi$   
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# Sketching Graphs of Sinusoidal Synopsis

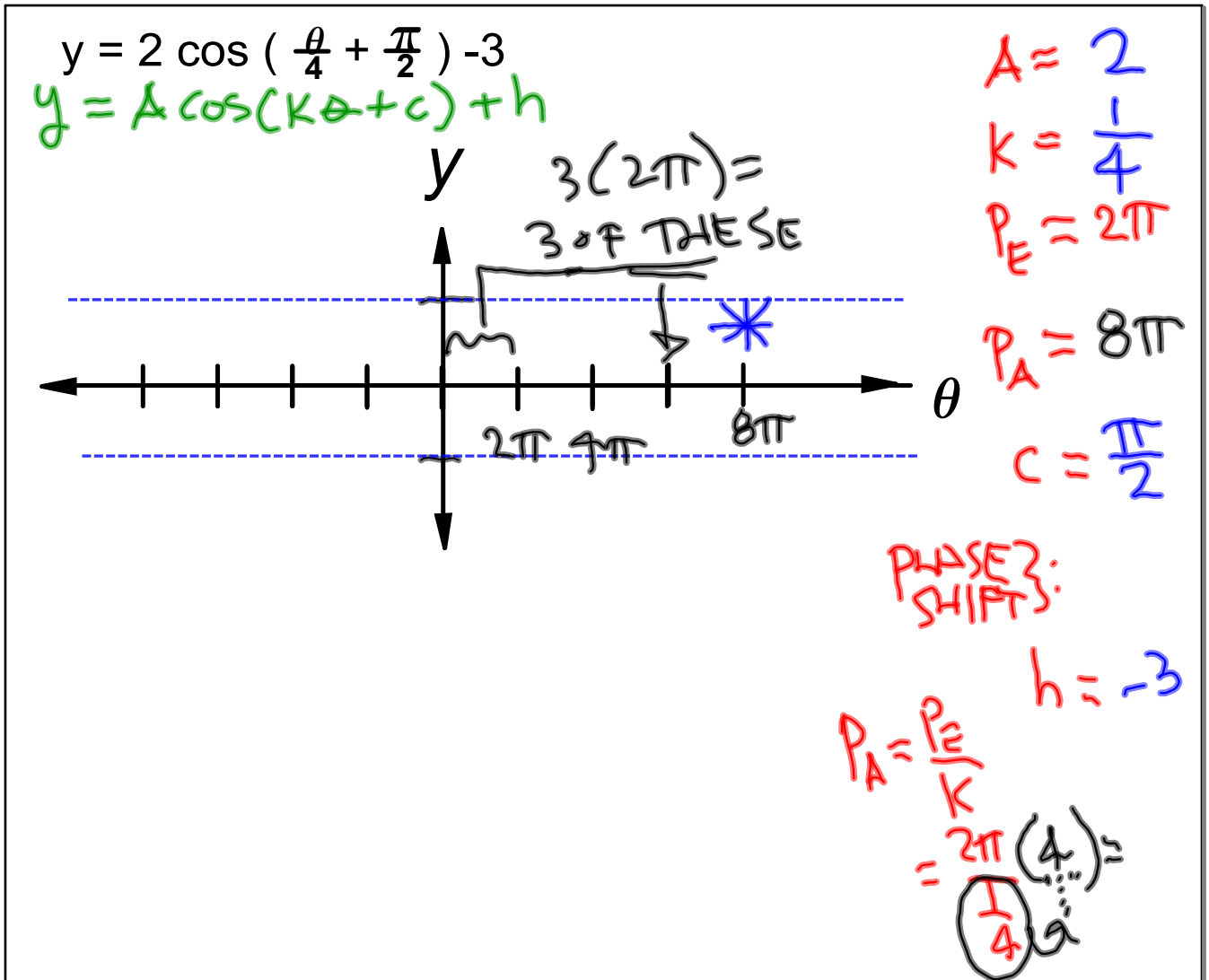
$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
 $y = A \cos(K\theta + c) + h$

$A = 2$   
 $K = \frac{1}{4}$   
 $P_E = 2\pi$   
 $P_A = 8\pi$   
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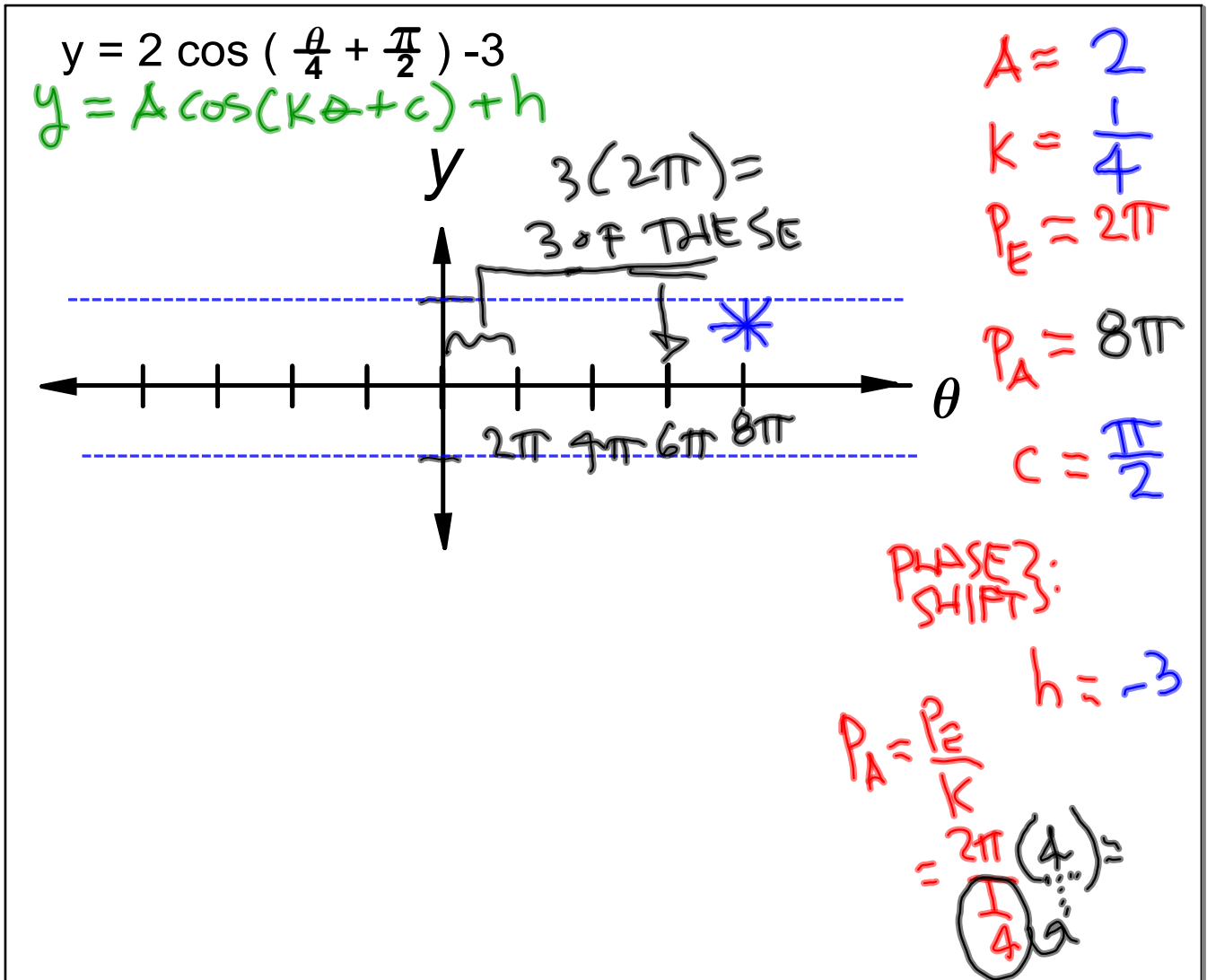
PHASE SHIFT:  
 $h = -3$

$P_A = \frac{P_E}{K}$   
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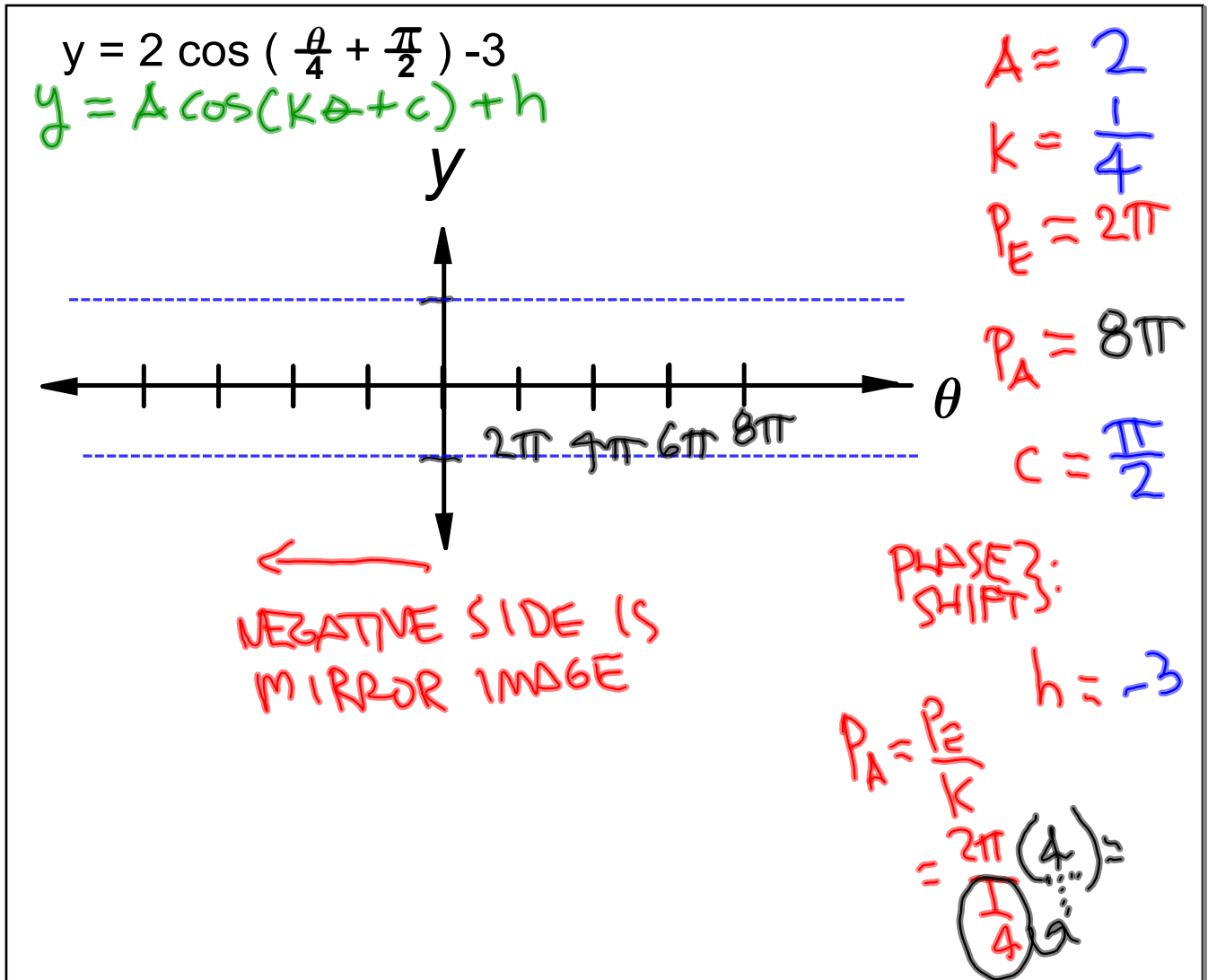
# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis

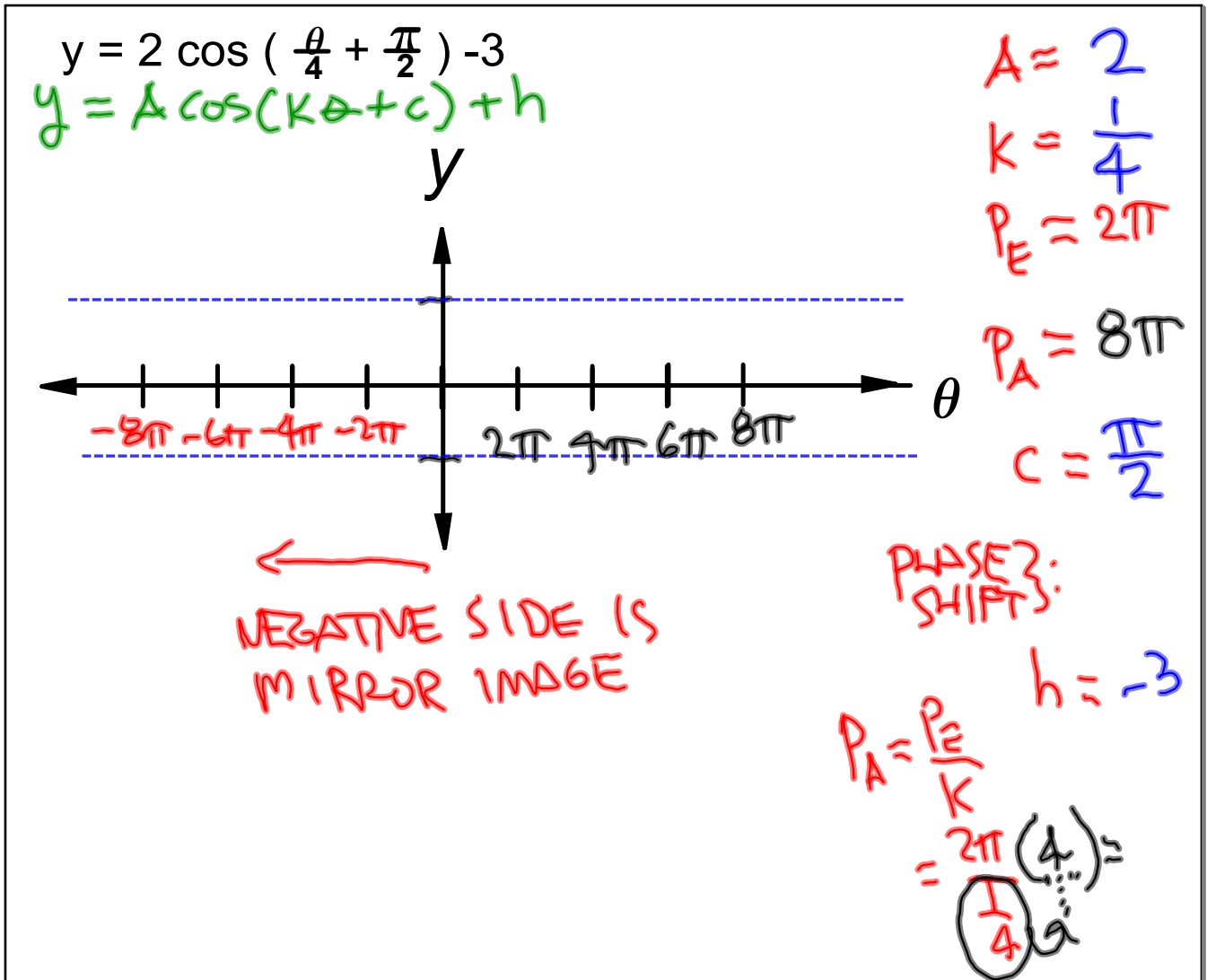


# Sketching Graphs of Sinusoidal Synopsis





# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis

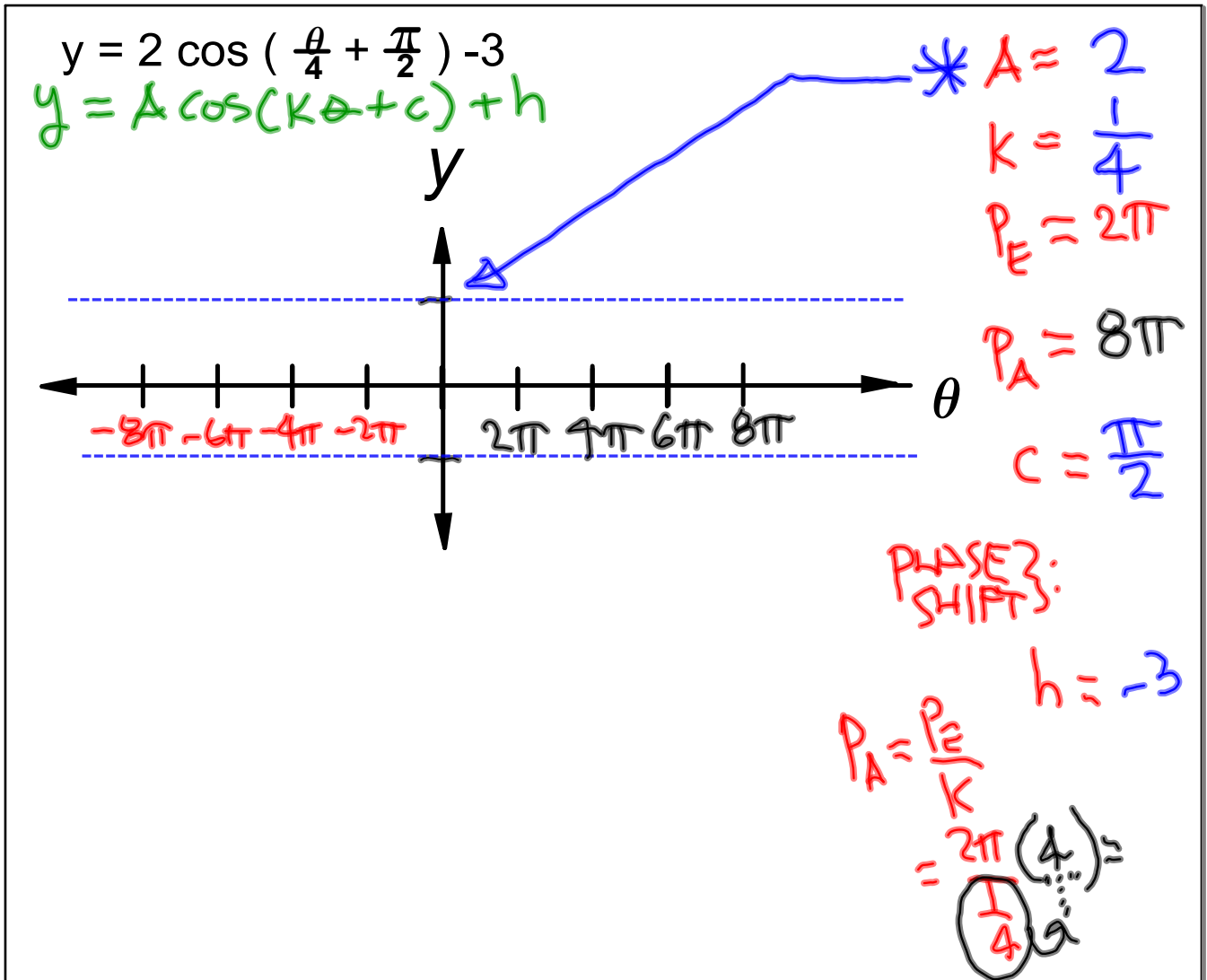
$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$   
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$A = 2$   
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 $P_A = 8\pi$   
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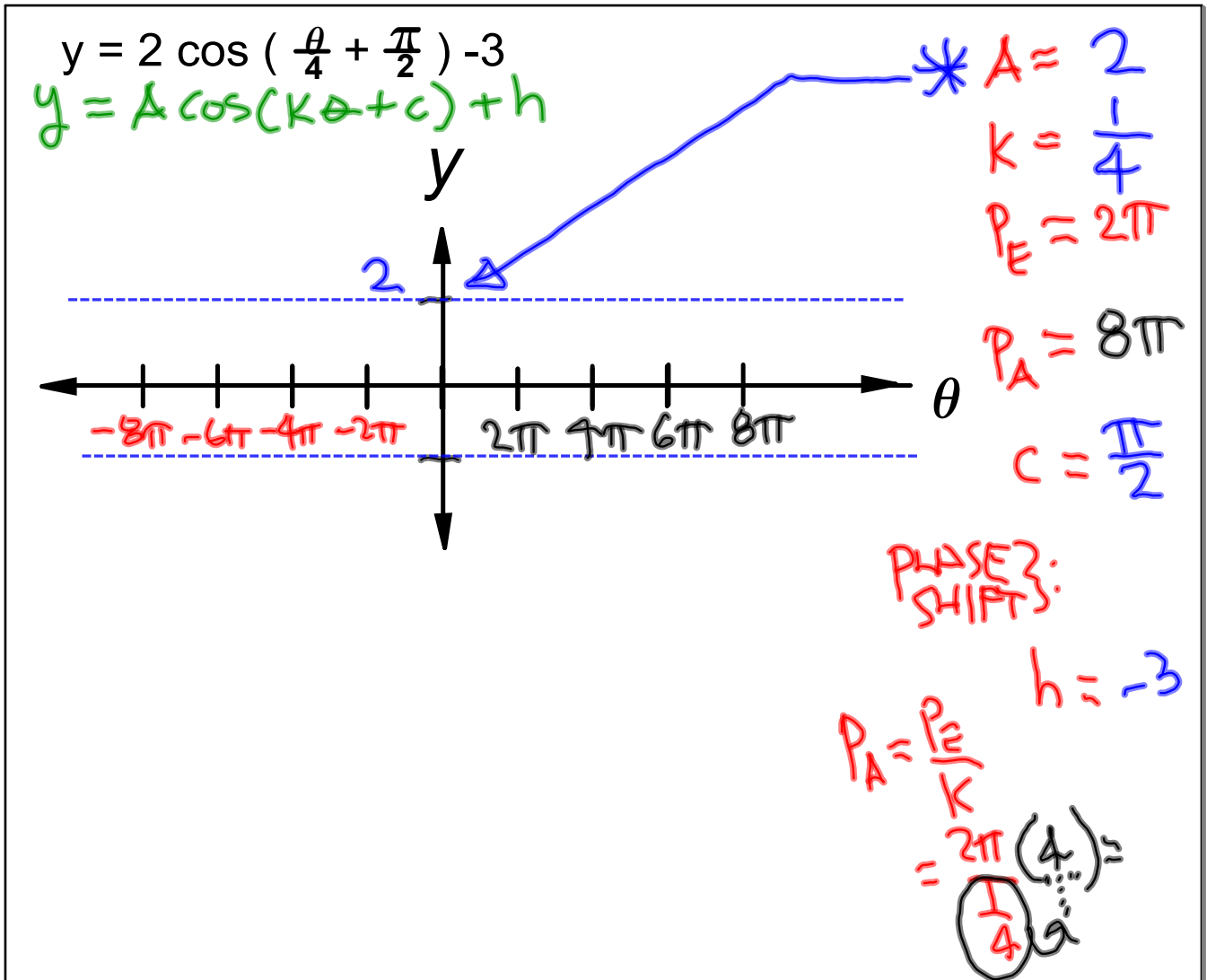
PHASE SHIFT:  
 $h = -3$

$P_A = \frac{P_E}{K}$   
 $= \frac{2\pi}{\frac{1}{4}} = 8\pi$

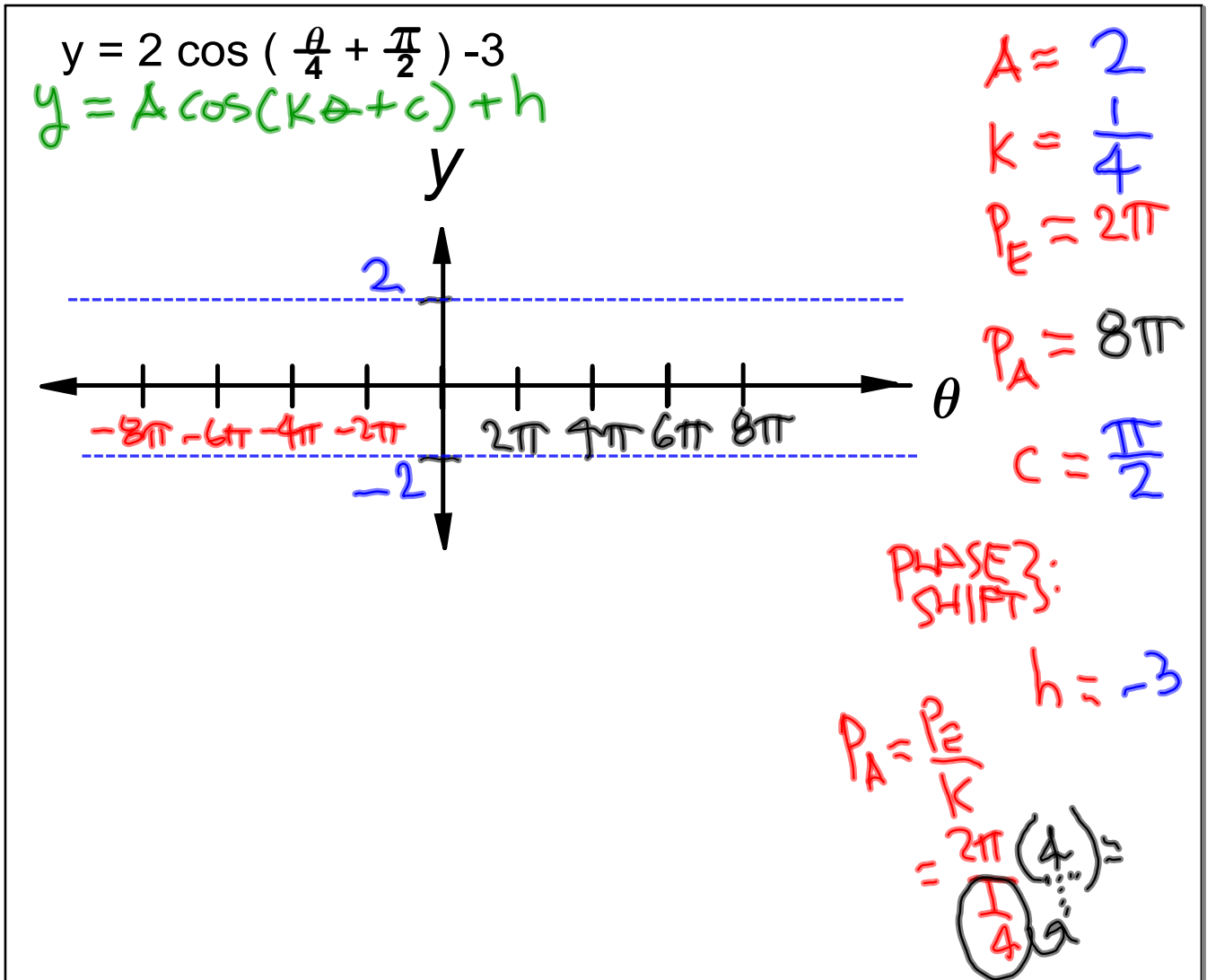
# Sketching Graphs of Sinusoidal Synopsis



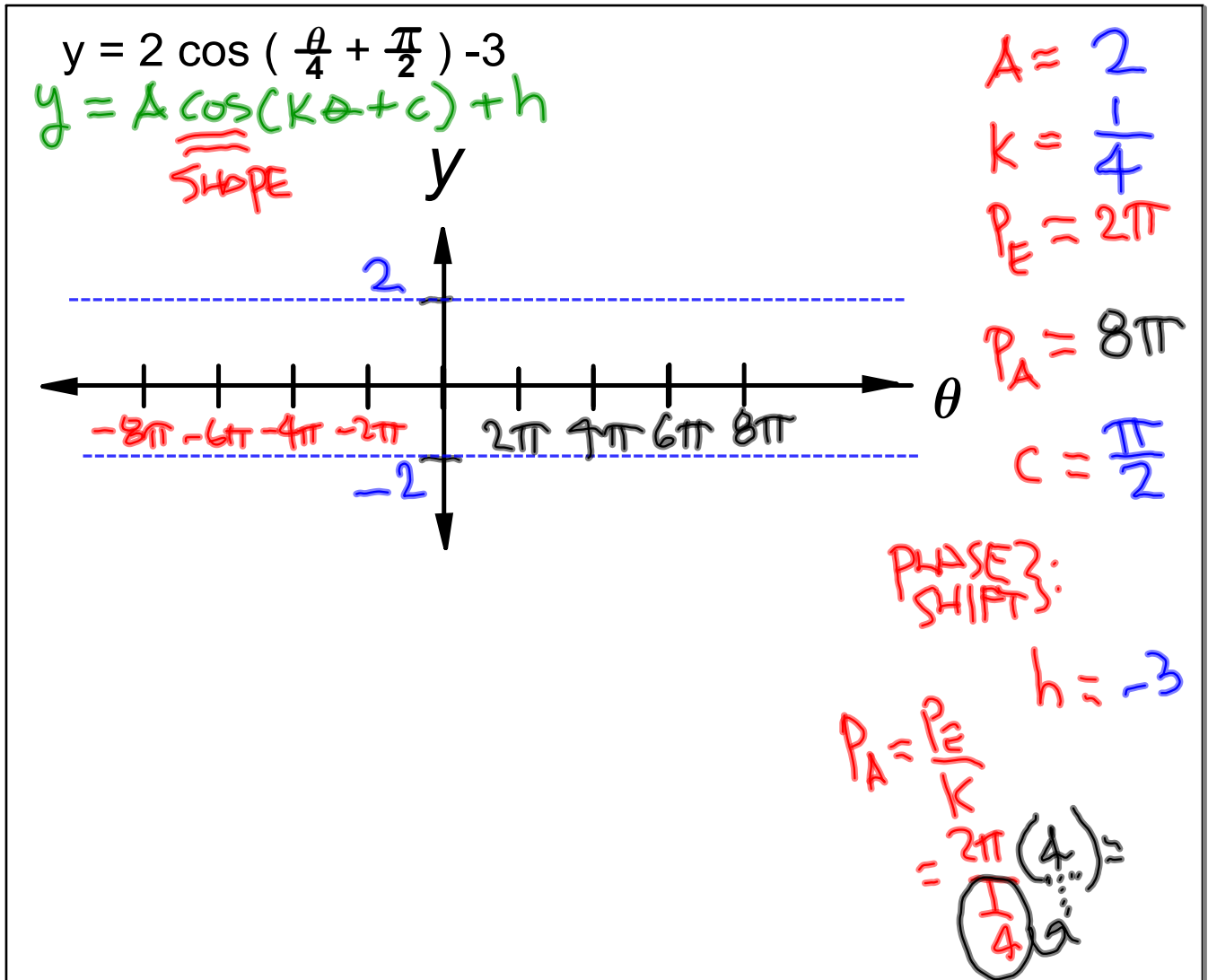
# Sketching Graphs of Sinusoidal Synopsis



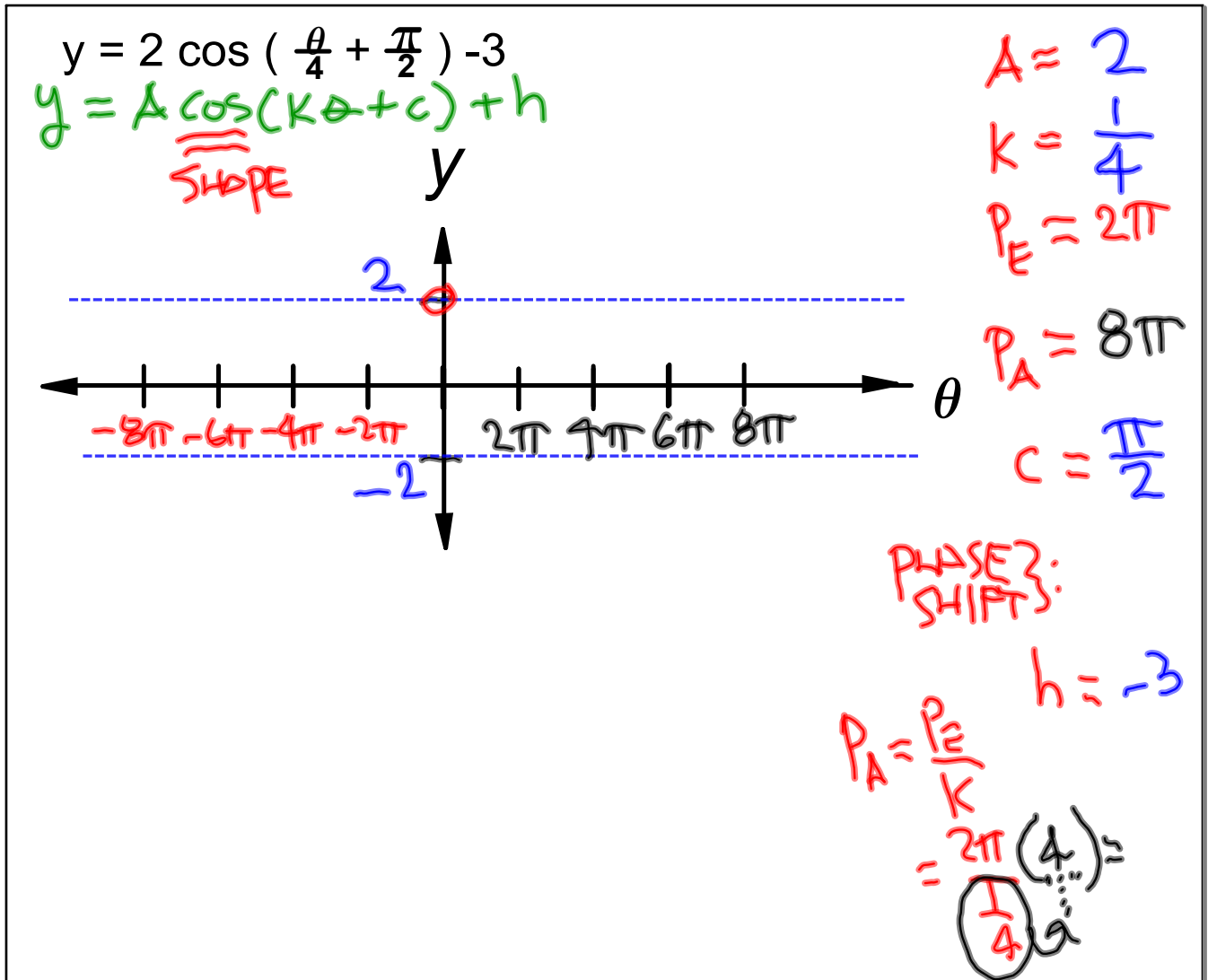
# Sketching Graphs of Sinusoidal Synopsis



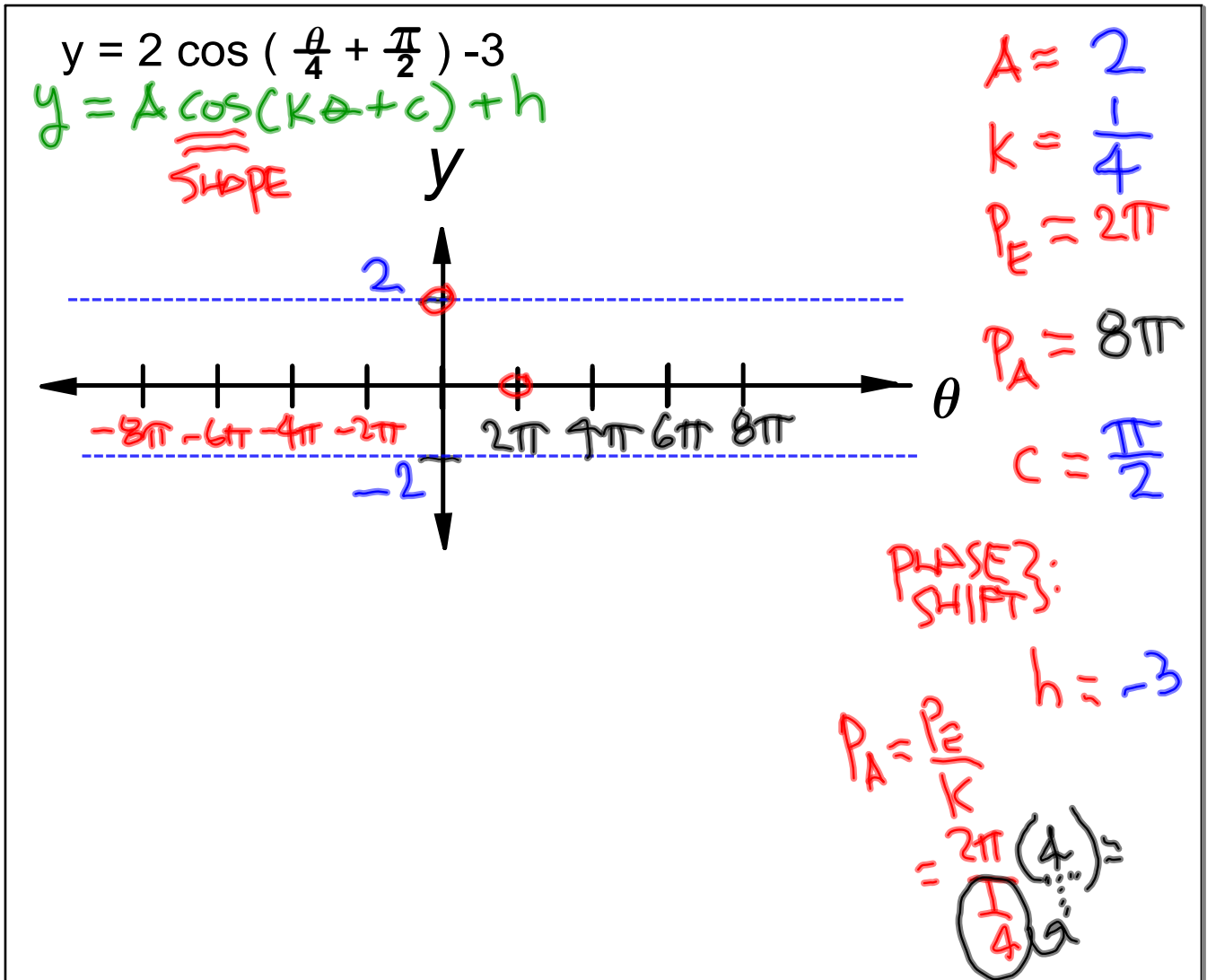
# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis

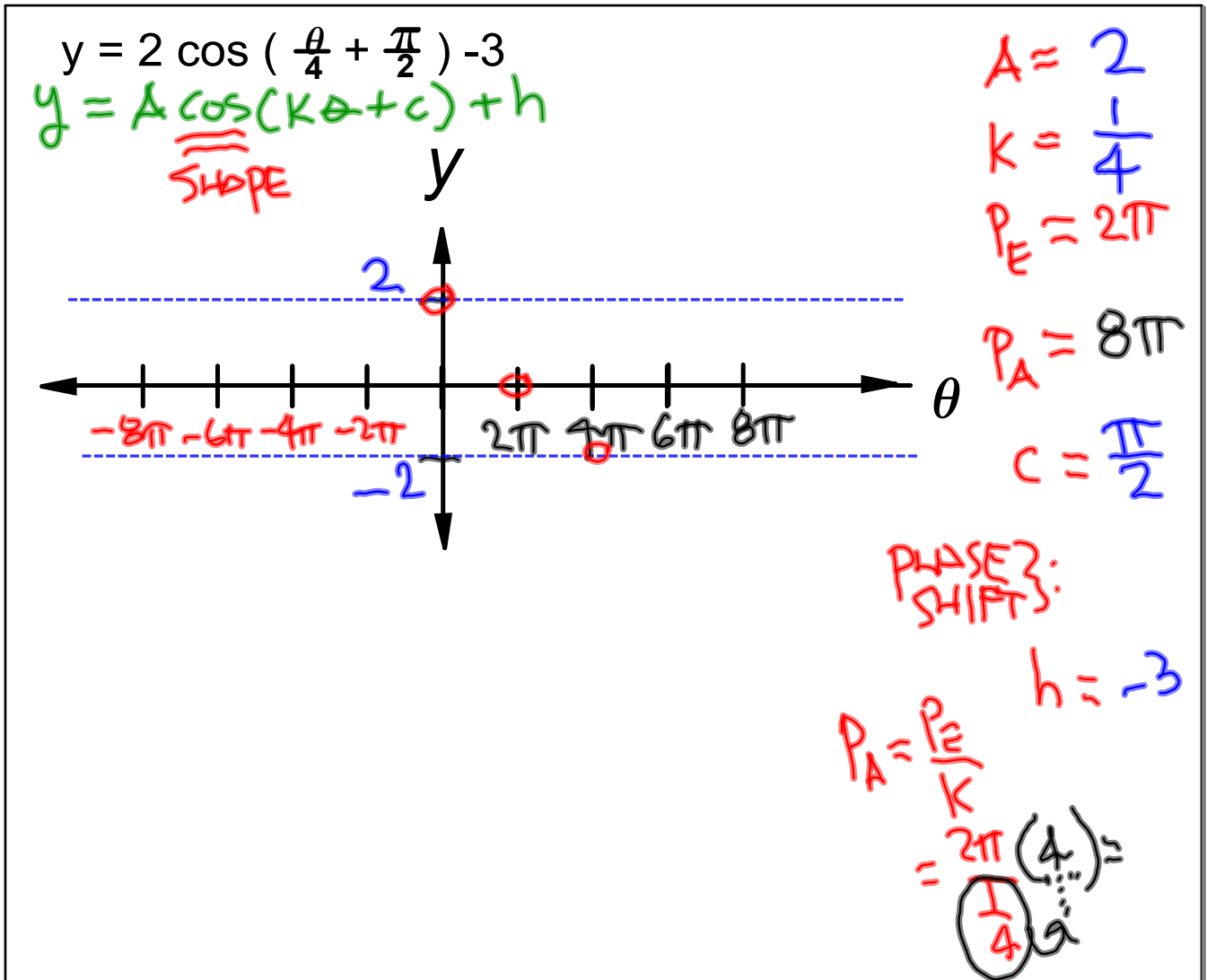


# Sketching Graphs of Sinusoidal Synopsis

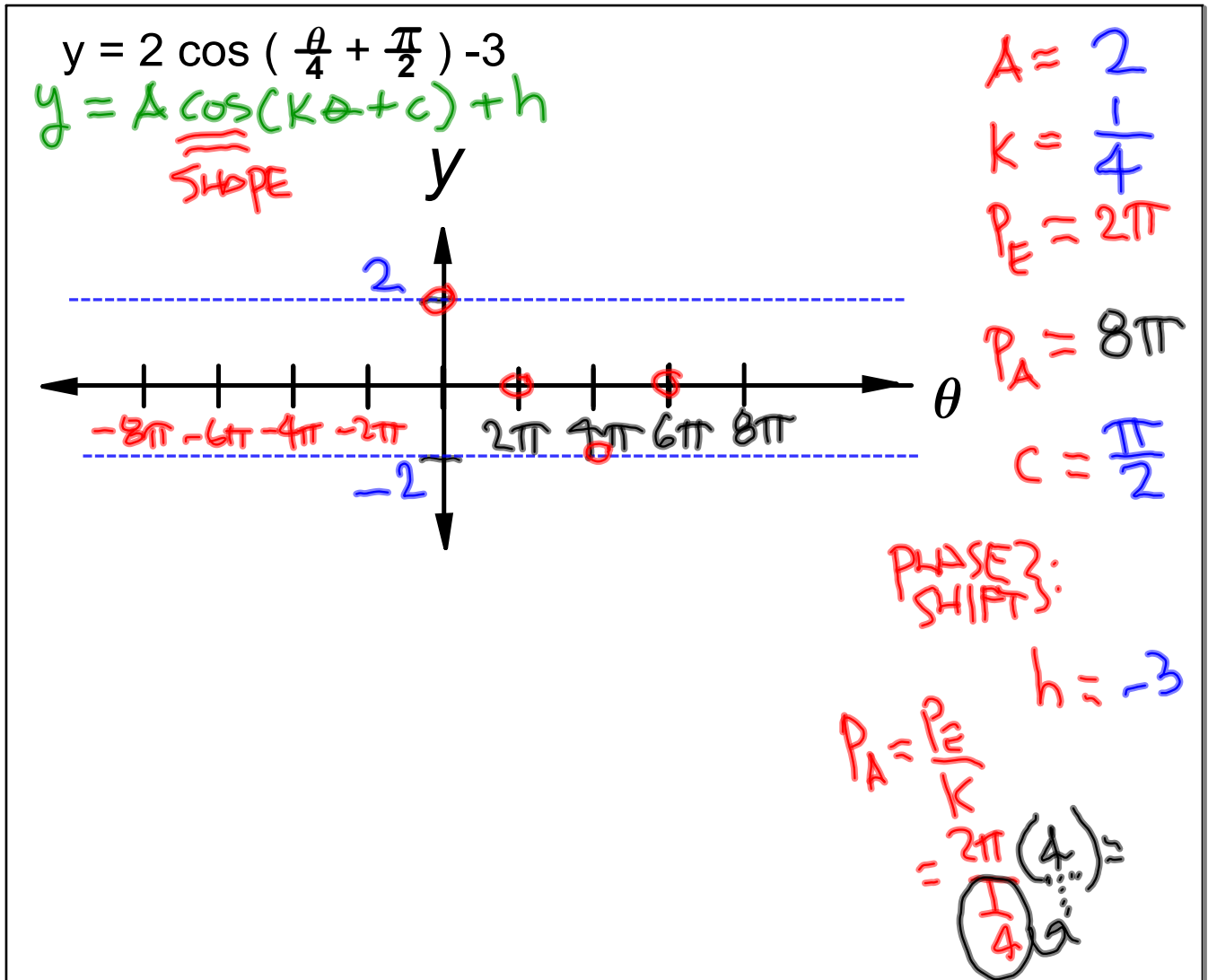




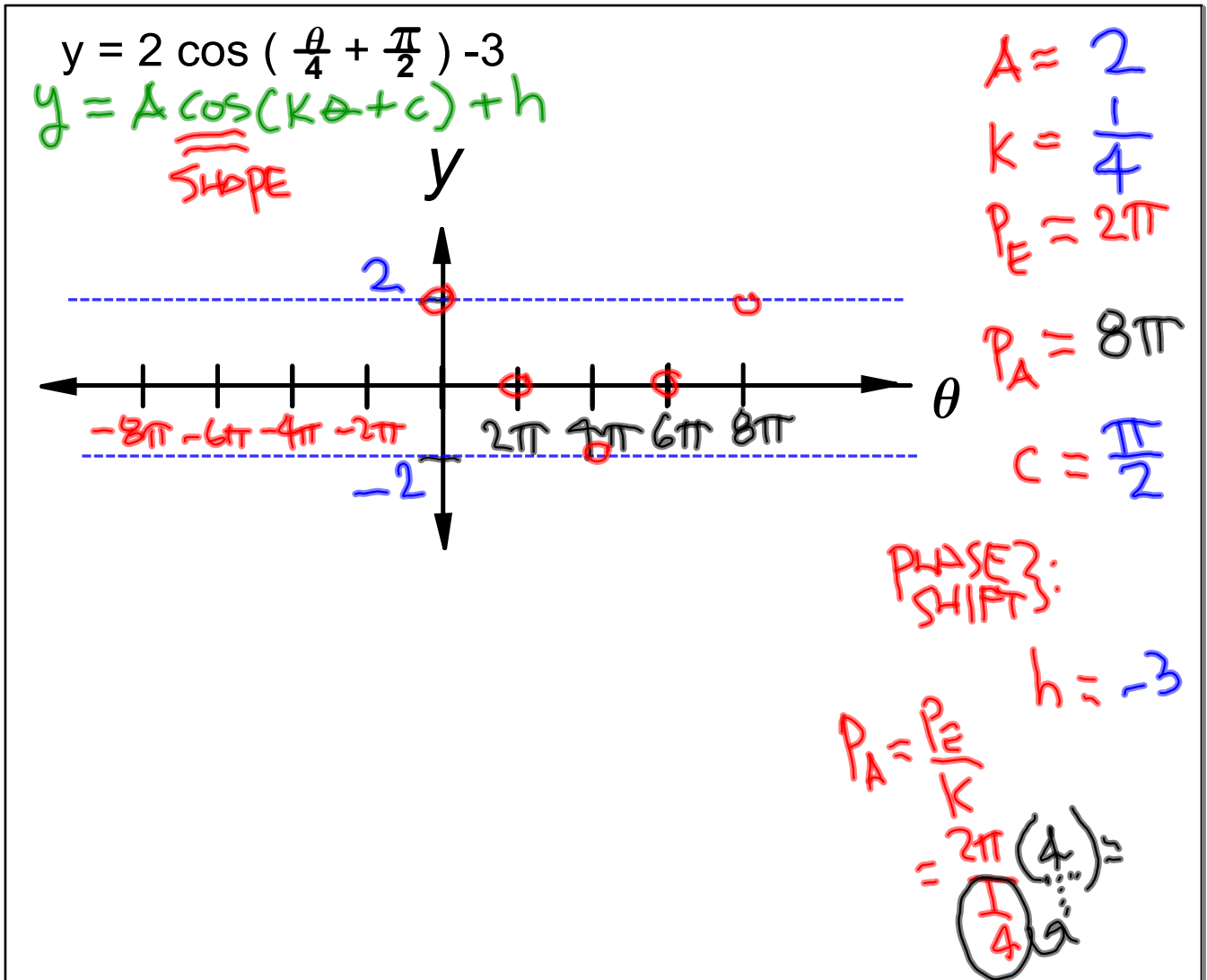
# Sketching Graphs of Sinusoidal Synopsis



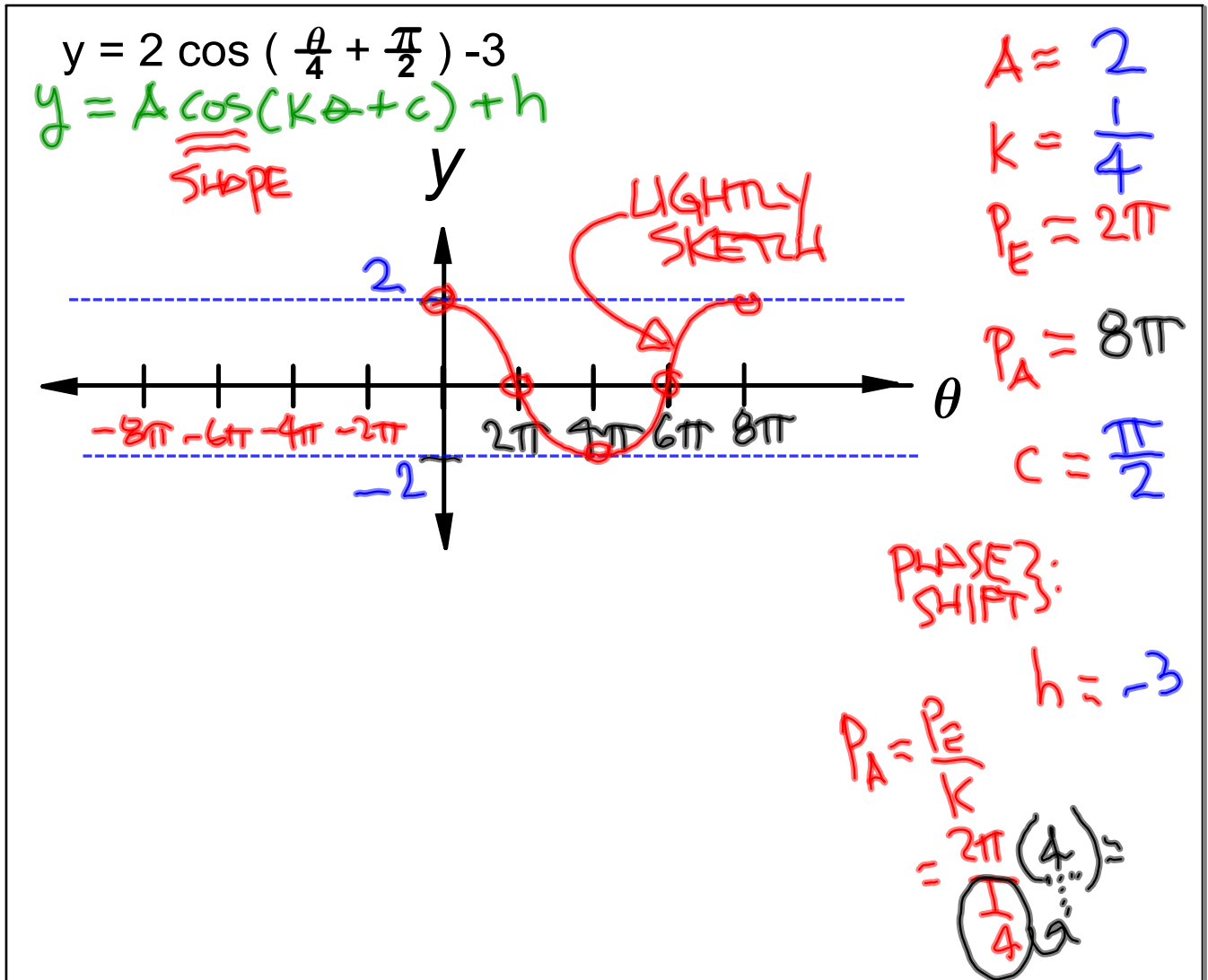
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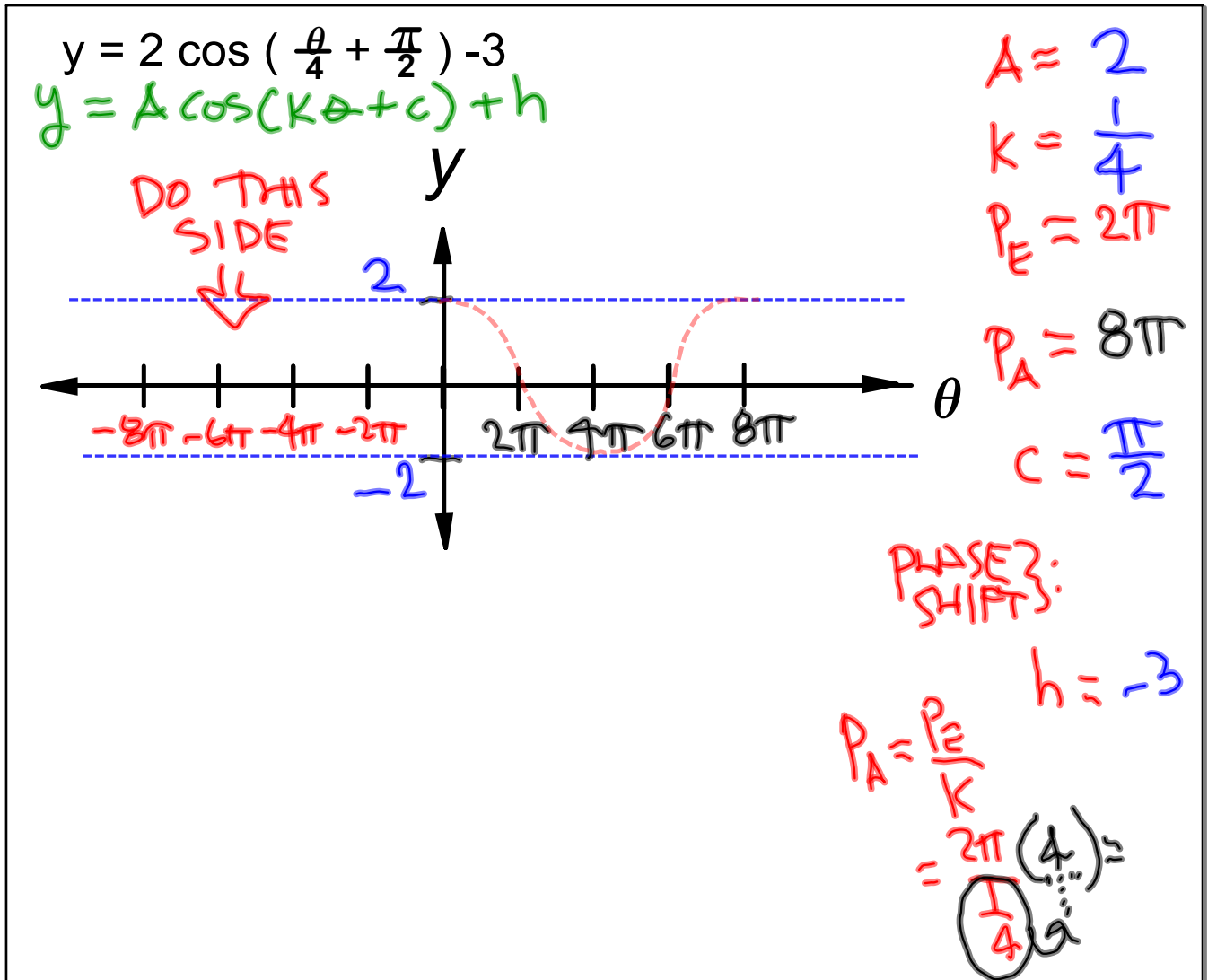
# Sketching Graphs of Sinusoidal Synopsis



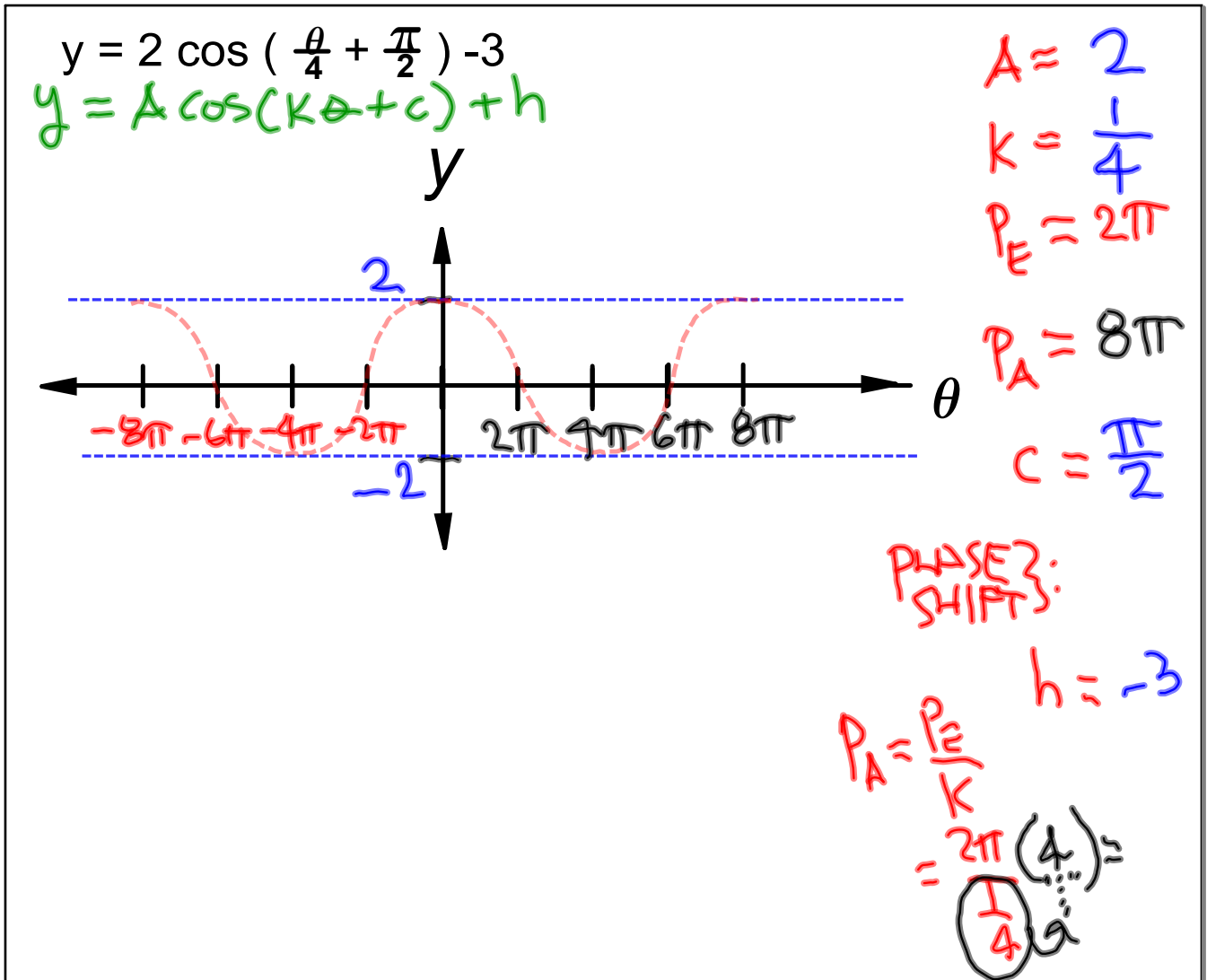
# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$

$$y = A \cos(K\theta + c) + h$$

$$A = 2$$

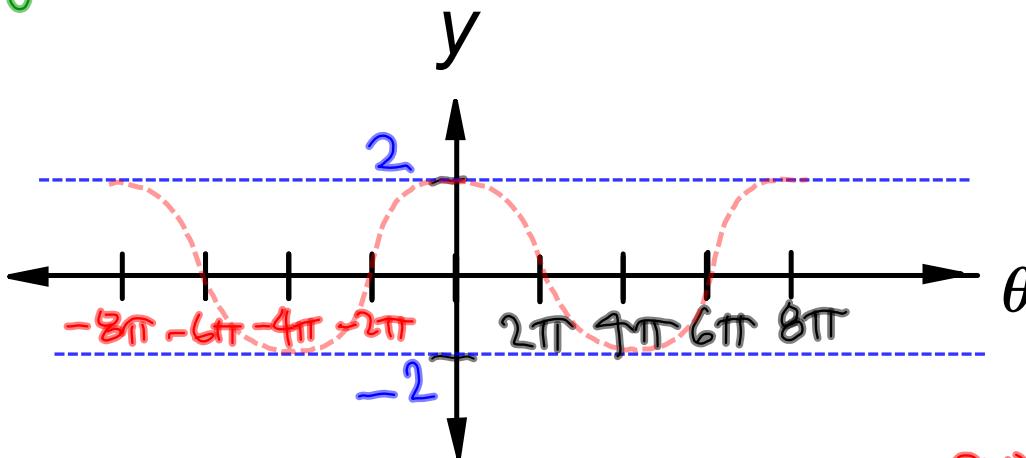
$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$

$$h = -3$$



FOCUS ON SHIFTING



PHASE SHIFT:

# Sketching Graphs of Sinusoidal Synopsis

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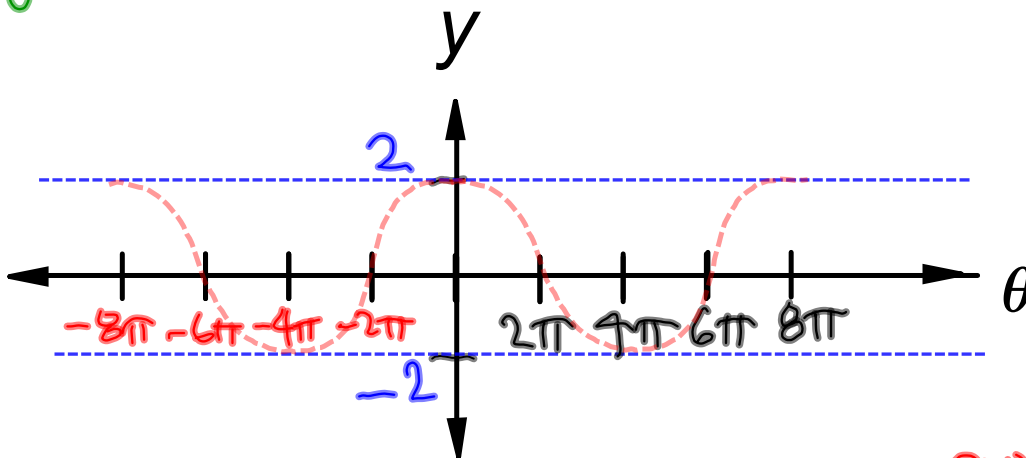
$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$

$$h = -3$$



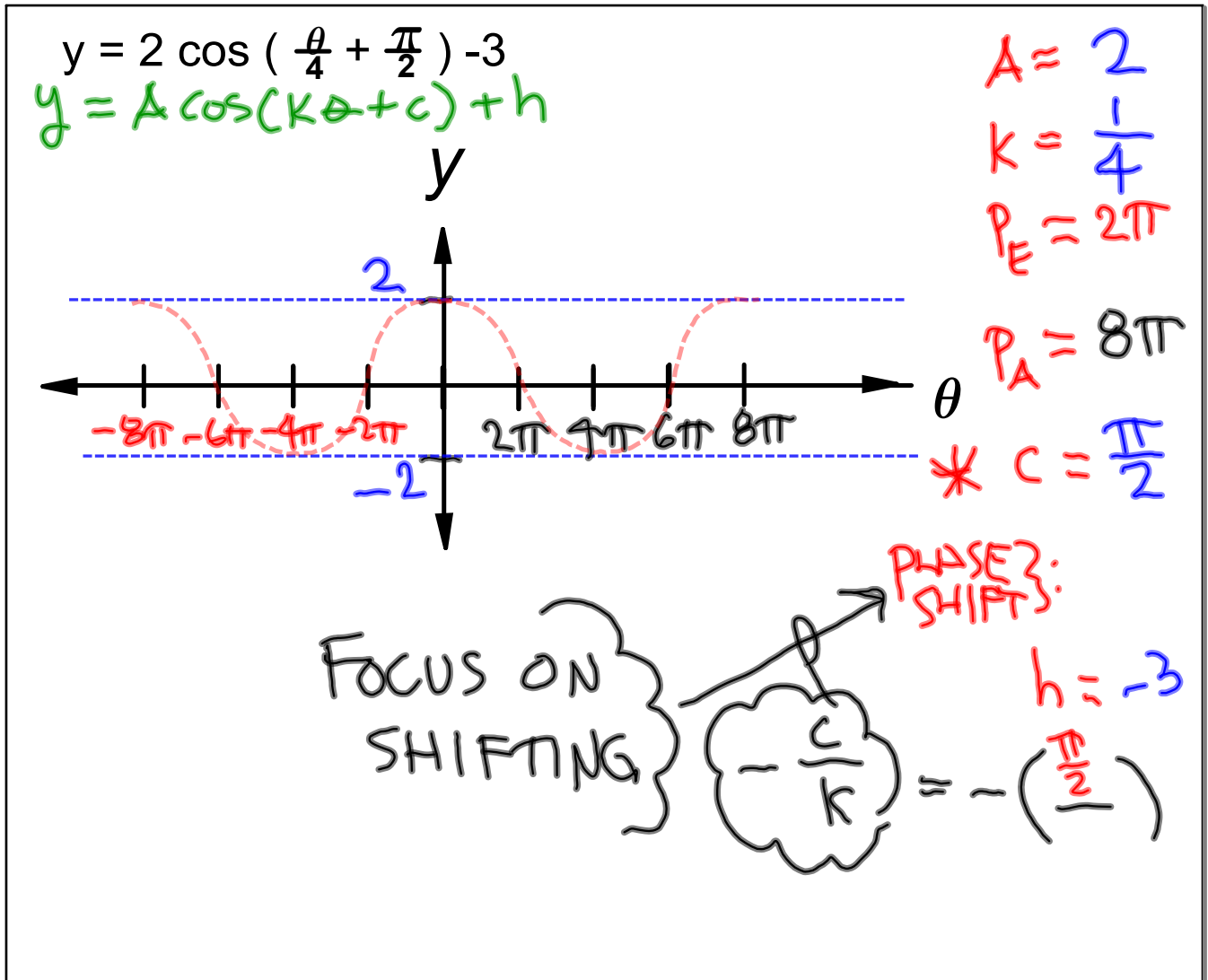
FOCUS ON SHIFTING

$$-\frac{c}{K} = -(-)$$

PHASE SHIFT:



# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$

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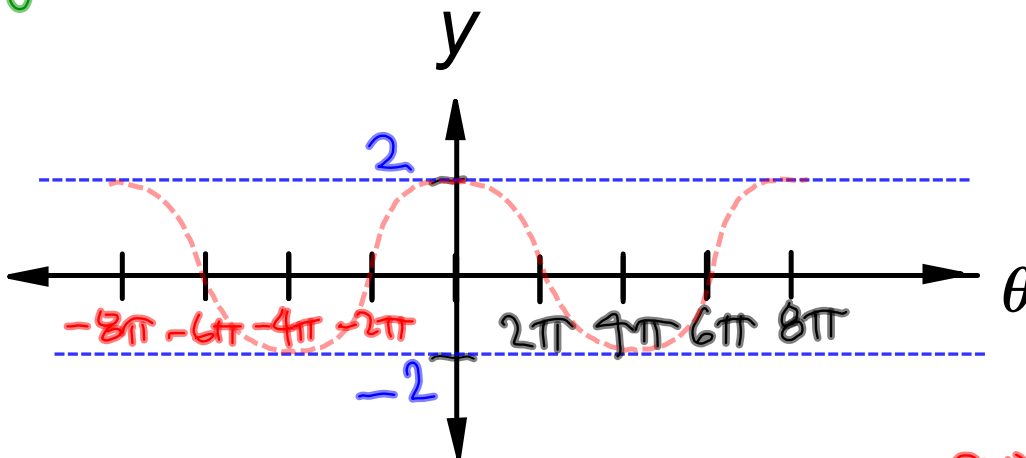
$$A = 2$$

$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$



FOCUS ON SHIFTING

$$-\frac{c}{k}$$

PHASE SHIFT:

$$h = -3$$

$$= -\left( \frac{\frac{\pi}{2}}{\frac{1}{4}} \right)$$

# Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$

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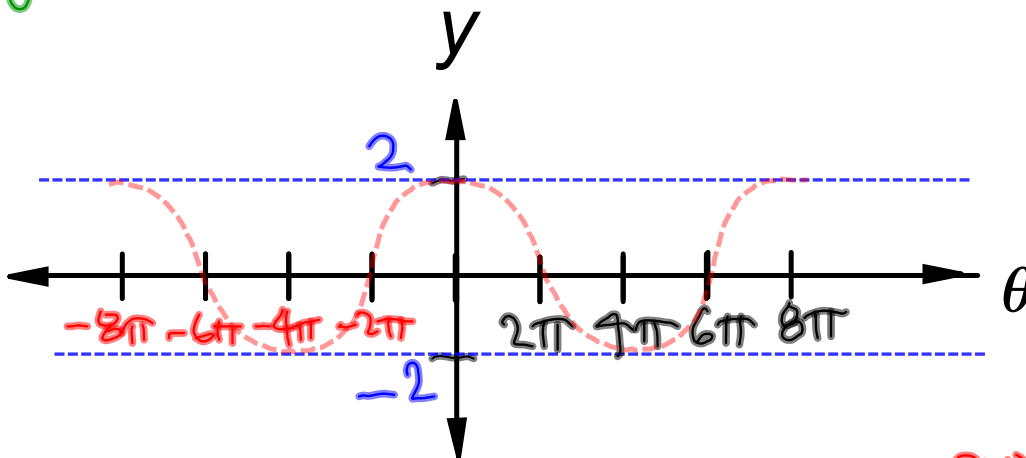
$$A = 2$$

$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$



FOCUS ON SHIFTING

$$-\frac{c}{k}$$

PHASE SHIFT:

$$h = -3$$

$$-\left( \frac{\frac{\pi}{2}}{\frac{1}{4}} \right)$$

# Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$

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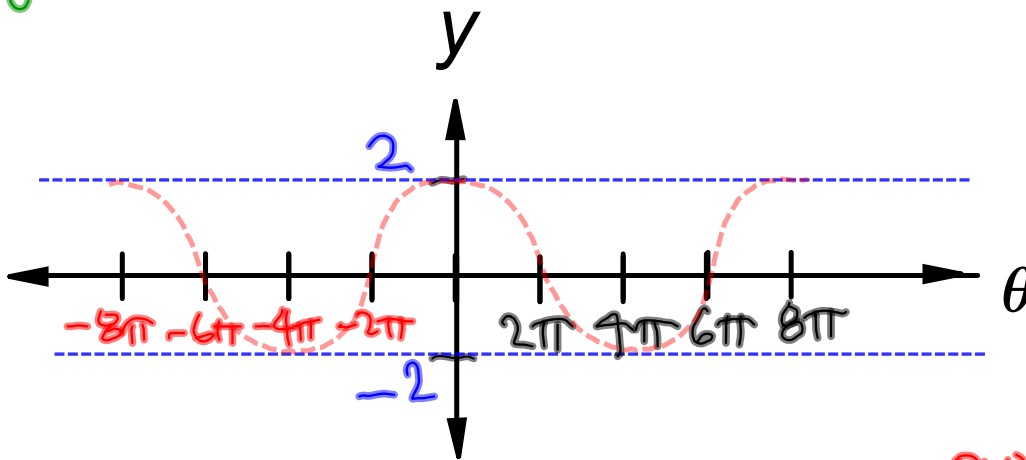
$$A = 2$$

$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$



FOCUS ON SHIFTING

$$-\frac{c}{k}$$

PHASE SHIFT:

$$h = -3$$

$$= - \left( \frac{\pi}{2} \right) \left( \frac{4}{1} \right)$$

# Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$

$$y = A \cos(K\theta + c) + h$$

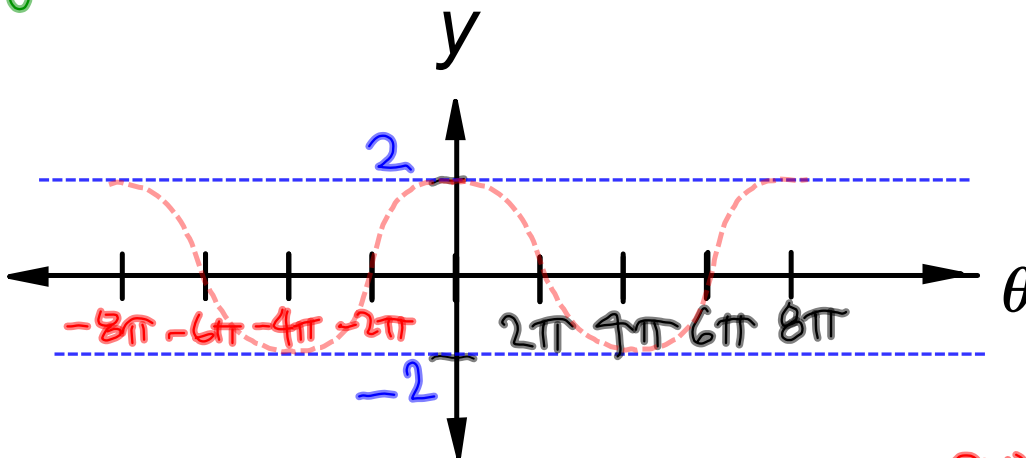
$$A = 2$$

$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$



FOCUS ON SHIFTING

$$-\frac{c}{k}$$

PHASE SHIFT:

$$h = -3$$

$$-\left( \frac{\pi/2}{1/4} \right) = -\left( \frac{\pi}{2} \cdot 4 \right) = -2\pi$$

# Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$

$$y = A \cos(K\theta + c) + h$$

$$A = 2$$

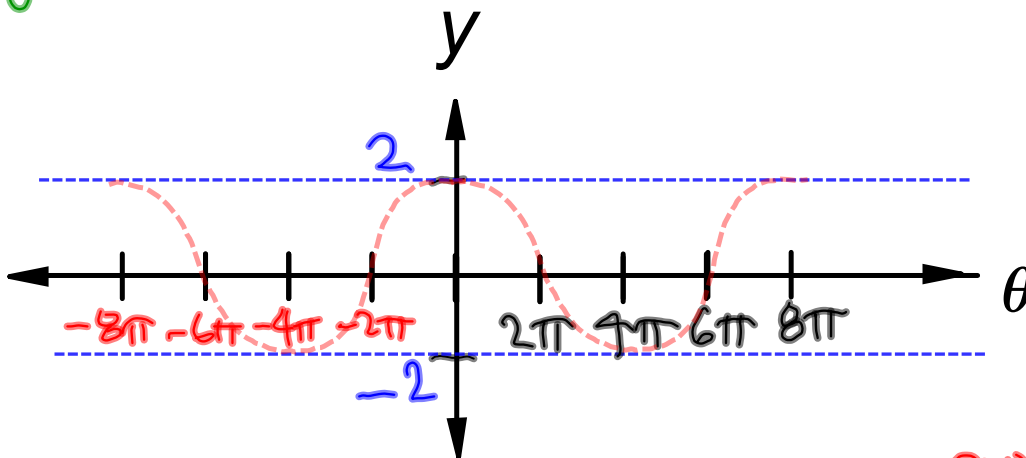
$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$

$$h = -3$$



FOCUS ON SHIFTING

$$-\frac{c}{K} = -(2\pi)$$

PHASE SHIFT:

# Sketching Graphs of Sinusoidal Synopsis

$$y = 2 \cos \left( \frac{\theta}{4} + \frac{\pi}{2} \right) - 3$$

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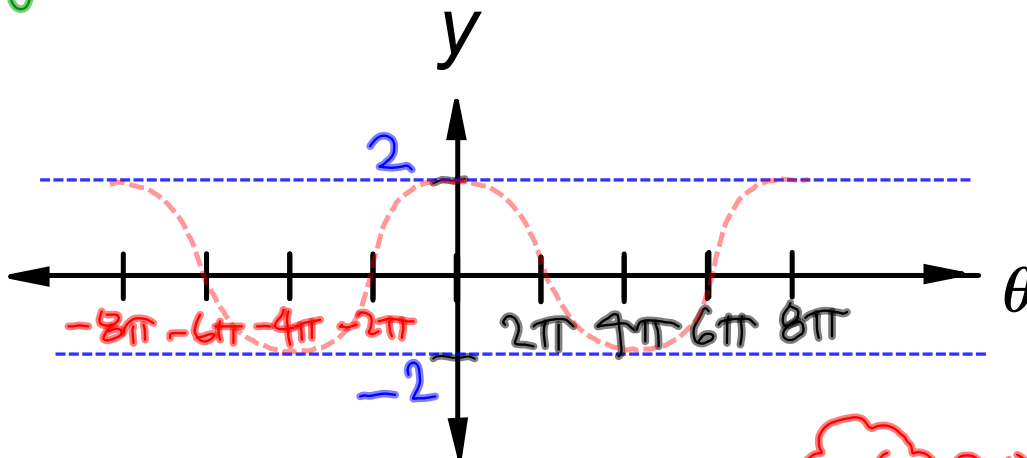
$$A = 2$$

$$K = \frac{1}{4}$$

$$P_E = 2\pi$$

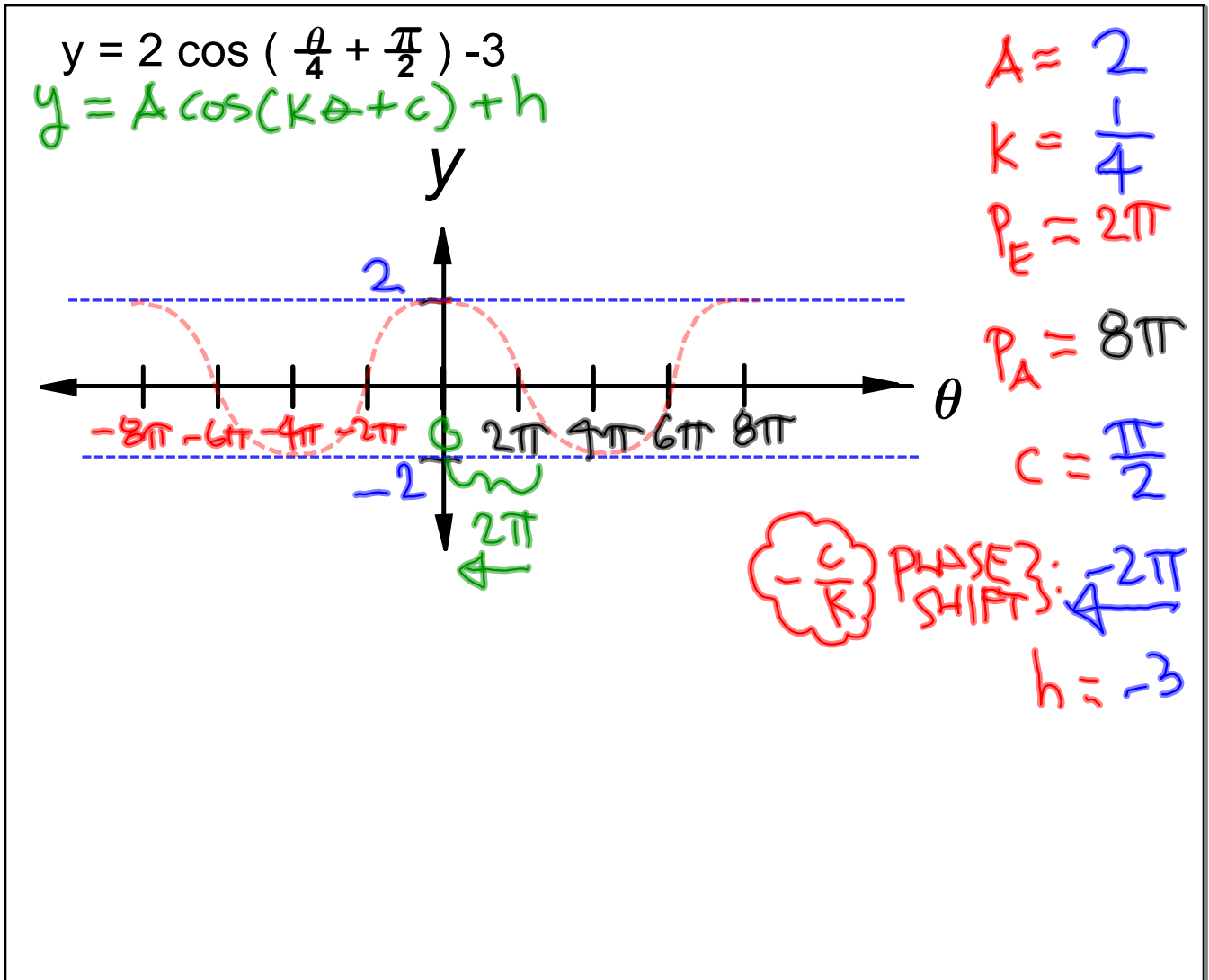
$$P_A = 8\pi$$

$$c = \frac{\pi}{2}$$



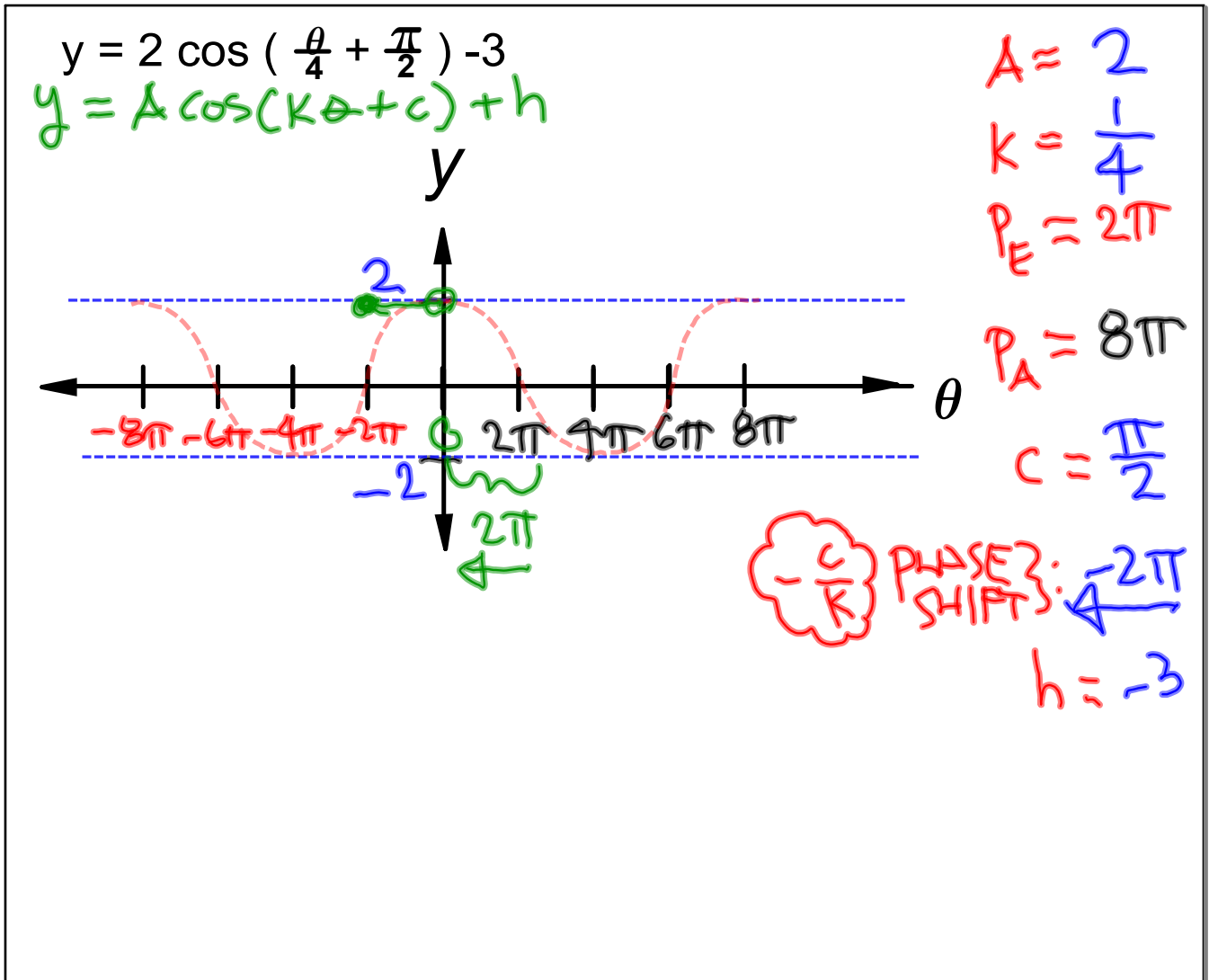
$\left( -\frac{c}{K} \right)$  PHASE SHIFT:  $\leftarrow -2\pi$   
 $h = -3$

# Sketching Graphs of Sinusoidal Synopsis

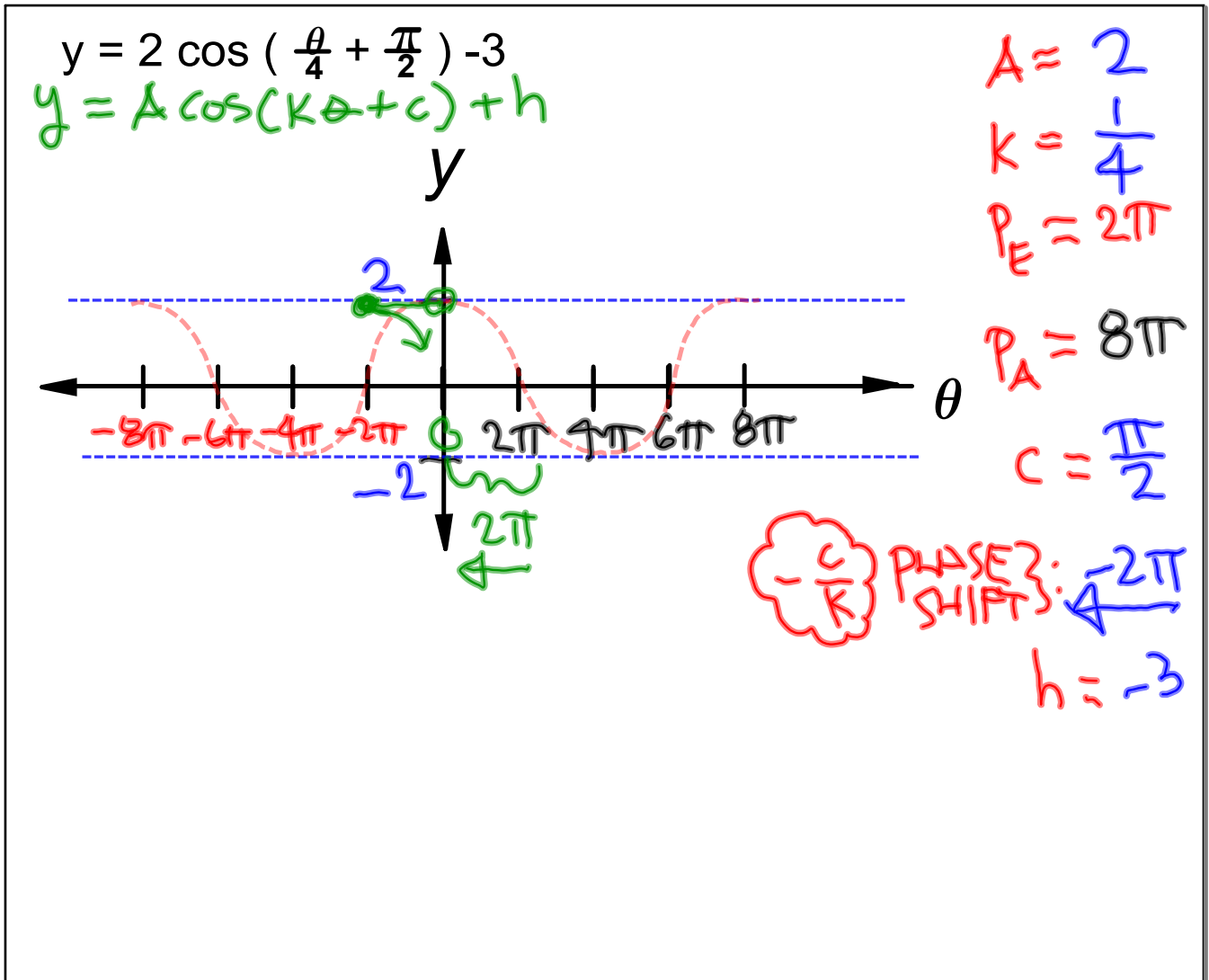




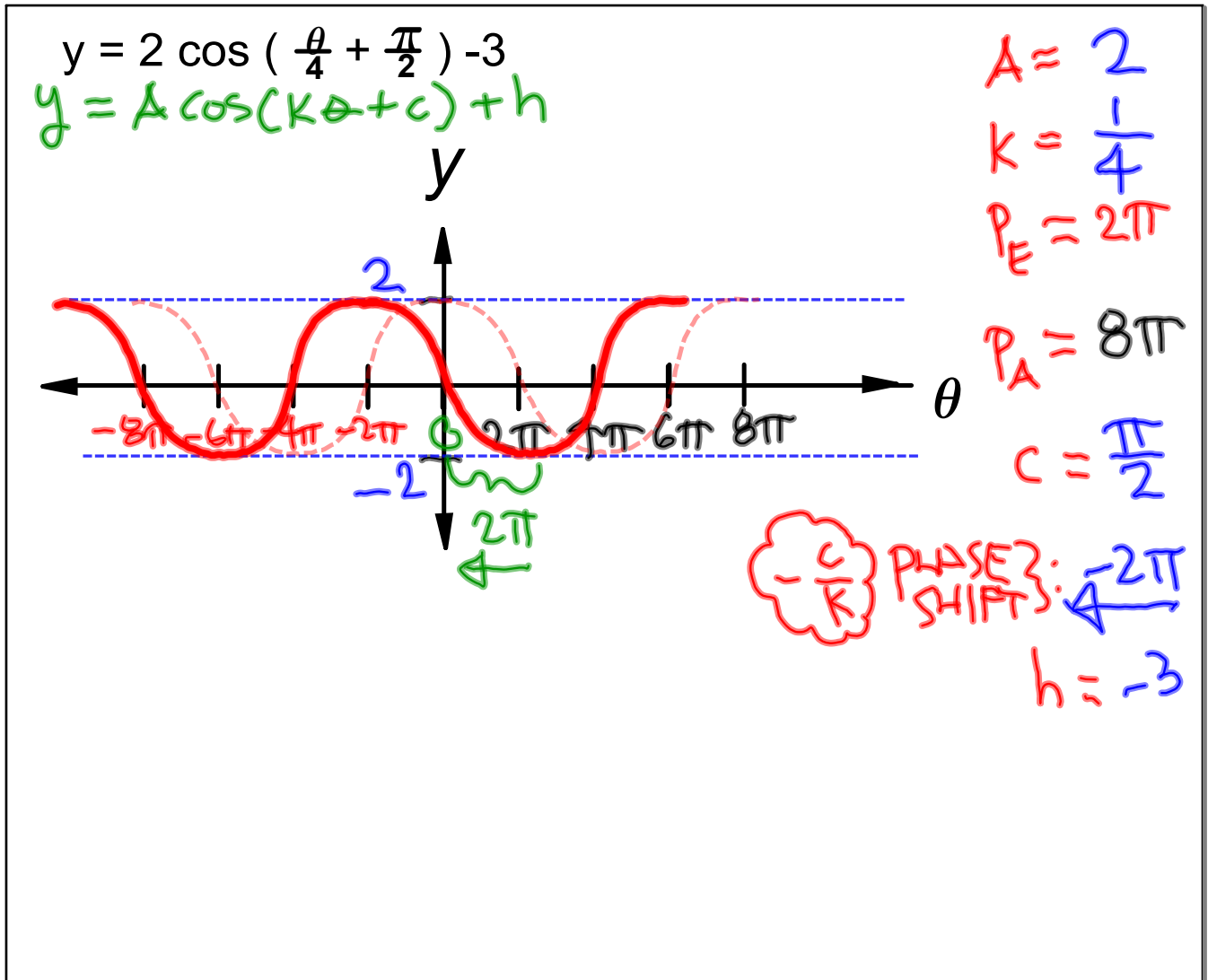
# Sketching Graphs of Sinusoidal Synopsis



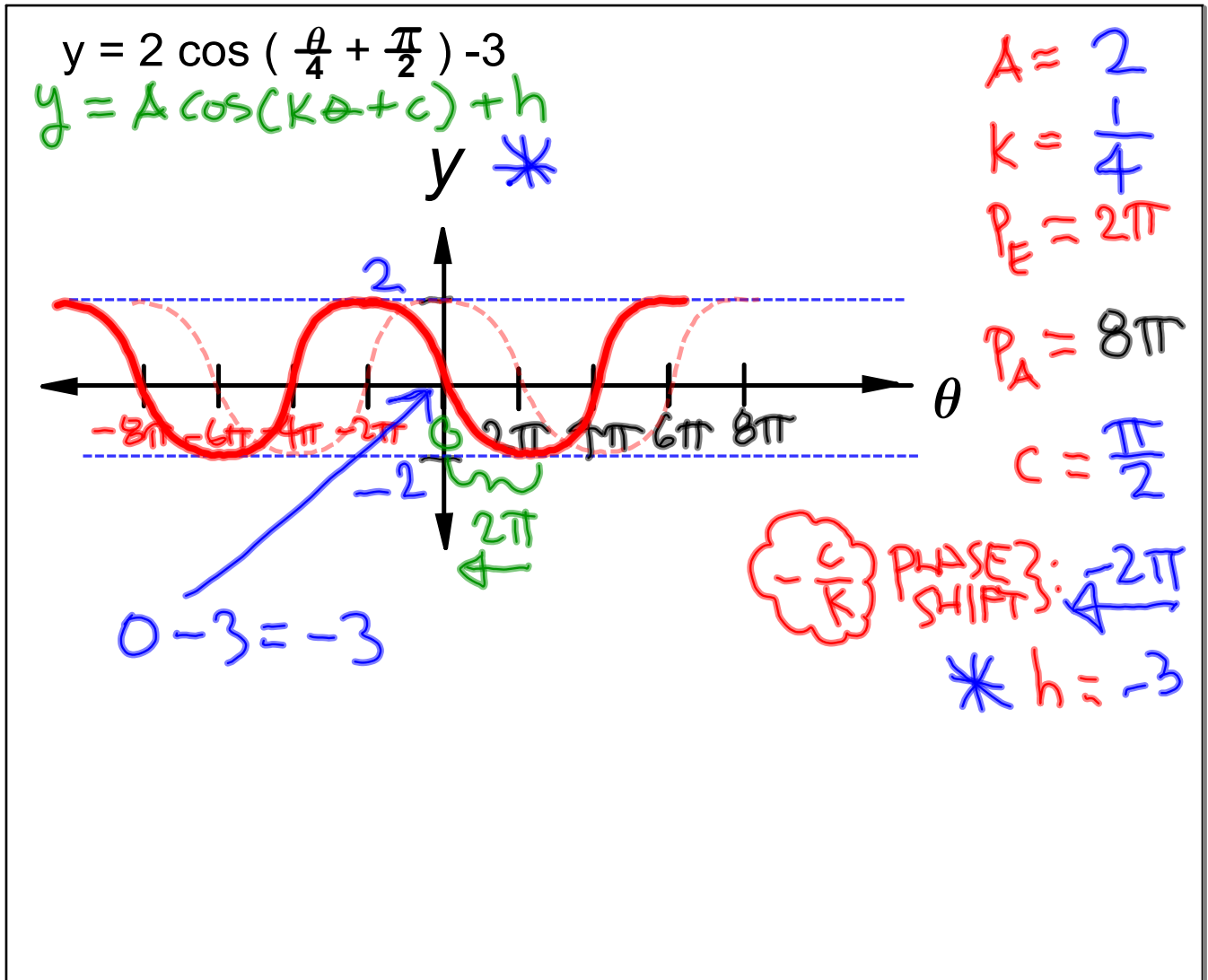
# Sketching Graphs of Sinusoidal Synopsis



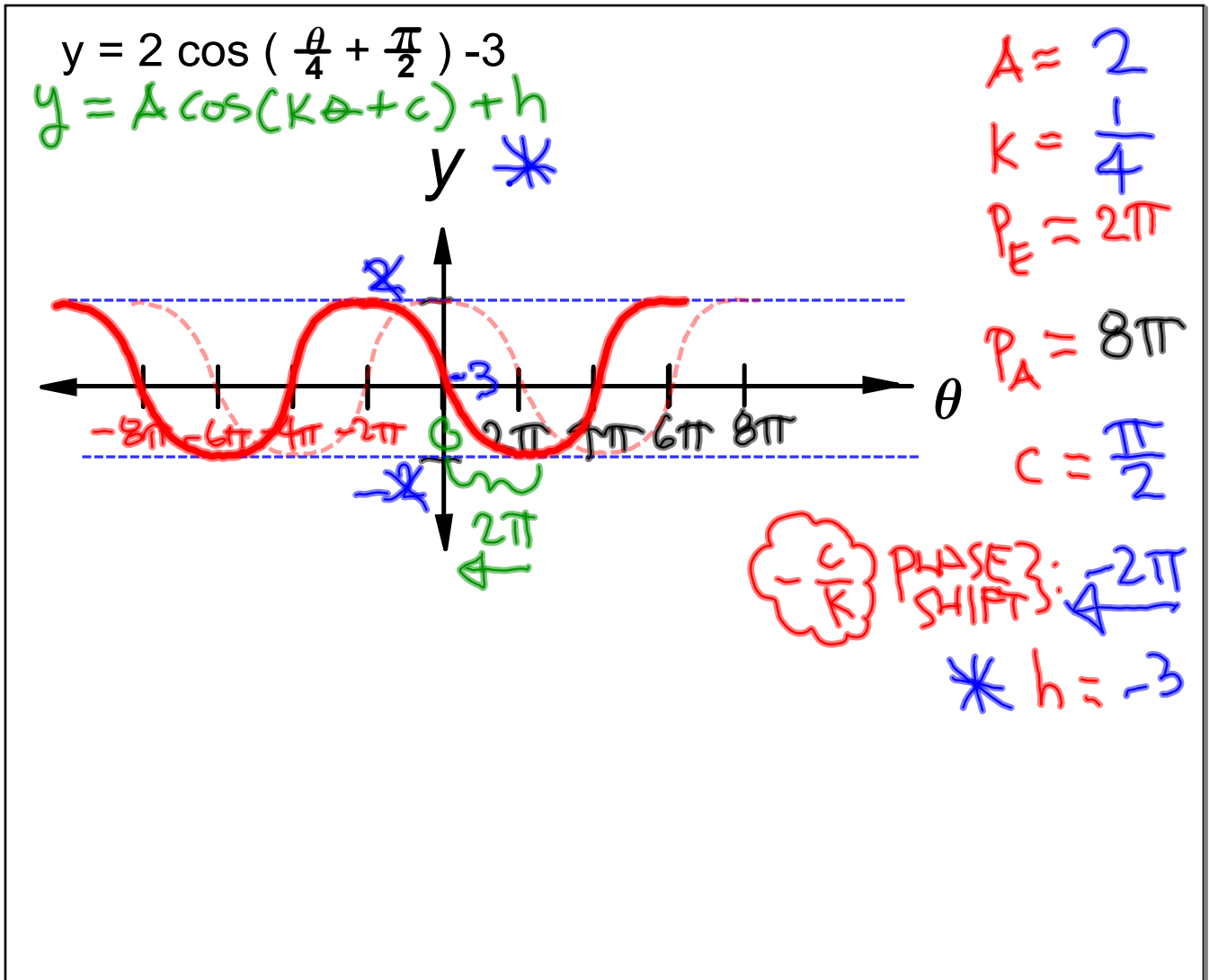
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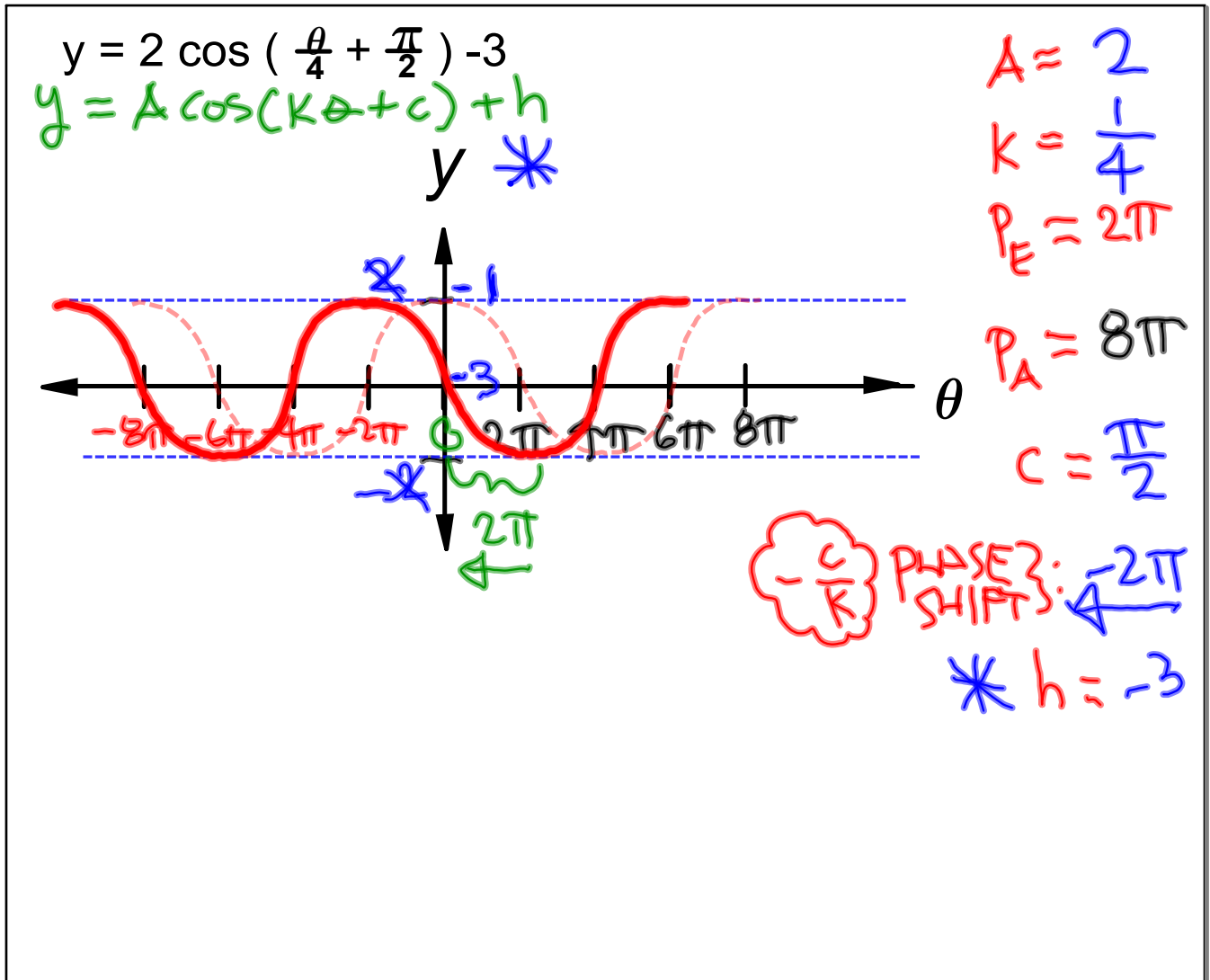
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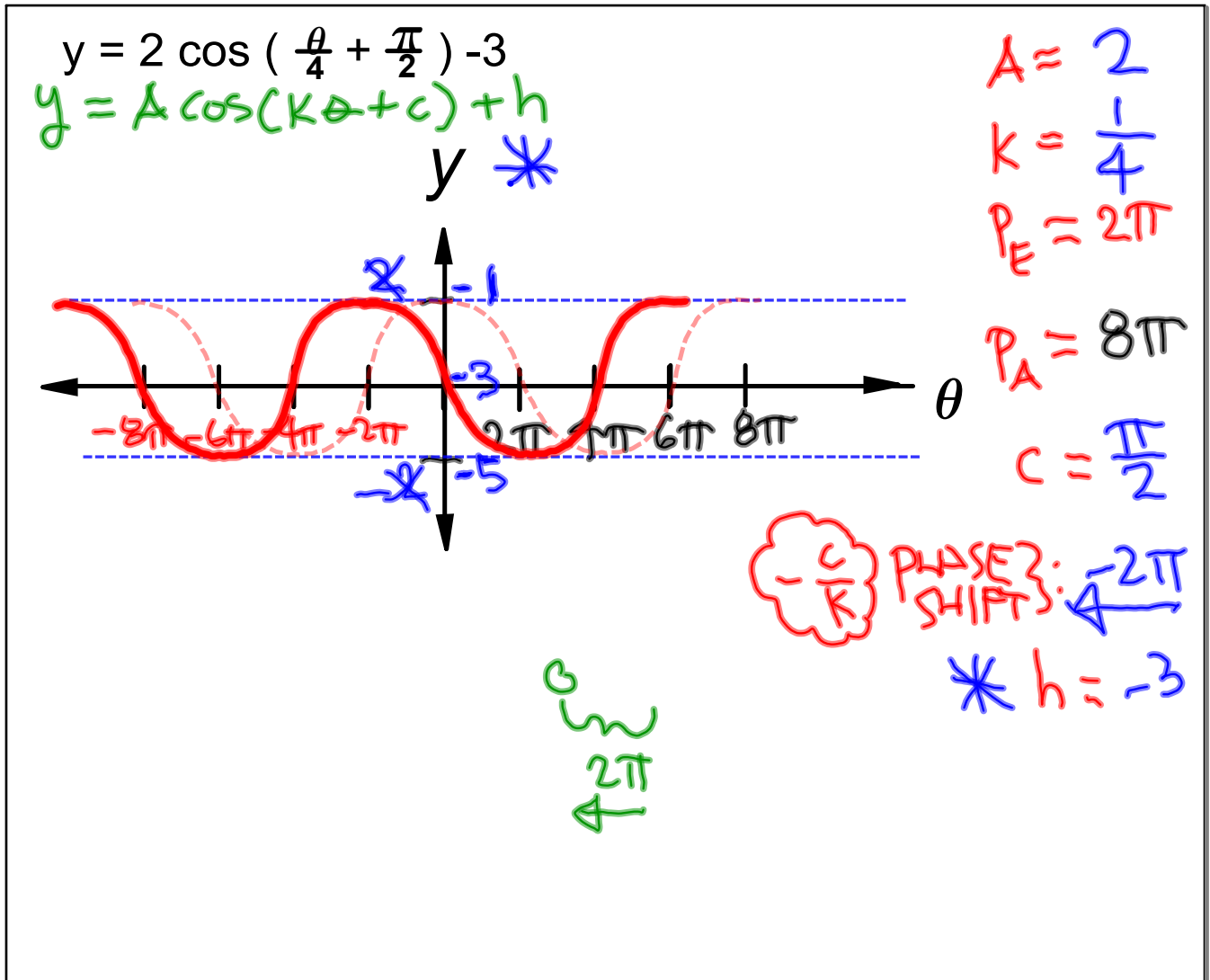
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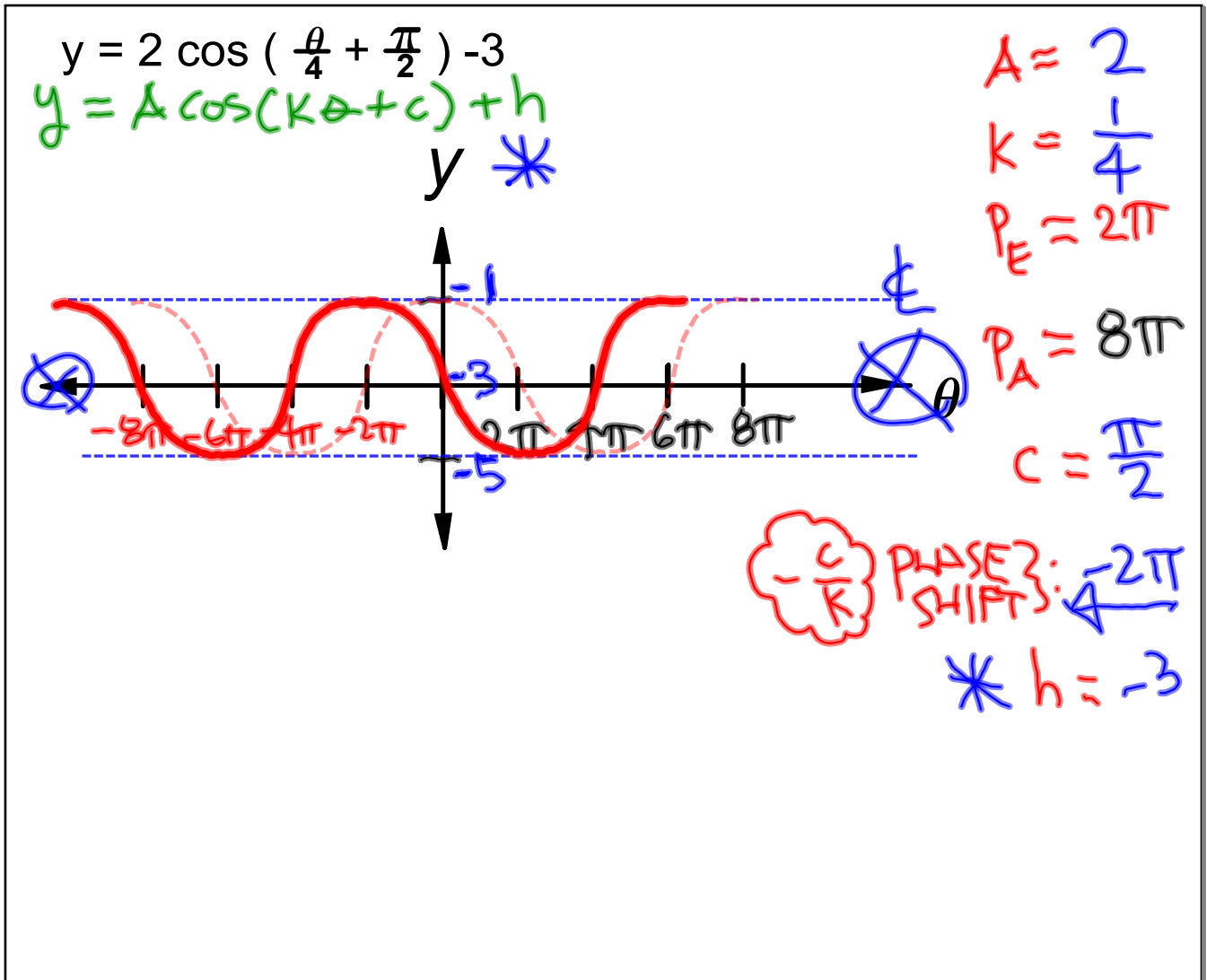
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# Sketching Graphs of Sinusoidal Synopsis

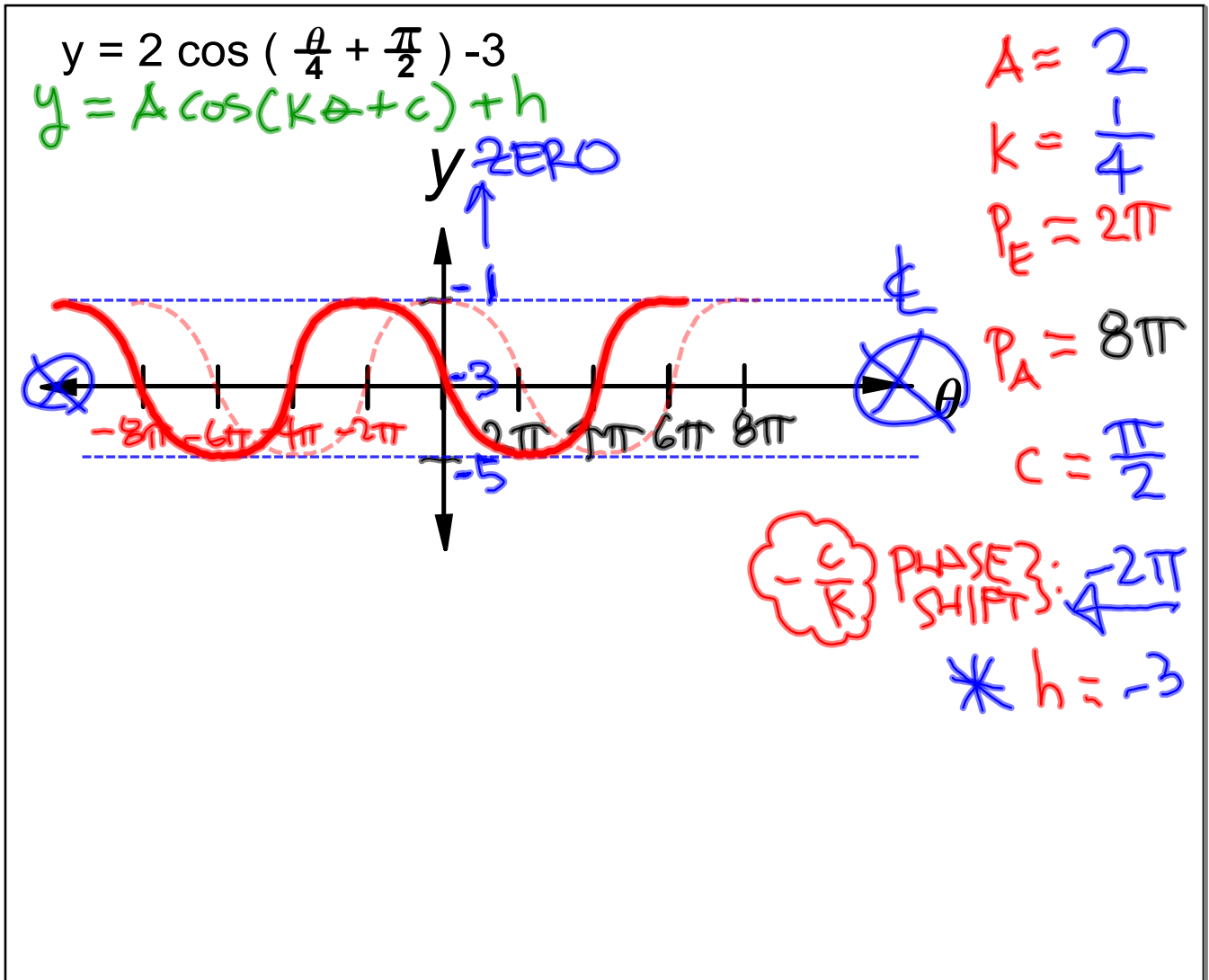


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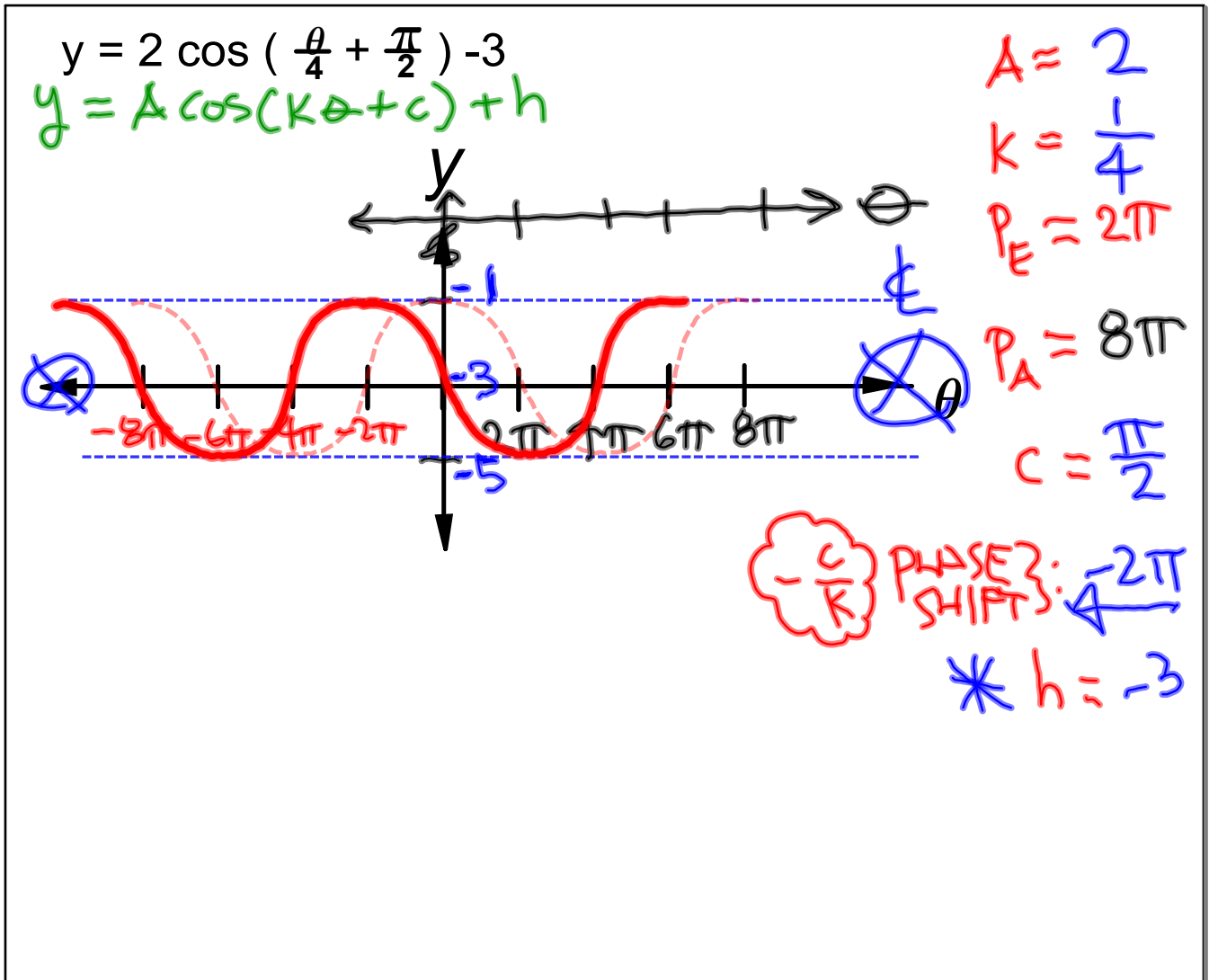




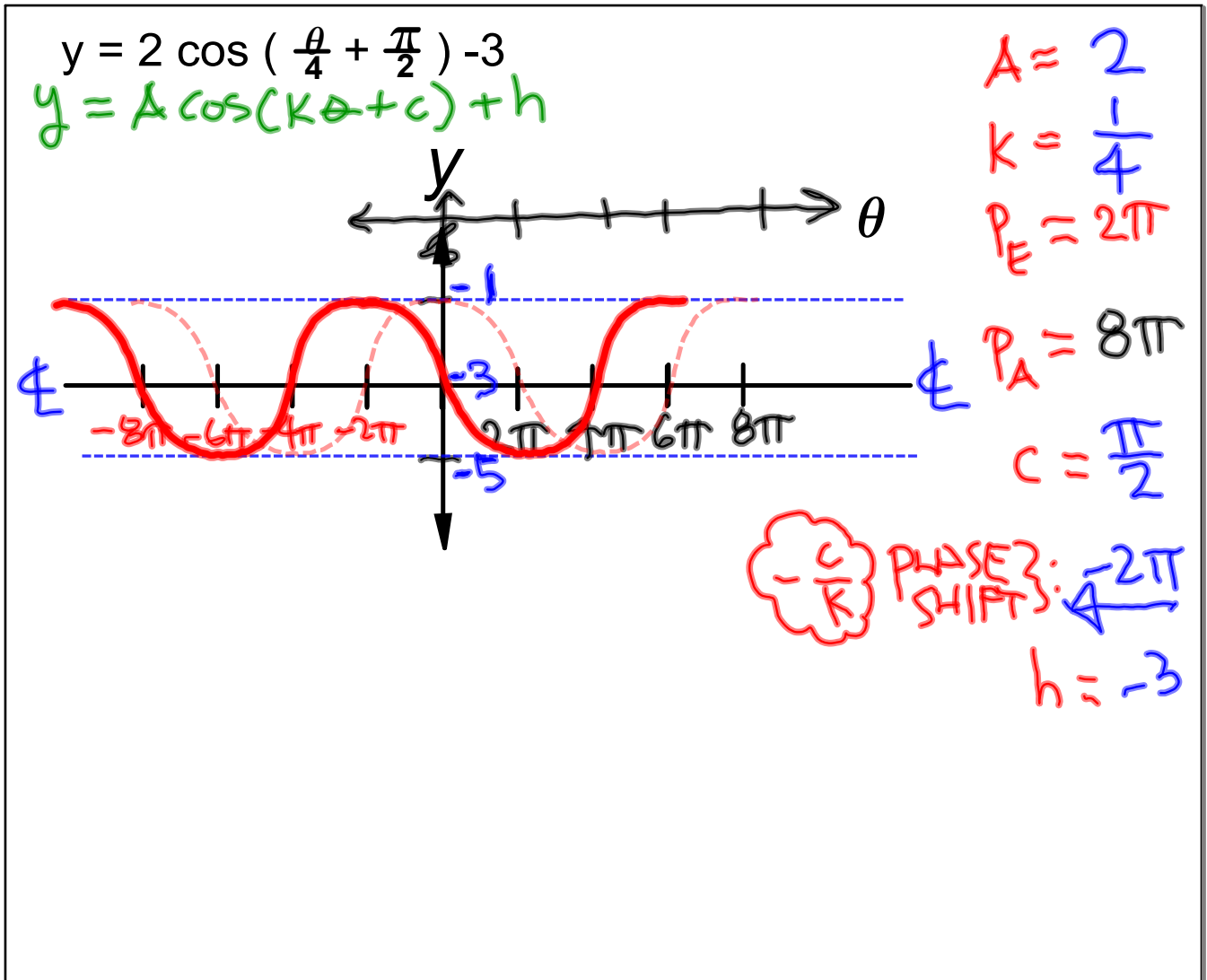
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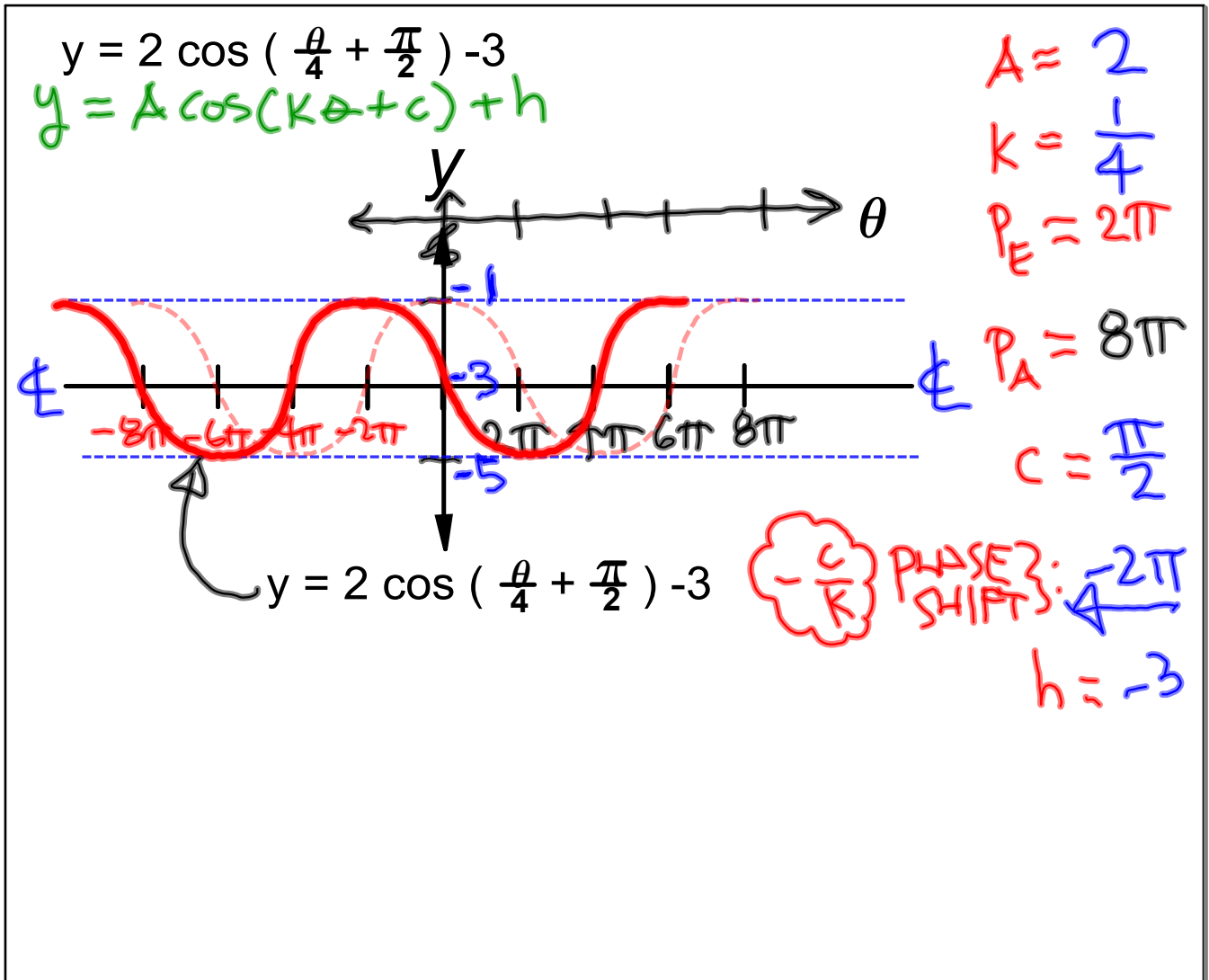
# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis



# Sketching Graphs of Sinusoidal Synopsis



# Student Questions:

$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$A$                        $K$                        $C$                        $h$

ASSESS:

$$\textcircled{22} \quad y = 6 \sin \left( \theta + \frac{\pi}{3} \right) + 2$$

$A$                        $K$                        $C$                        $h$

ASSESS:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$



$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$A$                        $K$                        $C$                        $h$

ASSESS:

SKETCH:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$A$                        $K$                        $C$                        $h$

ASSESS:

SKETCH:

SHIFT:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

$$\textcircled{22} \quad y = 6 \sin \left( \theta + \frac{\pi}{3} \right) + 2$$

$A$                        $K$                        $C$                        $h$

ASSESS:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

SKETCH:

SHIFT:

$$\text{PHASE: } -\frac{C}{K}$$

$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$A$                        $K$                        $C$                        $h$

ASSESS:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

SKETCH:

SHIFT:

$$\text{PHASE: } -\frac{C}{K}$$

$$-\left(\frac{\frac{\pi}{3}}{1}\right) =$$

$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$A$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

SKETCH:

SHIFT:

PHASE:  $-\frac{C}{K}$

$$-\left(\frac{\frac{\pi}{3}}{1}\right) = -\frac{\pi}{3}$$

↙ ↘  
↖ ↗

$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$A$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

SKETCH:

SHIFT:

$$\text{PHASE: } -\frac{C}{K}$$

$$-\left(\frac{\frac{\pi}{3}}{1}\right) = -\frac{\pi}{3}$$

↙  
↘

VERTICAL

$$h = 2$$

$$\textcircled{22} \quad y = 6 \sin \left( -\theta + \frac{\pi}{3} \right) + 2$$

$A$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

SKETCH:

SHIFT:

$$\text{PHASE: } -\frac{C}{K}$$

$$-\left(\frac{\frac{\pi}{3}}{1}\right) = -\frac{\pi}{3}$$

↙  
↘

VERTICAL

$$h = 2 \uparrow$$

$$\textcircled{22} \quad y = 6 \sin \left( \theta + \frac{\pi}{3} \right) + 2$$

$A$        $K$        $C$        $h$

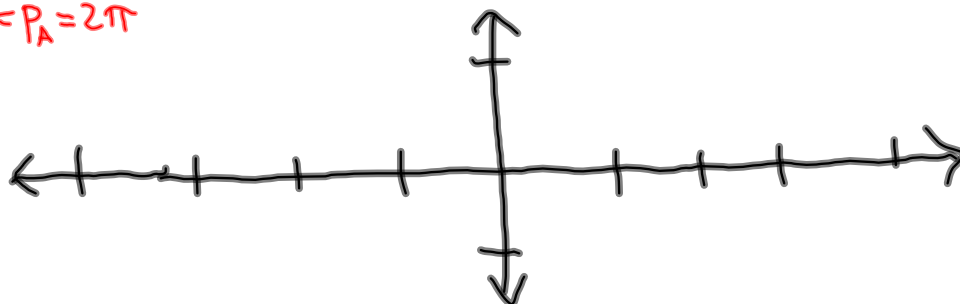
ASSESS:

$$A = 6$$

$$K = 1$$

$$P_E = P_A = 2\pi$$

SKETCH :





②  $y = 6 \sin \left( \theta + \frac{\pi}{3} \right) + 2$

$A$  \*  $K$   $C$   $h$

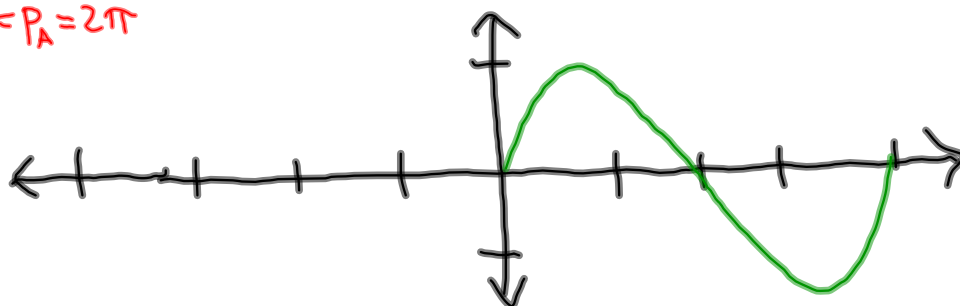
ASSESS:

$A = 6$

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :



22  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

$A$  \*  $K$   $C$   $h$

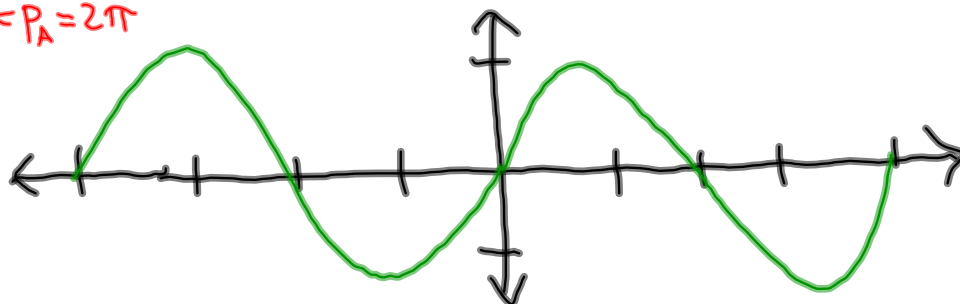
ASSESS:

$A = 6$

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :



②  $y = 6 \sin\left(-\theta + \frac{\pi}{3}\right) + 2$

$A$  \*  $K$   $C$   $h$

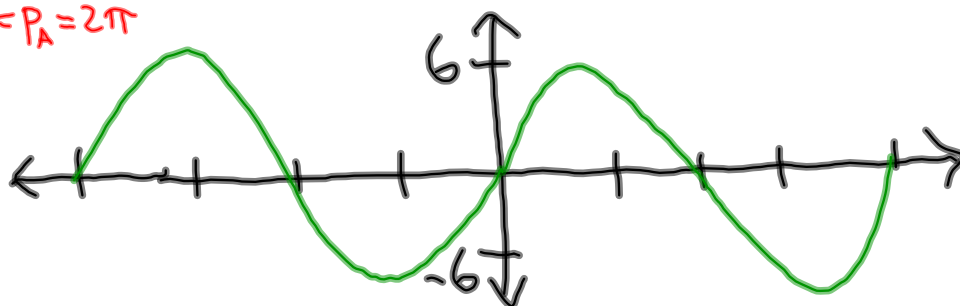
ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :



②  $y = 6 \sin\left(-\theta + \frac{\pi}{3}\right) + 2$

A \* K C h

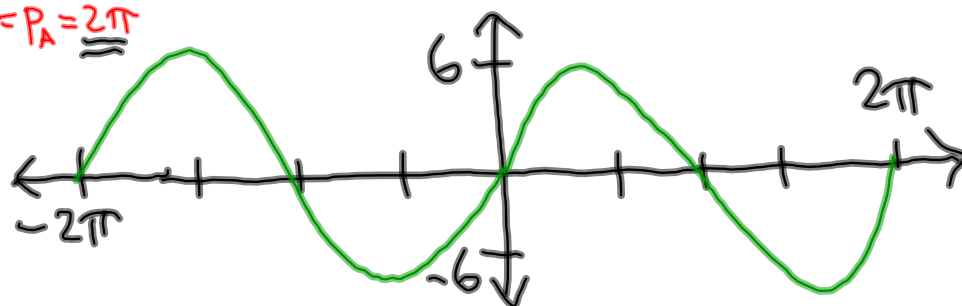
ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :



②  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

A \* \* K      C      h

ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

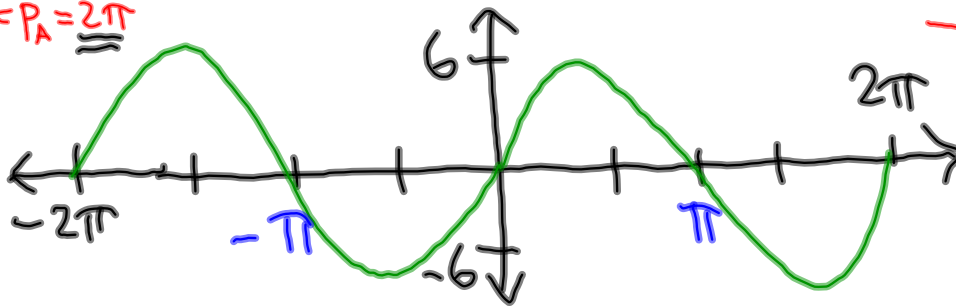
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

VERTICAL

$h = 2$



②  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

A \* K C h

ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

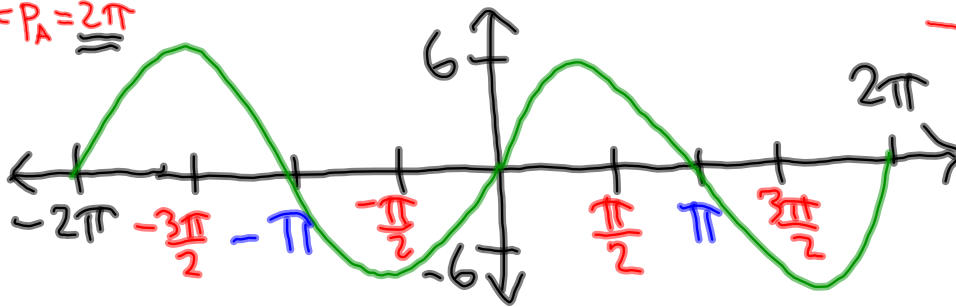
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

VERTICAL

$h = 2$



②  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

$A$ 
 $*$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$A = 6 *$

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

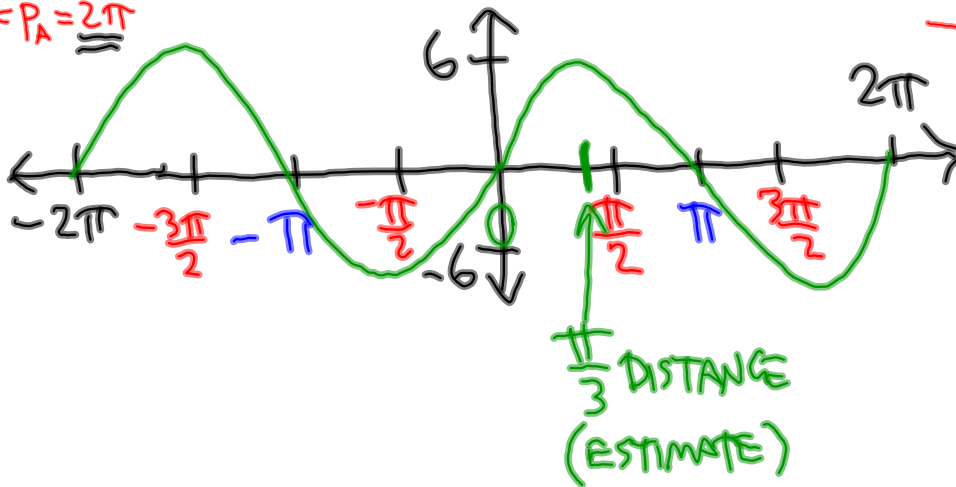
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

VERTICAL

$h = 2 \uparrow$



②  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

A \* K C h

ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

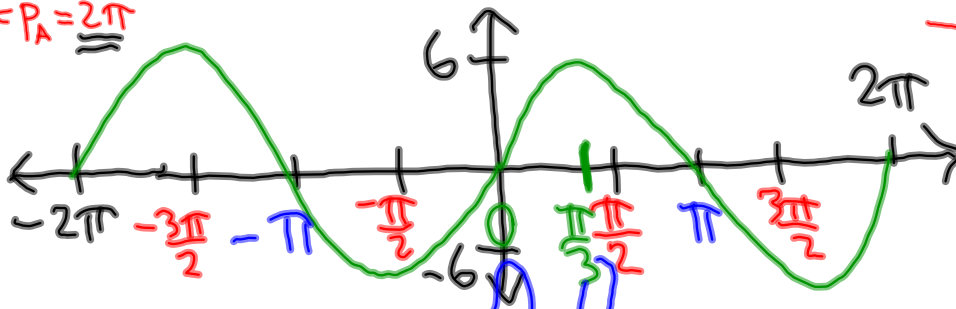
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

VERTICAL

$h = 2$



MEASURE W/ FINGERS  
& TRANSFER TO VARIOUS  
LOCATIONS...



22  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

$A$ 
 $*$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$A = 6 *$

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

SHIFT:

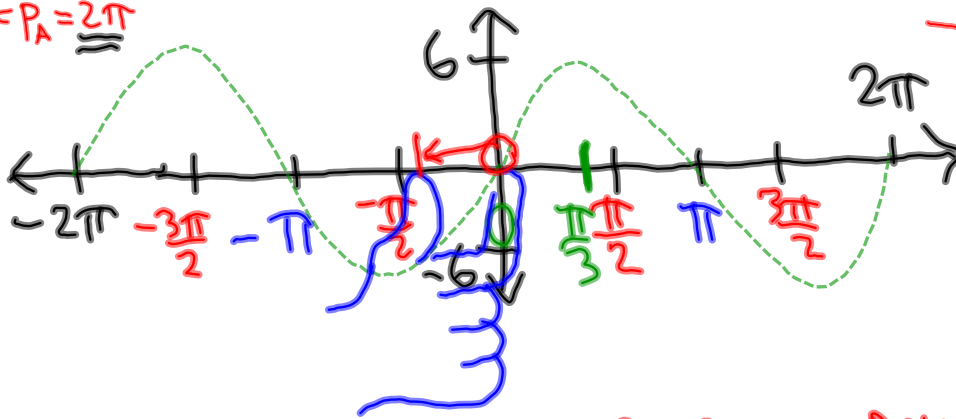
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

$\leftarrow \frac{\pi}{3}$

VERTICAL

$h = 2 \uparrow$



MY STARTING POINT  
GOES  $\leftarrow \frac{\pi}{3}$

(22)  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

$A$ 
 $*$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$A = 6 *$

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

SHIFT:

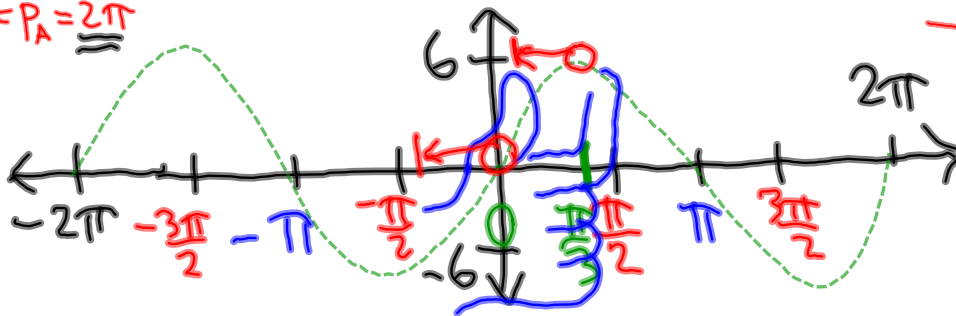
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

$\leftarrow \frac{\pi}{3}$

VERTICAL

$h = 2 \uparrow$



PEAK MOVES  
BACK ALSO, ETC...

②  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

$A$ 
 $*$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$A = 6 *$

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

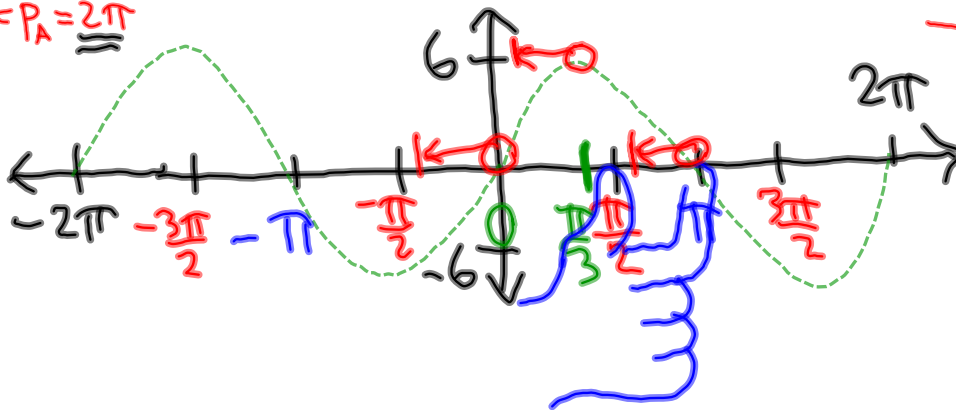
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

VERTICAL

$h = 2$



(22)  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

A \* K C h

ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

SHIFT:

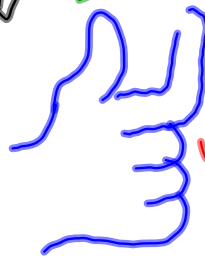
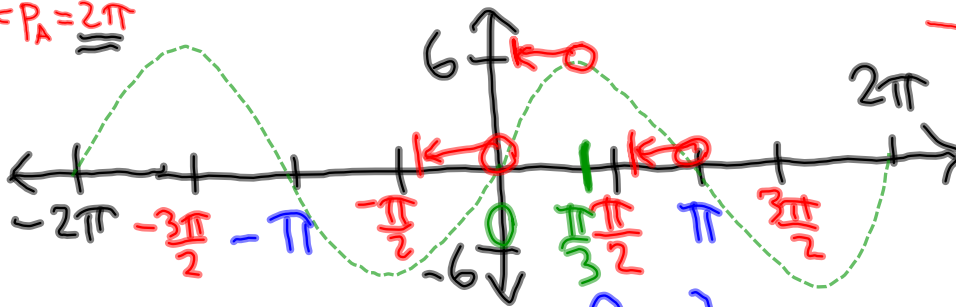
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

$\leftarrow \frac{\pi}{3}$

VERTICAL

$h = 2$



UNTIL I HAVE ENOUGH TO DRAW NEW WAVE

(22)  $y = 6 \sin\left(\theta + \frac{\pi}{3}\right) + 2$

$A$ 
 $*$ 
 $K$ 
 $C$ 
 $h$

ASSESS:

$A = 6 *$

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

SHIFT:

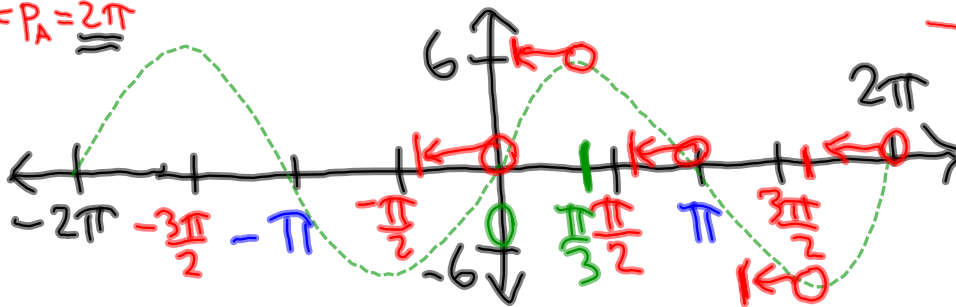
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

$\leftarrow \frac{\pi}{3}$

VERTICAL

$h = 2 \uparrow$



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$K = 1$

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SKETCH :

SHIFT:

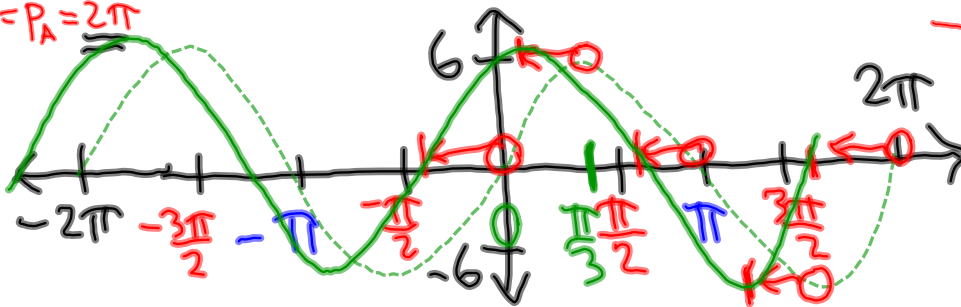
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

$\leftarrow \frac{\pi}{3}$

VERTICAL

$h = 2 \uparrow$



UNTIL I HAVE  
ENOUGH TO DRAW  
NEW WAVE

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$A = 6$  \*

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SKETCH :

SHIFT:

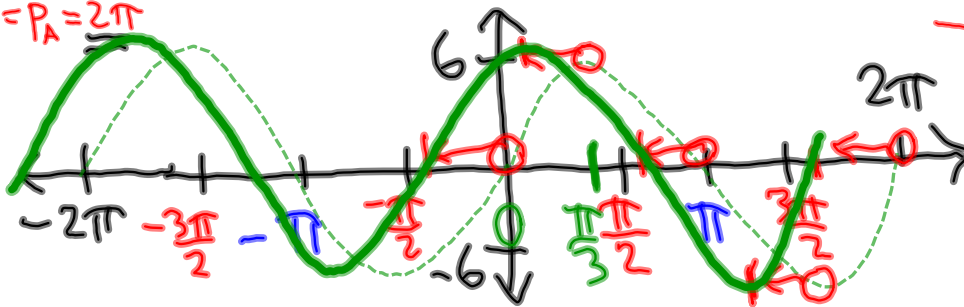
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

←  $\frac{\pi}{3}$  H

VERTICAL

$h = 2$  ↑



UNTIL I HAVE ENOUGH TO DRAW NEW WAVE

②  $y = 6 \sin(\theta + \frac{\pi}{3}) + 2$

A \* K K C h  
?

ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

SHIFT:

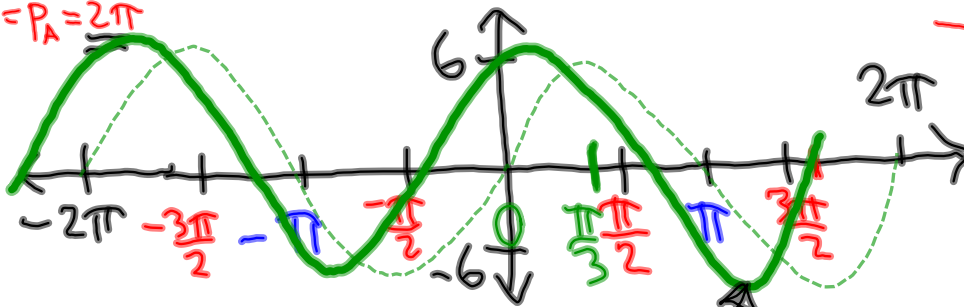
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

$\leftarrow \frac{\pi}{3}$

VERTICAL

$h = 2$



$y = 6 \sin(\theta + \frac{\pi}{3})$  ?



②  $y = 6 \sin(\theta + \frac{\pi}{3}) + 2$

A \* K K C h  
?

ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

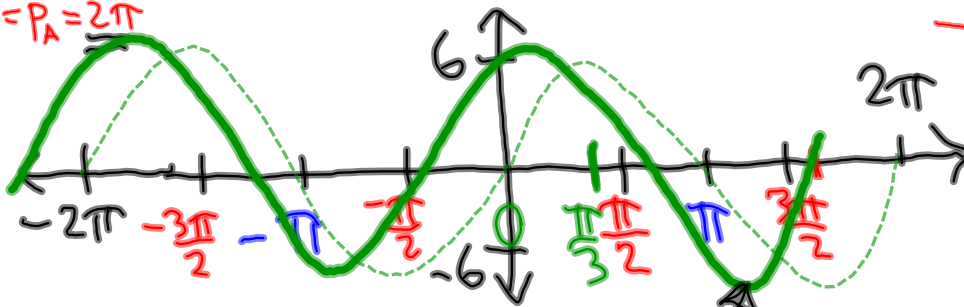
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

VERTICAL

$h = 2$



$y = 6 \sin(\theta + \frac{\pi}{3})$  ?

$\uparrow +2$

②  $y = 6 \sin(\theta + \frac{\pi}{3}) + 2$

A \* K K C h  
?

ASSESS:

$A = 6$  \*

$K = 1$

$P_E = P_A = 2\pi$

SKETCH :

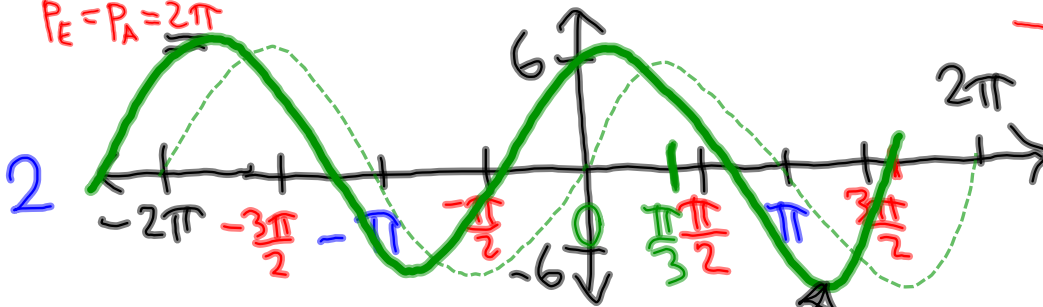
SHIFT:

PHASE:  $-\frac{C}{K}$

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VERTICAL

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SKETCH :

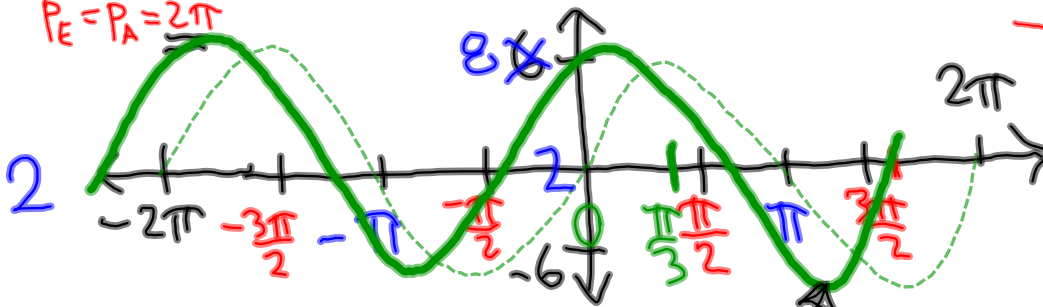
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

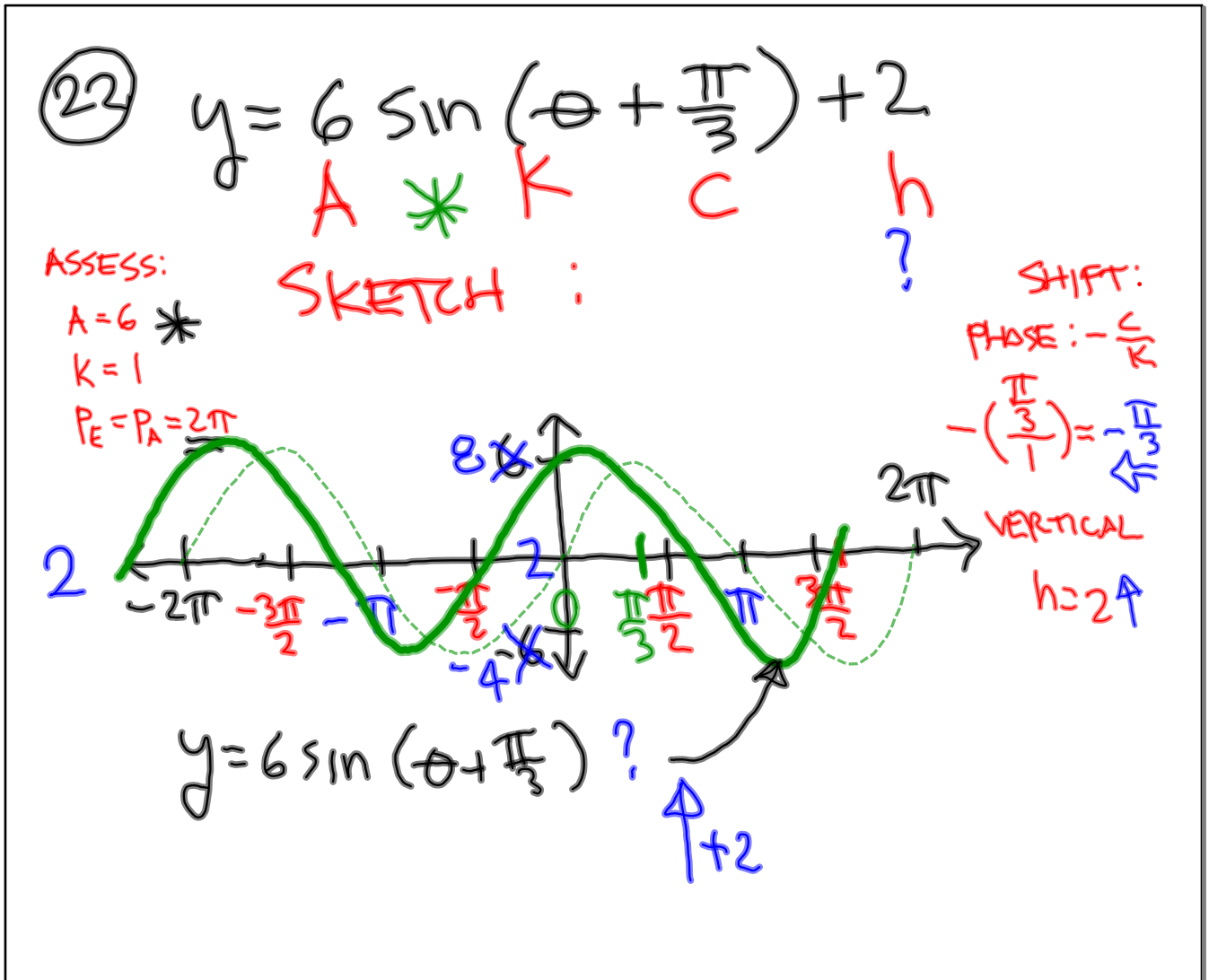
VERTICAL

$h = 2$



$y = 6 \sin(\theta + \frac{\pi}{3})$  ?

$\uparrow +2$



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$A = 6$  \*

$K = 1$

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SKETCH :

SHIFT:

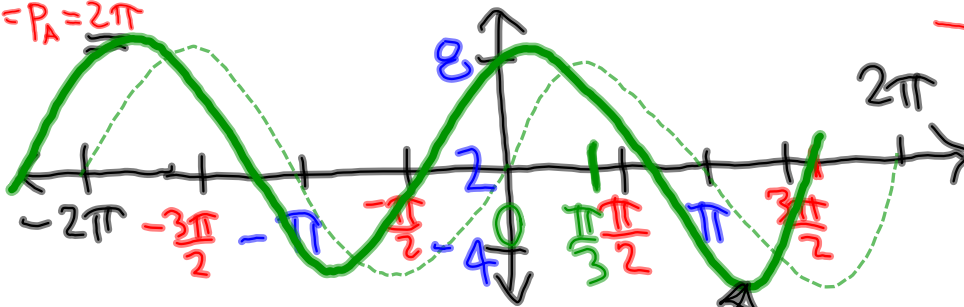
PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$

$\leftarrow \frac{\pi}{3}$

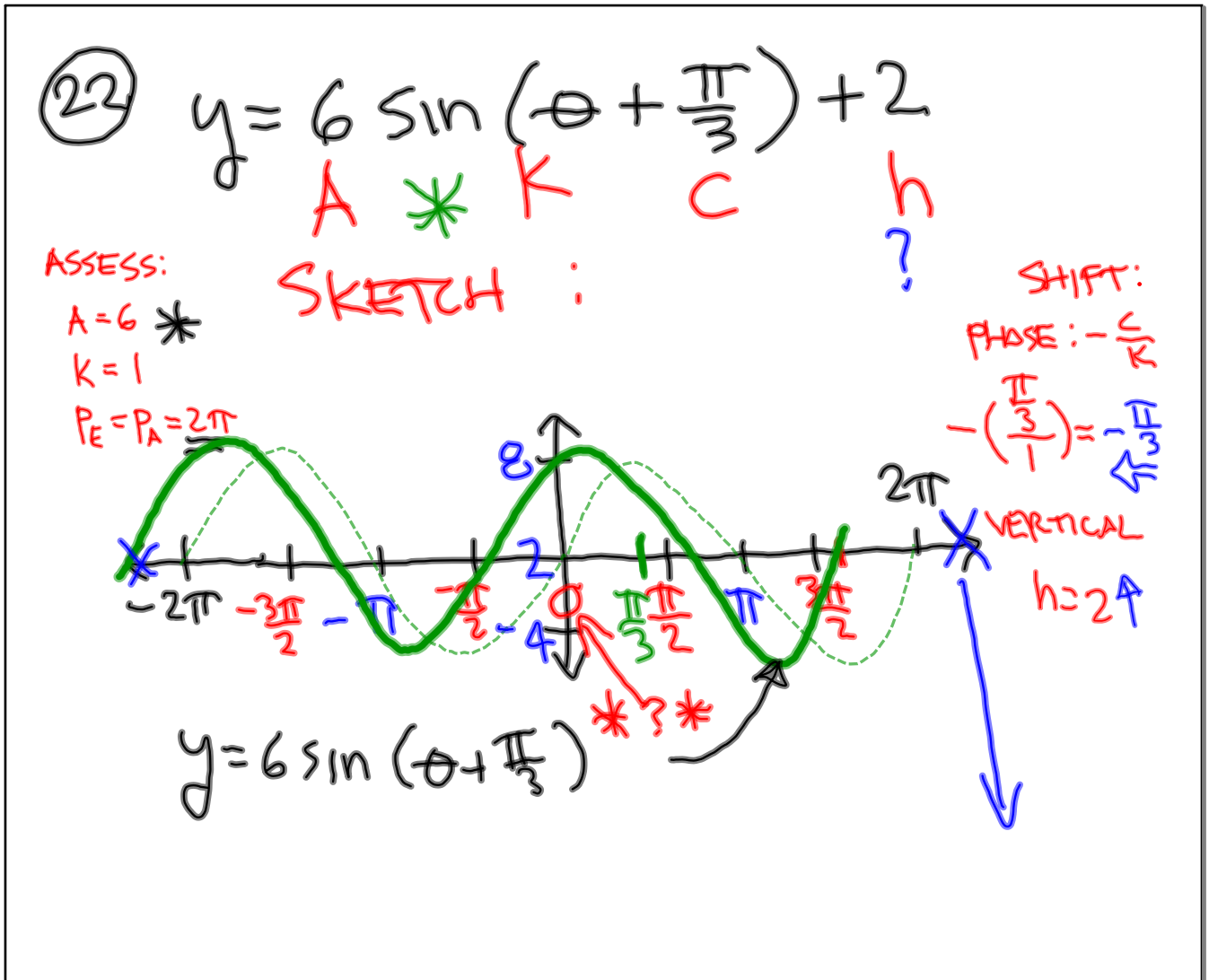
VERTICAL

$h = 2$



$y = 6 \sin(\theta + \frac{\pi}{3})$  ?

$\uparrow +2$



②  $y = 6 \sin(\theta + \frac{\pi}{3}) + 2$

A \* K K C h  
?

ASSESS:

$A = 6$  \*  
 $K = 1$   
 $P_E = P_A = 2\pi$

SKETCH :

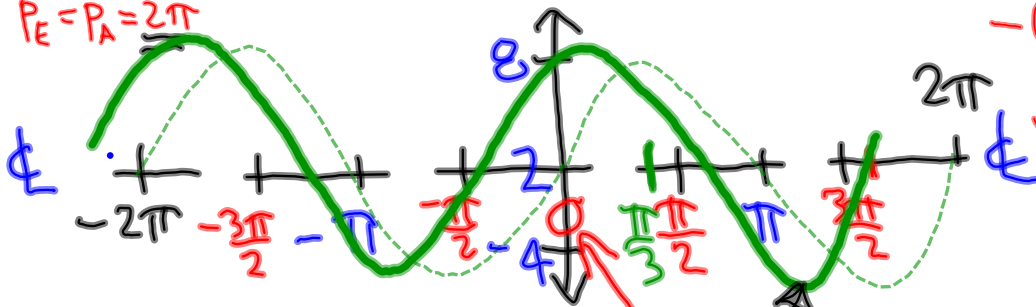
SHIFT:

PHASE:  $-\frac{C}{K}$

$-\left(\frac{\pi}{3}\right) = -\frac{\pi}{3}$   
↙  $\frac{\pi}{3}$

VERTICAL

$h = 2$  ↑



$y = 6 \sin(\theta + \frac{\pi}{3})$  \* ? \*

