

8.4: Sinusoidal Functions

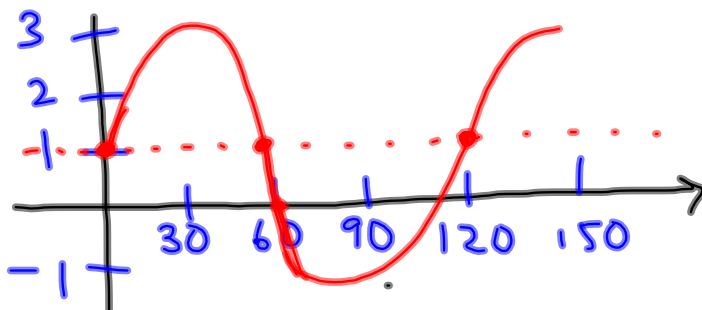
$$y = a \cos b(x-c) + d$$

↑
↑
↑
 amplitude period midline
 $\frac{360^\circ}{b}$

example) $y = 2 \sin 3(x) + 1$

↑
↑
↑
 amplitude $\frac{360^\circ}{3} = 120^\circ$ midline

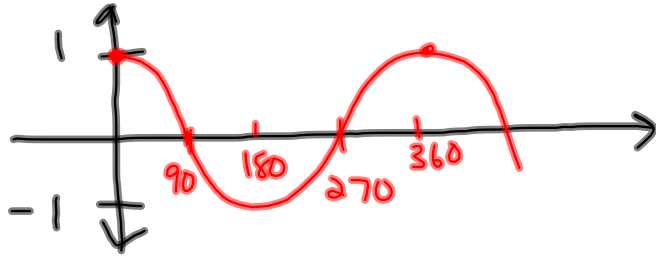
* Sin starts at the midline



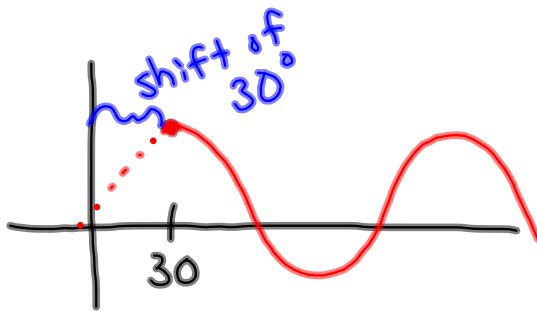
range: $\{y \mid -1 \leq y \leq 3, y \in \mathbb{R}\}$

④ The effect of 'c'

$$y = \cos x$$



$$y = \cos(x - 30^\circ)$$



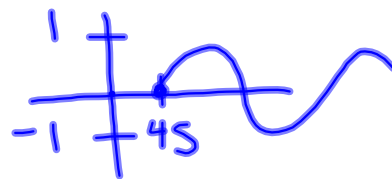
Five Key pts

x	y		x	y
0	1	→	0	.866
90	0		90	0.5
180	-1		180	-0.866
270	0			
360	1			

old table

examples

① $\sin(x - 45^\circ)$
 shift right 45°



② $\cos(x + 90^\circ)$
 shift -90° , which means to left

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Example 1:

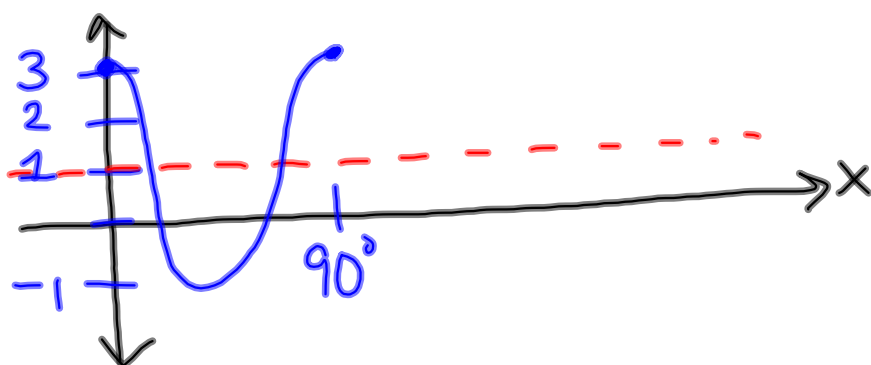
$$y = 2\cos 4x + 1$$

amplitude : 2

midline : 1

range $\{y \mid -1 \leq y \leq 3, y \in \mathbb{R}\}$ period : $\frac{360^\circ}{4} = 90^\circ$

horizontal shift : none



ex. 2 $y = 3\sin 2(x - 45^\circ)$

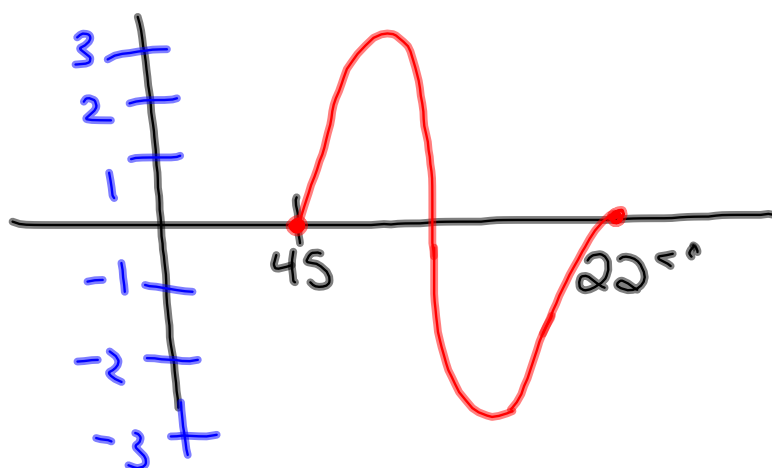
amplitude : 3

midline : $y = 0$

range : $|y| - 3 \leq y \leq 3, y \in \mathbb{R}$

period : $\frac{360}{2} = 180^\circ$

horizontal shift : 45°



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6, 8, 9, 10, 13, 14, 15