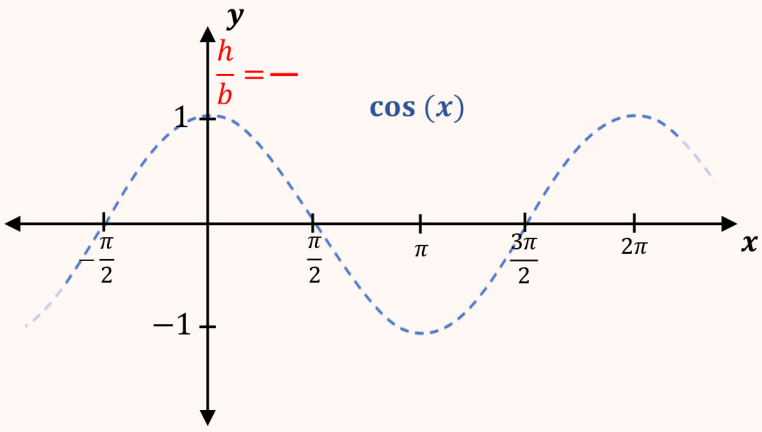
TOPIC: PHASE SHIFTS OF SINE & COSINE

Phase Shifts

◆ **Phase shift** (h): a _____ shift (left/right), indicated by numbers **[INSIDE | OUTSIDE]** parentheses.

- A phase shift can make a *cosine* graph look like a _____ graph.

New **Phase Shifts of Sine & Cosine Graphs**



x	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
$\cos x$	1	0	-1	0	1
$\cos\left(x-\frac{\pi}{2}\right)$					

$y = A\sin\ (bx - \_\_\_^{*}) + k$

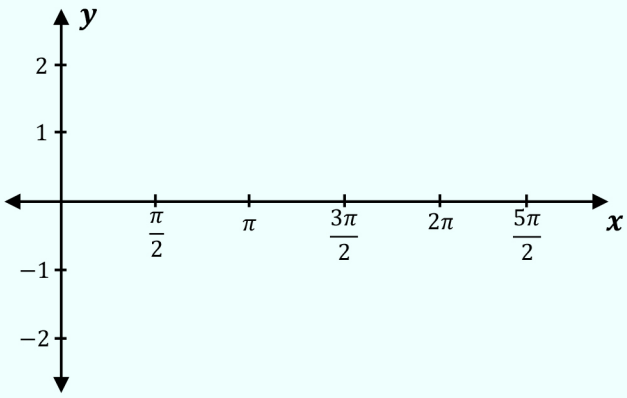
$y = A\cos\ (bx - \_\_\_^{*}) + k$

If given $(bx - \#)$ h is positive and graph shifts **[← | →]** by $\frac{h}{b}$

If given $(bx + \#)$ h is negative and graph shifts **[← | →]** by $\frac{h}{b}$

*you may see other letters for this (ϕ, C, d)

EXAMPLE Graph $y = \sin(2x + \pi)$ over one full period.



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PRACTICE Describe the phase shift for the following function: $y = \cos\left(5x - \frac{\pi}{2}\right)$

PRACTICE Describe the phase shift for the following function: $y = \cos\left(2x + \frac{\pi}{6}\right)$

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EXAMPLE Graph the function $y = 3 \cdot \sin(x + \pi)$.