

Student Workbook

Graphs of Sine and Cosine Functions

Learning Target: I can identify and graph transformations of sine and cosine functions, and write an equation from graph features.

Vocabulary

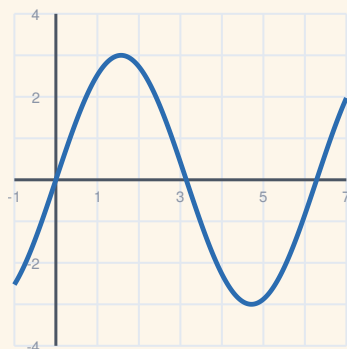
Term	Meaning
Amplitude	$ A $ — half the distance between the max and min values.
Period	$2\pi/ B $ — the length of one complete cycle.
Phase Shift	C — the horizontal shift in $y=A\sin(B(x-C))+D$.
Midline	$y=D$ — the horizontal line halfway between max and min.

Key Concept: The General Form

$y = A \sin(B(x-C)) + D$ or $y = A \cos(B(x-C)) + D$ Amplitude = $|A|$ Period = $2\pi/|B|$ Phase shift = C
Midline = $y=D$

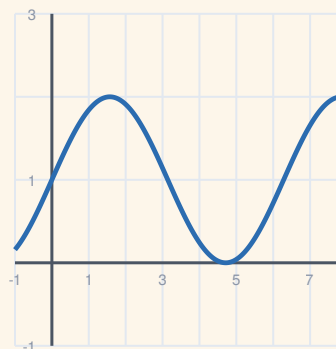
EXAMPLE 1

$y = 3\sin(x)$ (amplitude 3, period 2π)



EXAMPLE 2

$y = \cos(x-\pi/2)+1$ (shift right $\pi/2$, up 1)



COMMON MISTAKE

The period formula is $2\pi/|B|$ — students often multiply by B instead of dividing! Also, amplitude is always POSITIVE ($|A|$), even if A is negative.

Key Concept: Writing the Equation from a Graph

EXAMPLE 3

A graph has amplitude 4, period π , midline $y=2$, no phase shift. Write the equation using sine.

Period: $\pi = 2\pi/B \rightarrow B = \underline{\hspace{2cm}}$ Equation: $y = \underline{\hspace{2cm}}$

Guided Practice — Part A: Identify Amplitude, Period, Midline

A1 $y = 5\cos(x)$

A2 $y = 2\sin(3x) - 1$

Guided Practice — Part B: Find the Period

B1 $y = \sin(2x)$

B2 $y = \cos(x/2)$

Guided Practice — Part C: Graph with Shifts

C1 $y = \sin(x - \pi/4)$

C2 $y = \cos(x) + 3$

Guided Practice — Part D: Write the Equation

D1 Amplitude 2, period 4π , midline $y=0$, no phase shift. Write using sine.

D2 Amplitude 5, period π , midline $y=-2$, no phase shift. Write using cosine.

BEFORE YOU MOVE ON

Check with a partner: did you divide 2π by B (not multiply) to find the period?