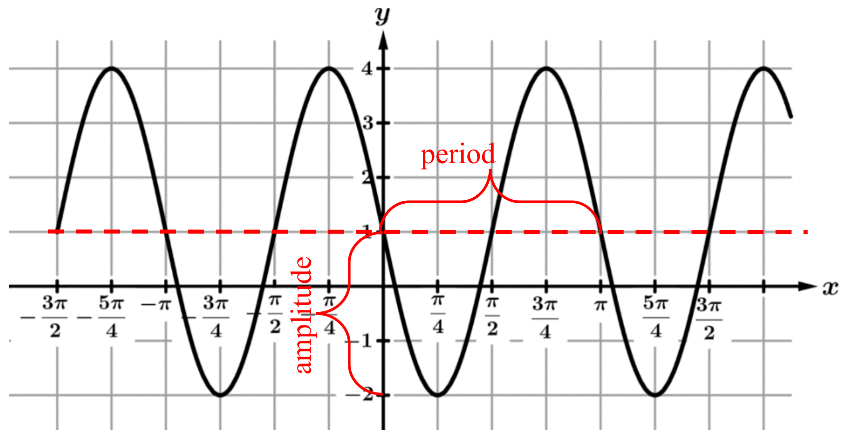
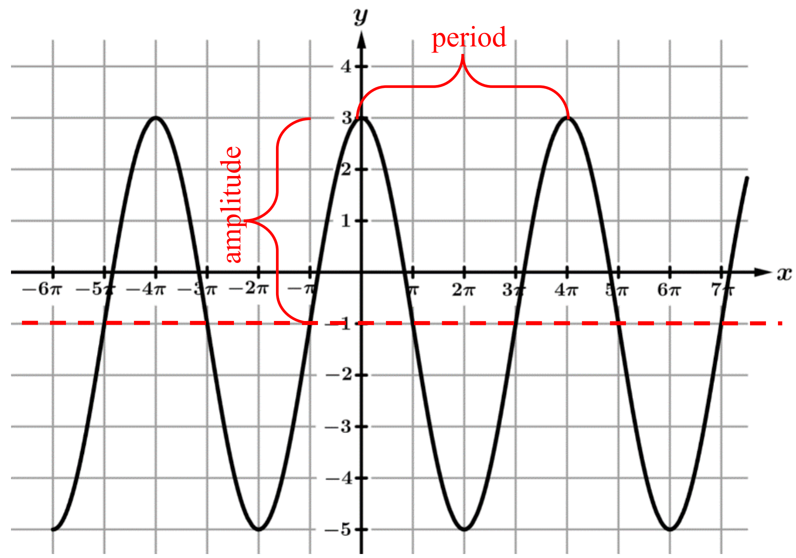


Graph of *h*

1. The graph of the sinusoidal function h is shown in the figure above. The function h can be written as $h(\theta) = a\sin(b\theta) + d$. Find the values of the constants a, b, and d.

A sine curve reflected over the midline $y = 1$. Amplitude 3 $\boxed{a = -3}$ because of the reflection, vertical shift $\boxed{1 = d}$

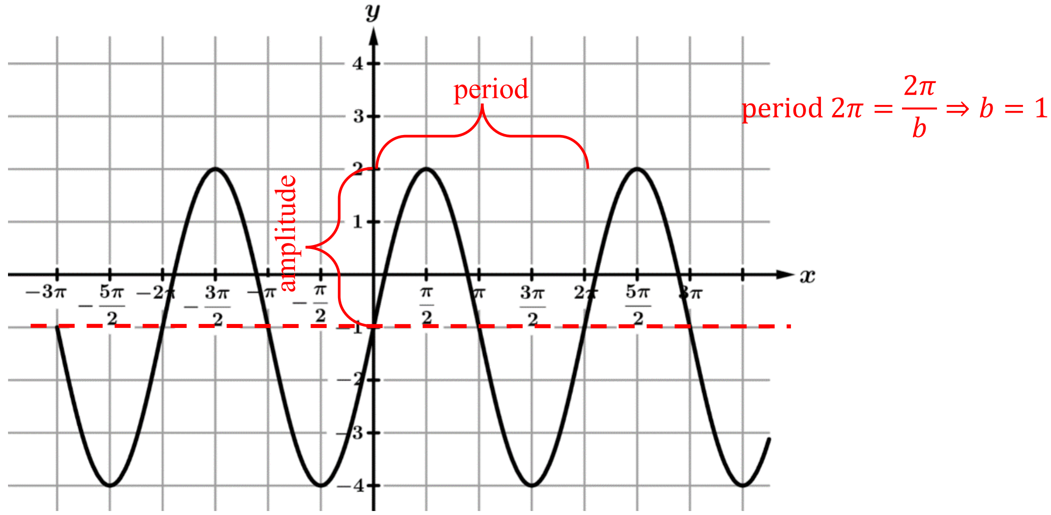
period $\pi = \dfrac{2\pi}{b} \Rightarrow \boxed{b = 2}$



Graph of *f*

2. The graph of the sinusoidal function f is shown in the figure above. The function f can be written as $f(\theta) = a\cos(b\theta) + d$. Find the values of the constants a, b, and d.

Amplitude 4 $\boxed{a = 4}$ vertical shift $\boxed{-1 = d}$ period $4\pi = \dfrac{2\pi}{b} \Rightarrow b = \dfrac{2\pi}{4\pi}$ $\boxed{b = \dfrac{1}{2}}$



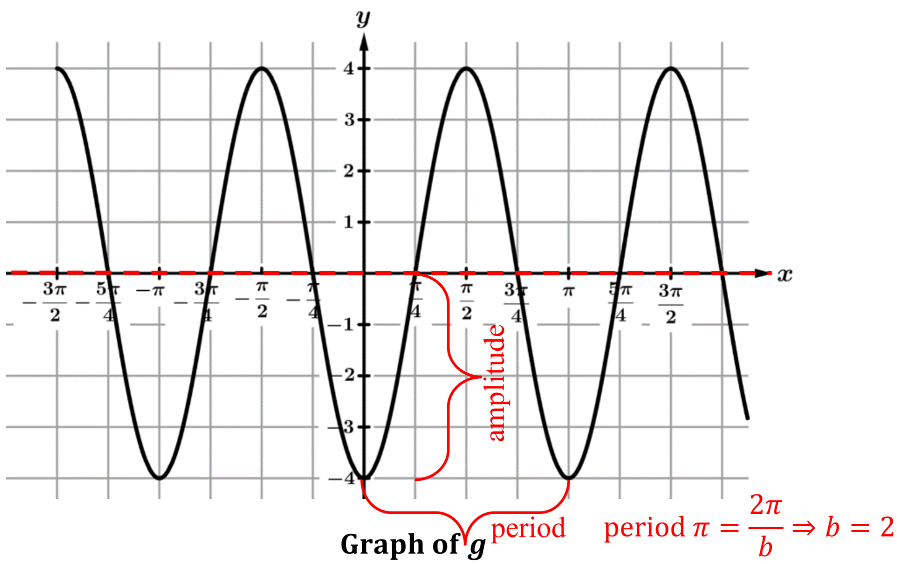
Graph of *h*

3. The figure shows the graph of a trigonometric function h. Which of the following could be an expression for $h(x)$

(A) $-3\sin(x)-2$ (B) $3\sin(x-\pi)-1$ (C) $-3\cos\left(x-\frac{3\pi}{2}\right)-1$ (D) $3\cos\left(\left(x+\frac{\pi}{2}\right)\right)-1$

The midline is $y = -1$ which eliminates (A). Looks like a sine curve with no horizontal shift but that is none of the choices. The amplitude is 3 and $a = 3$ but choice (B) has a horizontal shift to the right of π which means there needs to be a reflection over the midline and $a = -3$ which eliminates (B).

A cosine curve shifted to the right $\frac{3\pi}{2}$ will require a reflection over the midline so $a = -3$.

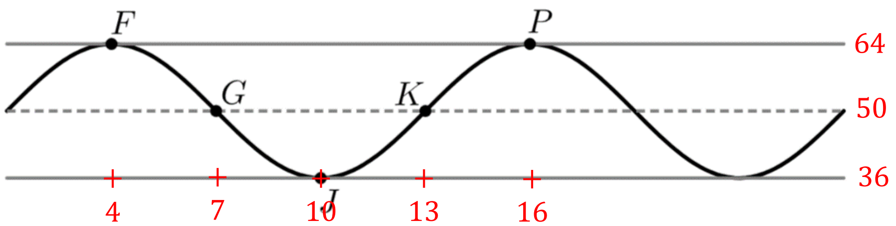


Graph of *g*

4. The figure shows the graph of a trigonometric function g. Which of the following could be an expression for $g(x)$

(A) $4\cos(2x)$ (B) $4\cos\left(2\left(x-\frac{\pi}{4}\right)\right)$ (C) $-4\cos\left(2\left(x-\frac{\pi}{2}\right)\right)$ (D) $-4\cos(2(x-\pi))$

Looks like a cosine curve with no vertical shift, $d = 0$ and no horizontal shift with a reflection over the x −axis. Choice (A) is eliminated because there is no reflection, $a = 4 > 0$. Amplitude is 4 with a reflection over the midline so $a = -4$. $g(x) = -4\cos(2x)$ which is not one of the choices. Choice (D) has a shift of 1 period to the right.



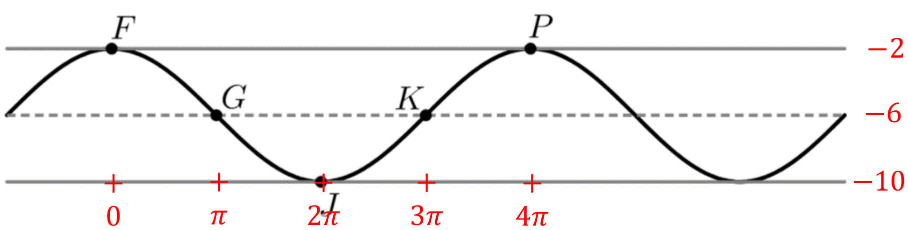
5. The graph of h and its dashed midline for two full cycles is shown. Five points, $F, G, J, K,$ and P are labeled on the graph. No scale is indicated, and no axes are presented.

The coordinates for the five points $F, G, J, K,$ and P are $F(4, 64)$, $G(7, 50)$, $J(10, 36)$, $K(13, 50)$, $P(16, 64)$.

The function h can be written in the form $h(t) = a\cos(b(t+c)) + d$. Find values of constants $a, b, c,$ and d.

amplitude $a = 64 - 50 = 14$ period $= 16 - 4 = 12 = \frac{2\pi}{b} \Rightarrow b = \frac{2\pi}{12} = \frac{\pi}{6}$ $d = 50$ midline $y = 50$

$b(t + c) = 0$ $\frac{\pi}{6}(4 + c) = 0 \Rightarrow 4 + c = 0 \Rightarrow c = -4$



6. The graph of h and its dashed midline for two full cycles is shown. Five points, $F, G, J, K,$ and P are labeled on the graph. No scale is indicated, and no axes are presented.

The coordinates for the points $F, G, J, K,$ and P are $F(0, -2), G(\pi, -6), J(2\pi, -10), K(3\pi, -6), P(4\pi, -2)$

The function h can be written in the form $h(t) = a\sin(b(t+c)) + d$. Find values of constants $a, b, c,$ and d.

amplitude $a = -2 - (-6) = 4$ period $= 4\pi = \frac{2\pi}{b} \Rightarrow b = \frac{2\pi}{4\pi} = \frac{1}{2}$ $d = -6$ midline $y = -6$

The maximum value of a sine curve occurs at $x = \frac{\pi}{2}$ On $h(t)$, the maximum is $h(0)$

$b(t + c) = \frac{\pi}{2}$ $\frac{1}{2}(0 + c) = \frac{\pi}{2} \Rightarrow \frac{1}{2}c = \frac{\pi}{2} \Rightarrow c = \pi$