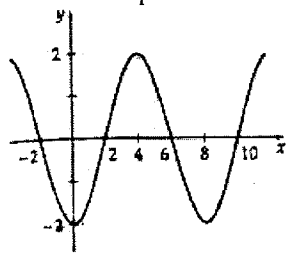
Example 6 Write an equation in the form y = Asin(Bx) or y = Acos(Bx) for each graph.

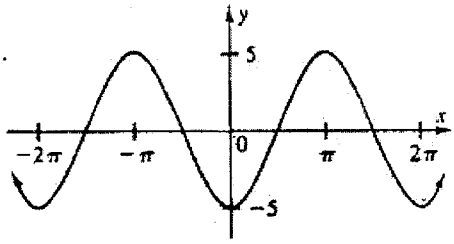
A.



cosine
reflected over x-axis
amp = 2 ⇒ A = −2
period = 8 $\frac{2\pi}{|B|} = 8$
$2\pi = 8B$
$B = \frac{2\pi}{8} = \frac{\pi}{4}$

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

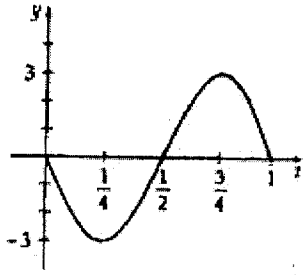
B.



cosine
reflected
amp = 5 } A = −5
period = 2π
$\frac{2\pi}{|B|} = 2\pi$
$B = 1$

$y = -5\cos(x)$

C.



sine
reflected
amp = 3 } A = −3
period = 1 $\frac{2\pi}{|B|} = 1$
$B = 2\pi$

$y = -3\sin(2\pi x)$

Example 7 Write an equation for each description or graph.

A. sine function; amplitude = 2, period = $\frac{\pi}{3}$, shifted down 1 unit

A = 2 $\frac{2\pi}{|B|} = \frac{\pi}{3}$
$\pi \cdot B = 6\pi$ $B = 6$

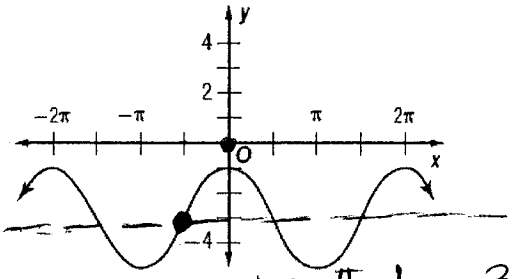
$y = 2\sin(6x) - 1$

B. cosine function; amplitude = 4, period = 3, shifted right $\frac{\pi}{8}$ units, shifted up 2 units

A = 4 $\frac{2\pi}{|B|} = 3$
$3B = 2\pi$
$B = \frac{2\pi}{3}$

$y = 4\cos\left(\frac{2\pi}{3}\left(x - \frac{\pi}{8}\right)\right) + 2$

C. sine equation

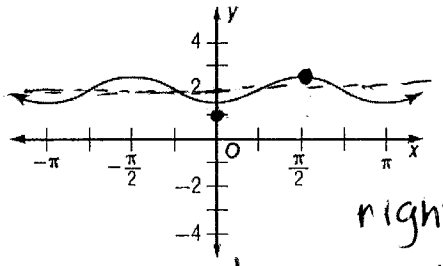


left $\frac{\pi}{2}$ down 3

amp = 2
per = 2π
$\frac{2\pi}{|B|} = 2\pi$
$B = 1$

$y = 2\sin\left(1x + \frac{\pi}{2}\right) - 3$

D. cosine equation



right $\frac{\pi}{2}$ up 2

amp = $\frac{1}{2}$
per = π
$\frac{2\pi}{|B|} = \pi$
$2\pi = \pi \cdot B$
$B = 2$

$y = \frac{1}{2}\cos\left(2\left(x - \frac{\pi}{2}\right)\right) + 2$

(midline is at y = 2)