Questions

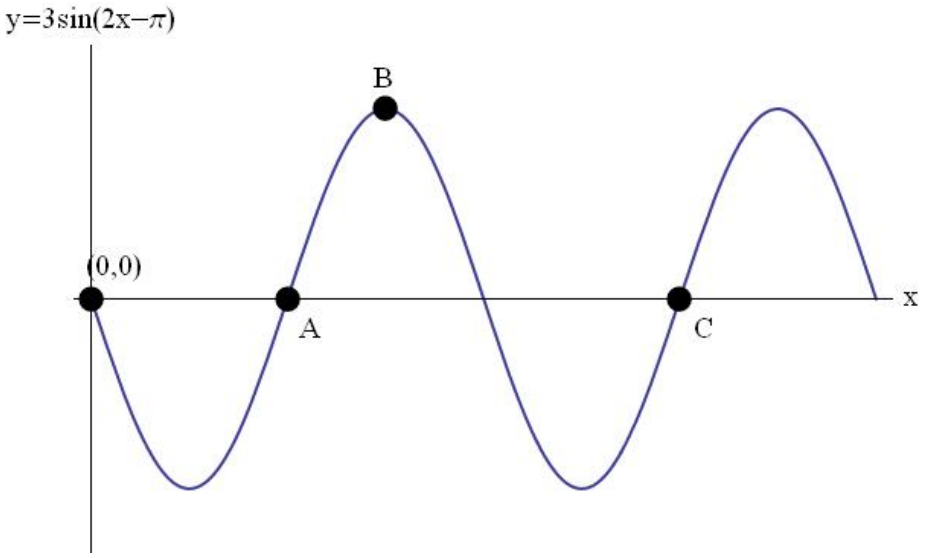
1. Find the amplitude, period, and frequency of the function and use this information to sketch the graph of the function.

$$y = -\frac{3}{2}\sin 2x.$$

2. State the amplitude and period of the sinusoid, and (relative to the basic function) the phase shift and vertical translation.

$$y = \frac{2}{3}\cos\left(\frac{x-3}{4}\right) + 1.$$

3. The graph of the sinusoid $y = 3\sin(2x - \pi)$ is given below. Find the value of the coordinates of the points A, B, and C.



Solutions

1. Find the amplitude, period, and frequency of the function and use this information to sketch the graph of the function.

$$y = -\frac{3}{2}\sin 2x.$$

The amplitude of this function is $\left|-\frac{3}{2}\right| = \frac{3}{2}$.

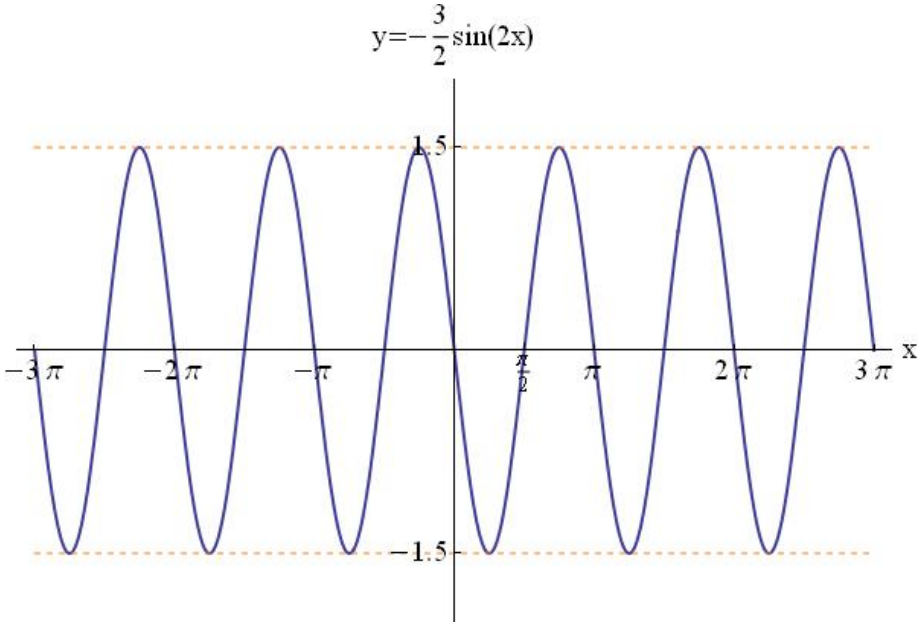
The sine function has period 2π. Therefore, $0 \leq 2x \leq 2\pi$ means $0 \leq x \leq \pi$, and this function has period π.

The frequency the reciprocal of the period, so this function has frequency $1/\pi$.

At $x = 0$ this function is zero, so it will pass through the origin.

Since there is a minus sign out front, this will be a sine function that is reflected about the x axis.

Sketch:



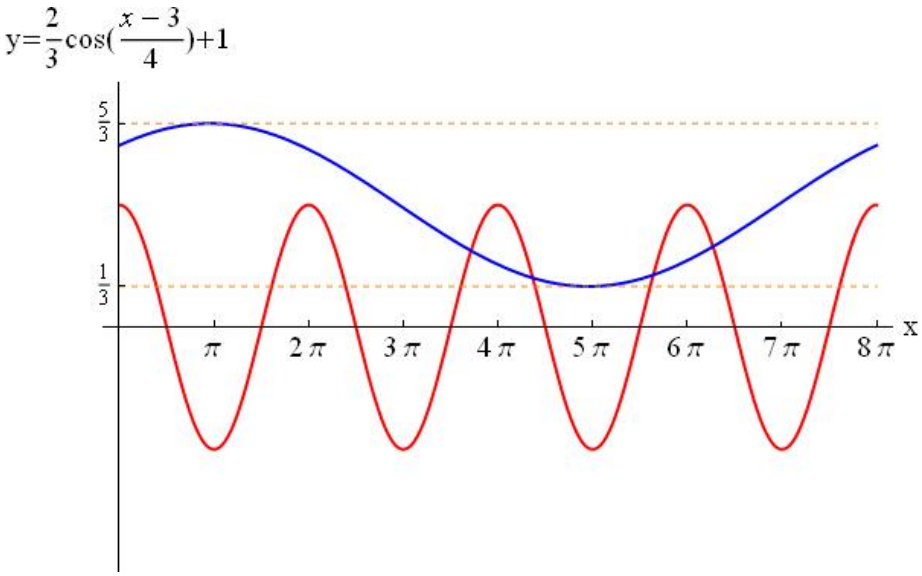
2. State the amplitude and period of the sinusoid, and (relative to the basic function) the phase shift and vertical translation.

$$y = \frac{2}{3}\cos\left(\frac{x-3}{4}\right) + 1.$$

The amplitude of the sinusoid is $\left|\frac{2}{3}\right| = \frac{2}{3}$.

The cosine function has period 2π. Therefore, $0 \leq \dfrac{x-3}{4} \leq 2\pi$ means $3 \leq x \leq 3 + 8\pi$, and this function has period 8π, and a phase shift of 3 units.

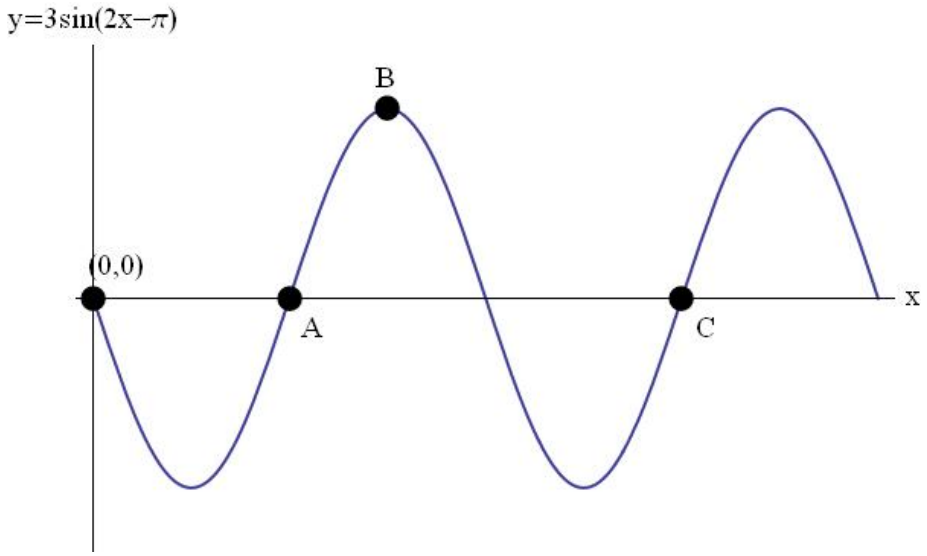
There is a vertical translation of $+1$ units.



The red sketch is $y = \cos x$, and the blue is $y = \frac{2}{3}\cos\left(\frac{x-3}{4}\right) + 1$.

Notice that the maximum for the blue curve is at $x = 3$, not $x = 0$, which is an effect of the phase shift.

3. The graph of the sinusoid $y = 3\sin(2x - \pi)$ is given below. Find the value of the coordinates of the points A, B, and C.



Start by analysing the sinusoid $y = 3\sin(2x-\pi)$ to determine amplitude, phase, period, etc. and then use that information to figure out the coordinates of the points.

The amplitude of the sinusoid is $|3| = 3$.

The sine function has period 2π. Therefore, $0 \leq 2x - \pi \leq 2\pi$ means $\frac{\pi}{2} \leq x \leq \frac{\pi}{2} + \pi$, and this function has period π, and a phase shift of $\pi/2$ units.

The point A is half a period away from the origin in the x direction, therefore, it has coordinates $(\pi/2, 0)$.

The point B is $3/4$ of a period away from the origin in the x direction, and since it is at a maximum it will be the amplitude away from the x axis, therefore it has coordinates $(3\pi/4, 3)$.

The point C is one and a half periods away from the origin in the x direction, therefore, it has coordinates $(3\pi/2, 0)$.