

Example 4.4.15 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 $\left| -\frac{3}{2} \right| = \frac{3}{2}$.

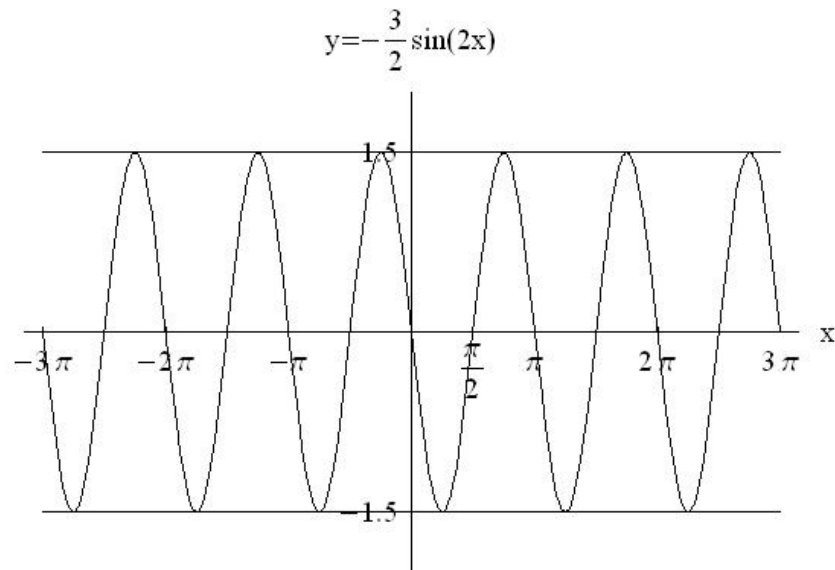
The sine function has period 2π . Therefore, $0 \leq 2x \leq 2\pi$ means $0 \leq x \leq \pi$, and this function has period π .

The frequency is 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:



Example 4.4.68 State the amplitude and period of the sinusoid, and (relative to the basic function) the phase shift and vertical translation.

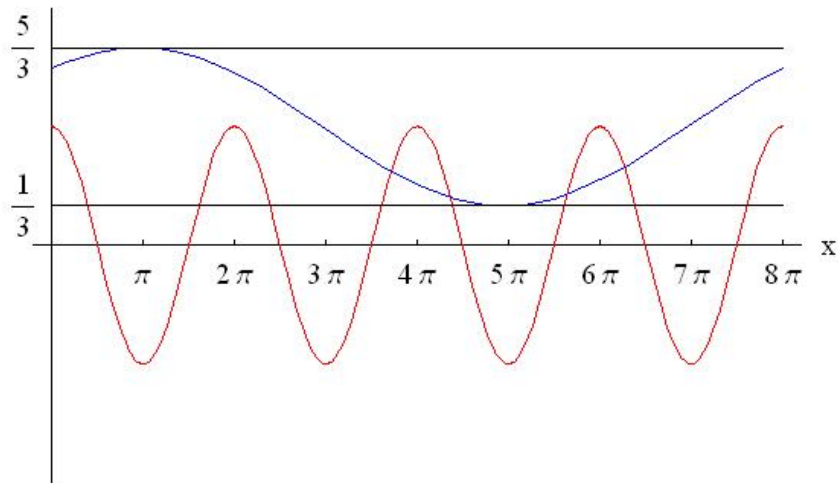
$$y = \frac{2}{3} \cos\left(\frac{x-3}{4}\right) + 1.$$

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

The sine function has period 2π . Therefore, $0 \leq \frac{x-3}{4} \leq 2\pi$ 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.

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



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