Simple Harmonica Motion

If an equation describes the displacement y of an object at time t is:

$$\boldsymbol{y = asin(\omega t)}$$
$$\boldsymbol{y = acos(\omega t)}$$
$$\boldsymbol{t \geq 0}$$

Then the object is in simple harmonic motion.

$amplitude = |a|$ max displacement.

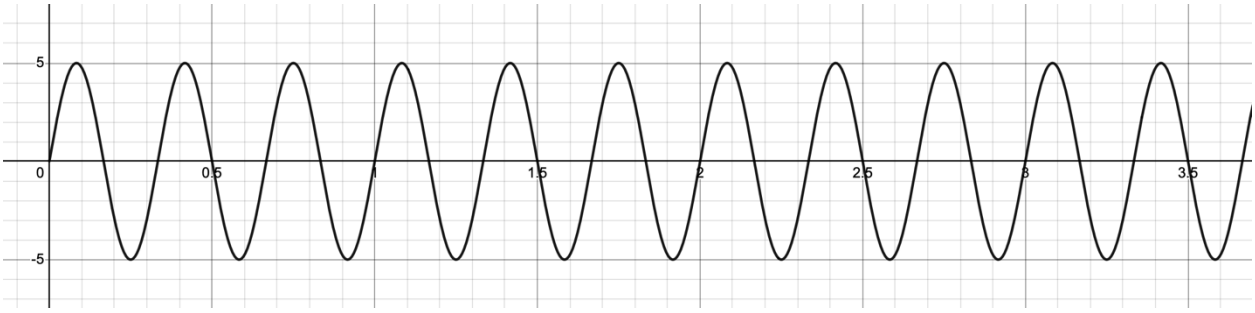
$Period = \frac{2\pi}{\omega}$ time required to complete one cycle.

$frequency = \frac{\omega}{2\pi}$ number of cycles per unit time.

Note- $f = \frac{1}{P}$ and $P = \frac{1}{f}$

Vibrating Spring

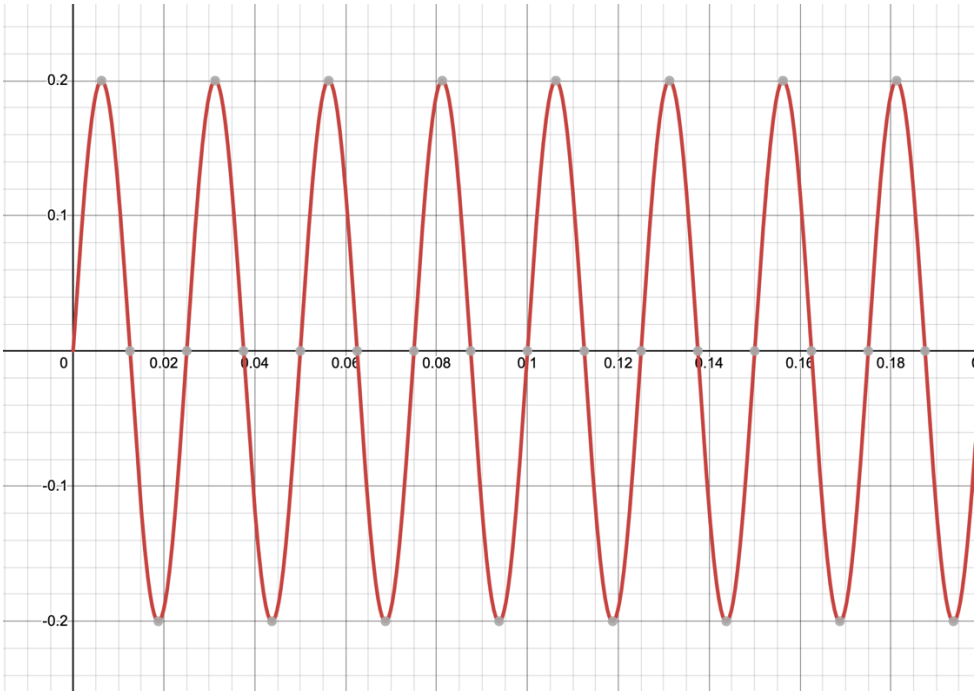
$$y = 5sin(6\pi t) \text{ for } t \geq 0 \text{ and time in seconds}$$



1. Determine the amplitude, period, and frequency.
2. Sketch one cycle.

Vibrations of a Musical Note

$$v = 0.2\sin(80\pi t) \text{ for } t \geq 0 \text{ and time in seconds}$$

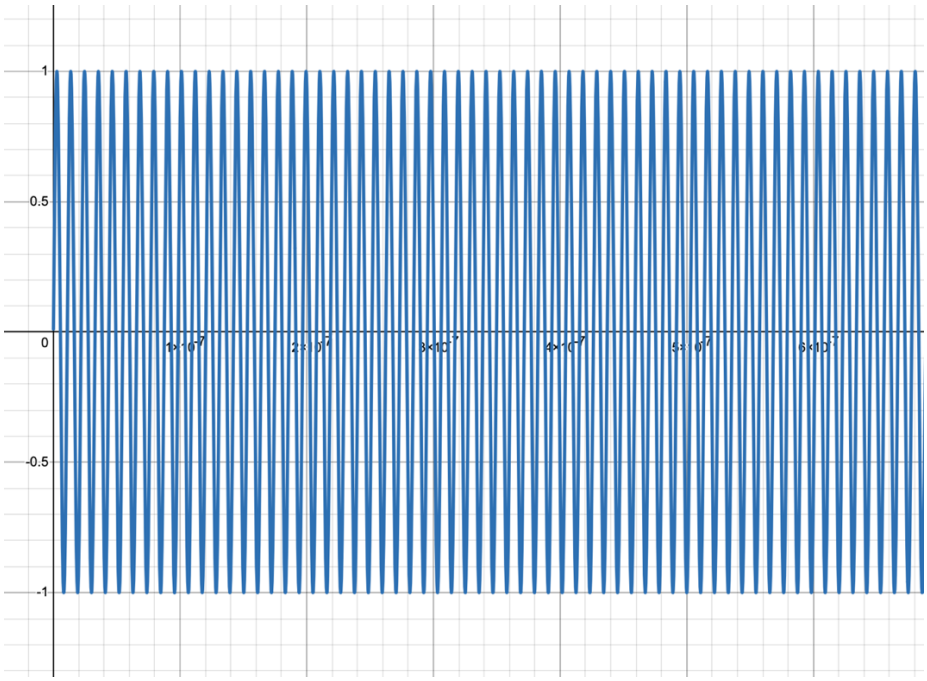


3. Determine the amplitude, period, and frequency.
4. Sketch one cycle.

FM Radio Signals

The carrier wave of an FM Radio is modeled by the following function.

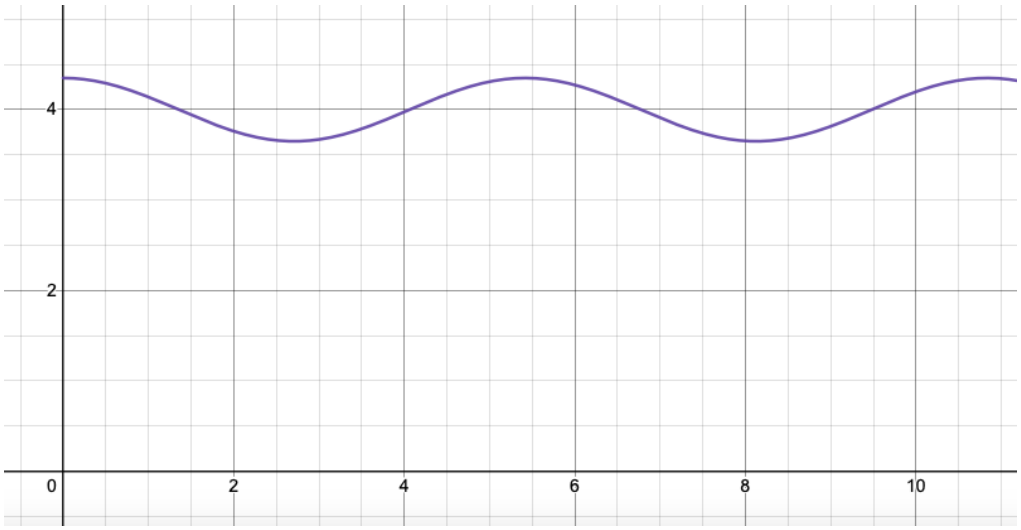
$$y = \sin[2\pi(91500000t)] \text{ for } t \geq 0 \text{ and time seconds}$$



5. Determine the amplitude, period, and frequency.
6. Sketch one cycle.

Brightness (Intensity) of Variable Star

$$I = 0.35\cos(1.16t) + 4.0 \text{ for } t \geq 0$$ **and time in days**



7. Determine the amplitude, period, and frequency.
8. Sketch one cycle.

Find a function that models **simple harmonic motion** with the following properties. Assume displacement is 0 when $t = 0$.

$$\boldsymbol{y = asin(\omega t)}$$

9. Amplitude is 12 cm and period is 4 sec.

10. Amplitude is 22 feet and period is 2 minutes.

11. Amplitude is 2.2 meters and frequency is $\frac{3}{\pi}$ Hz

12. Amplitude is 1.2 inches and frequency is 0/5 Hz.

Find a function that models **simple harmonic motion** with the following properties. Assume displacement is max when $t = 0$.

$$\boldsymbol{y = acos(\omega t)}$$

13. Amplitude is 6 feet and period is 0.5 minutes.

14. Amplitude is 5 cm and period is 12 sec.

15. Amplitude is 4.2 inches and frequency is 400 Hz.

16. Amplitude is 6.25 meters and frequency is 60 Hz.