1) velocity or speed = \( v = \frac{\text{distance}}{\text{time}} \)

   units = meters / second

2) mass = \( m \) = the amount of matter or material contained within an object

   units = kg = kilograms

3) force = \( F \) = the amount of push or pull

   units = Newtons

4) pressure = \( p \) = force / area

   units = Pa = Pascals = Newtons / square meter

5) density = \( d \) = mass / volume

   units = kilograms / cubic meter
**Periodic Motion** - Movement that exactly repeats over successive and equal time intervals.

**Simple Harmonic Motion (SHM)** - A specific type of periodic motion that occurs as the result of a linear restoring force. The graph of position vs. time for SHM looks like a sine or cosine function, depending on where the object is located at time $t = 0$.

**Linear Restoring Force** - A specific type of push and/or pull with the following properties:

1) The force is in the opposite direction of the displacement from the equilibrium position.

2) The force is proportional to the distance from the equilibrium position.
Important Quantities

1) **Amplitude** - The maximum distance from the equilibrium position. On the graph, it is the distance either from the top of the curve to the horizontal axis or from the bottom to the horizontal axis.

In general, the amplitude can be the maximum value of any quantity of interest, such as speed (or velocity), change in pressure, change in density, etc.

2) **Period** - The amount of time that it takes for the object to move back and forth once. On the graph, it is the amount of time that elapses in order to draw the repeating shape once.

In general, the period is the amount of time that it takes any quantity of interest to go through its cycle once.
3) **Frequency** - The number of times that the object moves back and forth in one second. (The frequency does not appear directly on the graph.)

In general, the frequency can be the number of times that any quantity of interest goes through its cycle in one second.

4) **Phase Angle** - An angle between 0 and 360 degrees used to specify a point in the cycle.

Here are some examples:

- 0 degrees = the beginning of the cycle
- 90 degrees = 1/4 period after the beginning
- 180 degrees = 1/2 period after the beginning
- 270 degrees = 3/4 period after the beginning
- 360 degrees = same as 0 degrees
5) **Out of phase** - The condition that occurs when two quantities have the same period (and frequency) and are offset by 180 degrees = half the period.

If two graphs are out of phase, then they are the same except one of them has been turned up side down.

6) **In phase** - The condition that occurs when two quantities have the same period (and frequency) and are not offset at all.

In phase is synonymous with In sync and Synchronous.