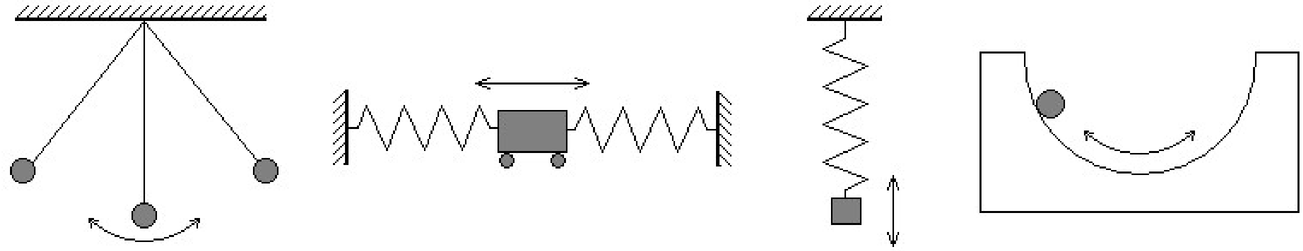
Oscillations

In each of the cases below there is something that is oscillating, it vibrates back and forth or up and down with a regular repeating motion which we describe as oscillations.



In each of these systems, we can measure:

Displacement, x

The distance from the equilibrium position at an instant in time. For a mechanical oscillator, **displacement is measured in metres.**

Amplitude, A — **Amplitude is measured in metres, m**

The amplitude of an oscillator is the maximum displacement of the particles from the equilibrium position.

Time Period, T — **Time Period is measured in seconds, s**

This is simply the time is takes for one complete oscillation to happen. It can be measured as the time it takes to oscillate from a point back to the same point in the next cycle.

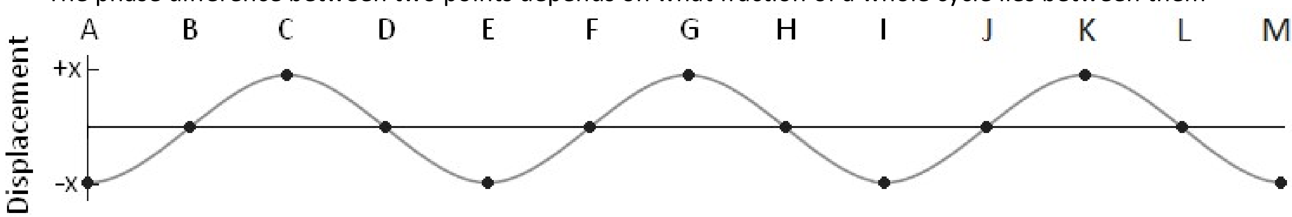
Frequency, f — **Frequency is measured in Hertz, Hz**

Frequency is a measure of how often something happens, in this case how many complete oscillations occur in every second. It is linked to time period of the wave by the following equations: $T = \frac{1}{f}$ and $\boxed{f = \frac{1}{T}}$

Phase Difference — **Phase Difference is measured in radians, rad**

If we look at two particles in an oscillating system at the same stage in the oscillation (such as C and G) we would see that they are oscillating in time with each other. We say that they are *completely in phase*. Two points half a cycle apart (such as I and K) we would see that they are always moving in opposite directions. We say that they are *completely out of phase*.

The phase difference between two points depends on what fraction of a whole cycle lies between them



	B	C	D	E	F	G	H	I	J	K	L	M
Phase Difference from A (radians)	½π	1π	1½π	2π	2½π	3π	3½π	4π	4½π	5π	5½π	6π
Phase Difference from A (degrees)	90	180	270	360	450	540	630	720	810	900	990	1080