Simple Harmonic Motion- Phase

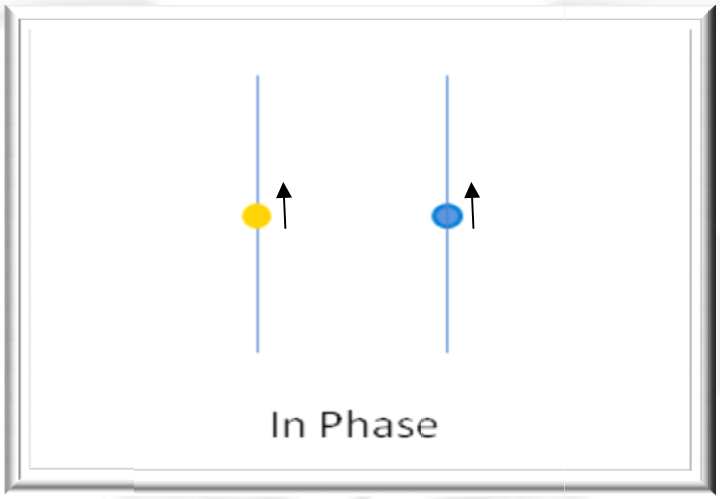
Phase of a S.H.M:

Phase of a S.H.M is defined as the state or condition as regard to the position and direction of vibration of the S.H.M. It tells us in which exact stage of vibration the particle is.

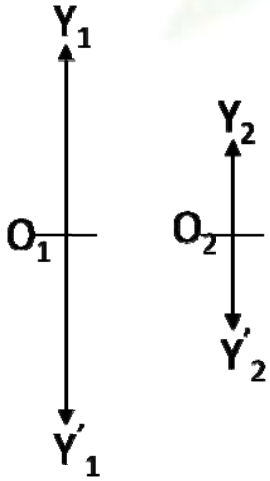
Phase of a S.H.M is represented either in terms of angle, as a fraction of 2π or in terms of time as a fraction of time period T.

Phase difference: Let us consider two simultaneous S.H.M (along same or different directions). Both the S.H.M can be represented by an equivalent circular motion. Atany instant of time 't' the angle between the two radius vectors will give the phase difference between the two S.H.M.

In Phase : Let us consider two S.H.M along same direction and same time period say Y – axis as shown. (See animation)



Out of Phase:



At t=0 both are at their mean position O_1 and O_2

At t= T/4 1st particle goes to Y_1 and the 2nd particle goes to Y'_2

At t=T/2 1st particle comes to O_1 and 2nd particle comes to O_2

At t=3T/4 1st particle moves to Y'_1 and the 2nd particle moves to Y_2

At t=T both comes to their mean position.

Epoch: Initial Phase

Generally at t=0, the particle remains at its mean position, phase angle is zero. But if the particle starts its motion from any other point the S.H.M has an initial phase and this is said to be Epoch.