Frequency depends upon source (producing wave) but does not depend upon medium through which the wave is travelling. Hence, frequency does not change when a wave travels from one medium to other (*i.e., frequency is the fundamental property of a wave*).

Mathematically, $frequency, f = \frac{1}{T}$

The SI unit of frequency **is sec^{-1} or Hertz or revolutions/sec.**

9. **Wave velocity** (v): The distance travelled by a wave in one second is called as wave velocity (speed). Wave velocity depends upon the mechanical properties (nature) of medium.

   Mathematically, $\boldsymbol{wave\ velocity, v = \frac{\lambda}{T}}$

   Or, $\boldsymbol{v = \lambda f}$ $\boldsymbol{also,[\ v = \frac{\omega}{k}\ ]}$

   The SI unit of wave velocity is ***m/s.***

10. **Particle velocity** (v_p): The velocity (speed) with which a particle in a medium vibrate as a wave travel through the medium is called as particle velocity.

    Mathematically,$\boldsymbol{particle\ velocity}$, $\boldsymbol{v_p = \frac{dy}{dt}}$ $\boldsymbol{v_p = \omega\sqrt{(a^2 - y^2)}}$

    The SI unit of wave velocity is ***m/s.*** $\boldsymbol{(v_p)_{max} = \omega a}$

    $\boldsymbol{particle\ acceleration, a_p = \frac{d^2y}{dt^2} = \frac{dv_p}{dt} = \omega^2 y}$ *SHM*

    The SI unit of wave acceleration is ***m/s^2.*** $\boldsymbol{(a_p)_{max} = \omega^2 a}$

11. **Phase**: The physical quantity which determines the position and state of vibration of a particle with respect to its mean position is called as phase.

    Its SI unit is ***radian***.

12. **Phase difference**: The difference in phase (state of vibration) of two points (particles) at the same instant is called as phase difference.

    Its SI unit is ***radian***.

13. **Path difference**: The linear distance between two points (particles) measured along the direction of propagation of wave is called as path difference.

    Its SI unit is ***meter (m).***

Simplified Note