

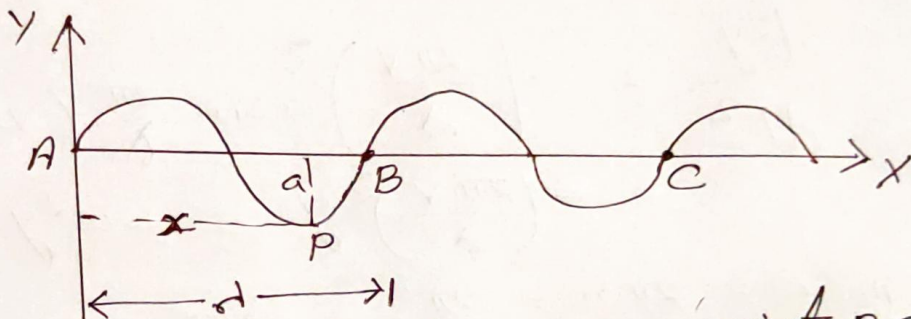
General Equation of Progressive Wave

Each particle of the medium executes simple harmonic motion the equation of motion of any particle A, is given by $y = a \sin \omega t$.

where a = amplitude of the vibrating particle
 y = the displacement after a time t .
 ω = the angular velocity.

$\therefore \omega = 2\pi n$, n = frequency of vibration.

$$y = a \sin 2\pi n t.$$



\therefore In going from the point A to any point P at a distance x from A the phase changes by ϕ and is given by

$$\phi = \frac{2\pi}{\lambda} x.$$

$$\begin{aligned} \therefore y &= a \sin(\omega t - \phi) \\ &= a \sin\left(2\pi n t - \frac{2\pi}{\lambda} x\right) \\ &= a \sin\left(2\pi \frac{v}{\lambda} t - \frac{2\pi}{\lambda} x\right) \end{aligned}$$

$$y = a \sin \frac{2\pi}{\lambda} (vt - x)$$

Hence this is the equⁿ of progressive simple harmonic wave.

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