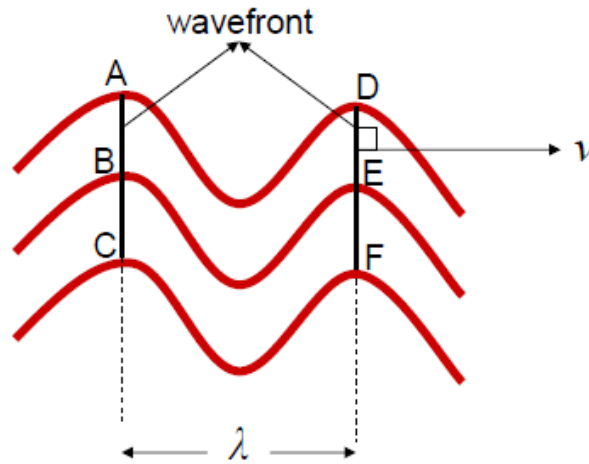


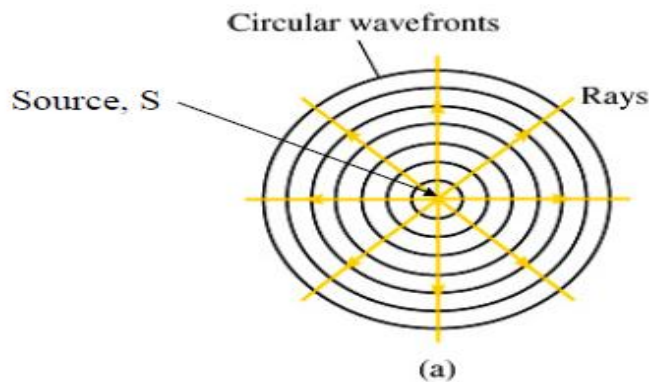
1.1. Wavefronts

- Definition – is defined as a *line or surface, in the path of a wave motion, on which the disturbances at every point have the same phase.*
- Figure below shows the wavefront of the sinusoidal waves.

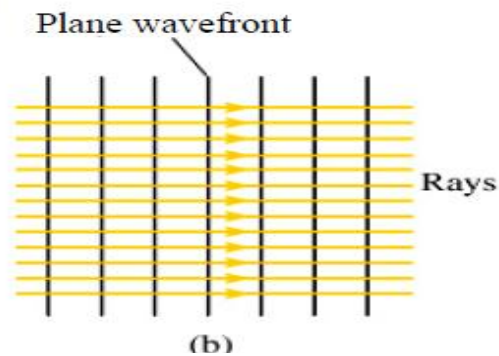


- Line joining all point of adjacent wave, e.g. A, B and C or D, E and F are in phase
 - Wavefront always perpendicular to the direction of wave propagation.
- Type of wavefronts

(a) Circular Wavefront

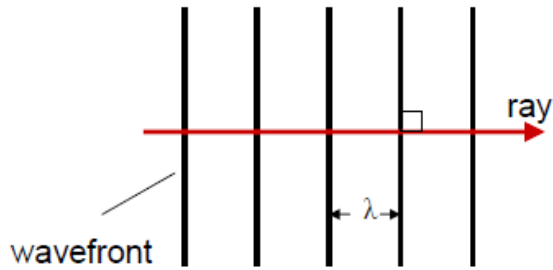


(b) Plane wavefront



○ **Ray**

Definition - A ray is a line represents the direction of travel of a wave.
It is at right angle to the wavefronts



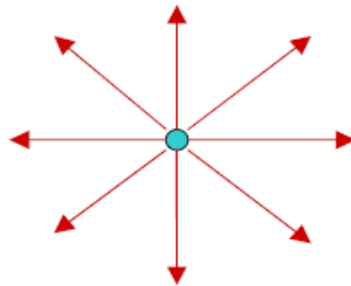
○ **Beam of light**

A collection of rays or a column of light

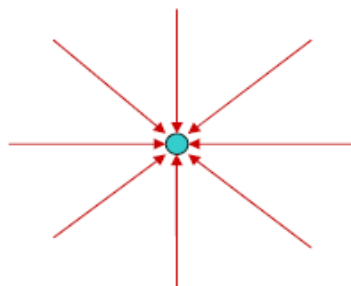
(a) parallel beam, e.g. a laser beam



(b) divergent beam, e.g. a lamp near you

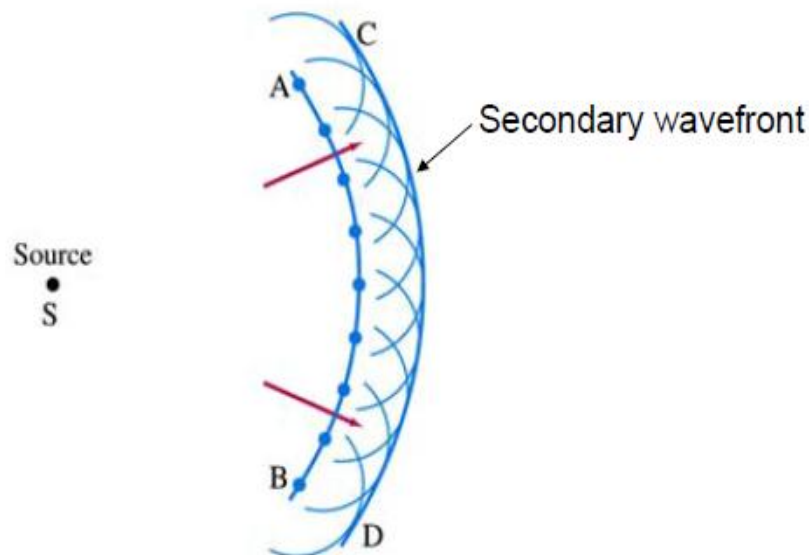


(c) convergent beam

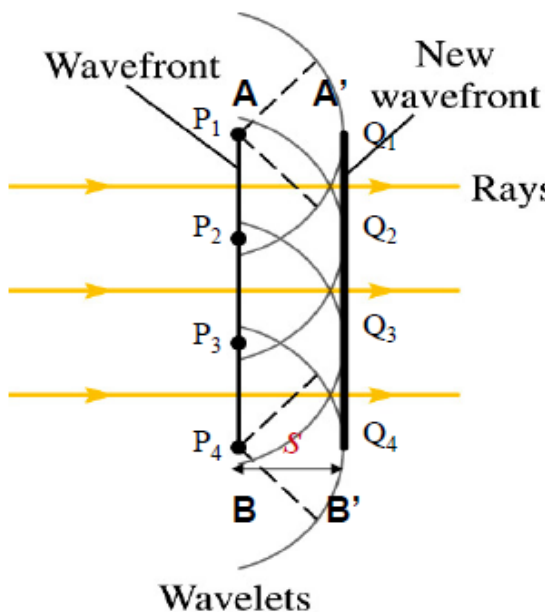


1.2.Huygen's Principle

- State – Every point on a wavefront can be considered as a source of secondary wavelets that spread out in the forward direction at the speed of the wave. The new wavefront is the envelope of all the secondary wavelets - i.e. the tangent to all of them.



(a) Construction of new wavefront for a plane wave



- If the wave speed is v , hence in time t the distance travels by the wavelet is $s = vt$.
- From Huygens' Principle, points P_1, P_2, P_3 and P_4 on the wavefront AB are the sources of secondary wavelets.
- From the points, draw curves of radius s .
- Then draw a straight line $A'B'$ which is tangent to the curves at points Q_1, Q_2, Q_3 and Q_4
- Hence, line $A'B'$ is the new wavefront after t second.