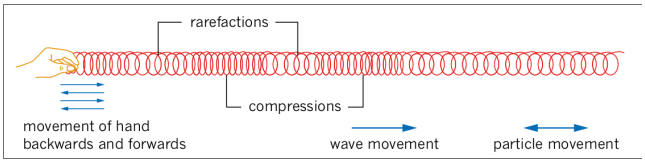
Waves

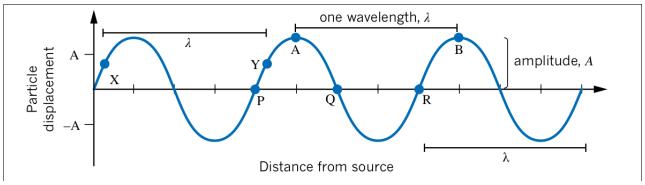
Longitudinal (motion || wave)

rarefactions (expansions) and **compressions**



Transverse waves (motion ⊥ wave)

nodes are fixed on graph



Measuring mechanical waves

Amplitude A - max displacement from rest position
Wavelength λ - x distance between $y_1 = y_2$
Frequency f - number of cycles (wavelengths) per second

$T = \frac{1}{f}$ (period: time for one cycle)
$v = f\lambda$ (speed: displacement per second)

Doppler effect

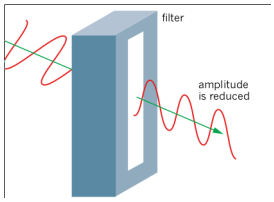
When P_1 approaches P_2, each wave w_n has slightly less distance to travel than w_{n-1}. Hence, w_n reaches the observer sooner than w_{n-1}, increasing "apparent" wavelength.

Interference

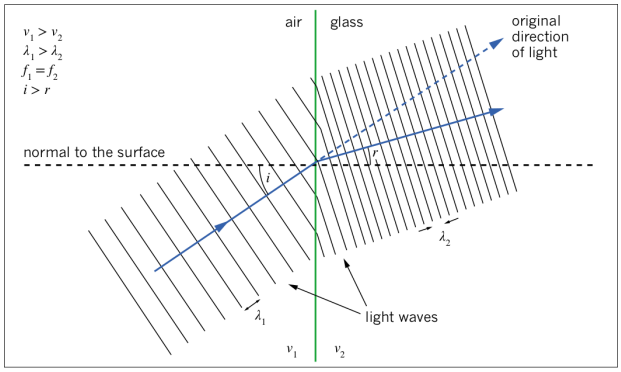
When a medium changes character, energy is *reflected*, *absorbed*, and *transmitted*

Standing waves - constructive int. at resonant freq

Polarisation



Refraction



Angle of incidence θ_i = angle of reflection θ_r

Critical angle $\theta_c = \sin^- 1\frac{n_2}{n_1}$

Snell's law - $n_1 \sin\theta_1 = n_2 \sin\theta_2$

Harmonics

where $a = 2$ for antinodes at both ends, $a = 4$ for antinodes at one end:

$\lambda = al \div n$ (wavelength for n^{th} harmonic)
$f = nv \div al$ (frequency for n_{th} harmonic at length l and speed v)

Double split

Path difference $pd = |S_1P - S_2P|$ for point p on screen

Constructive: $pd = n\lambda$ where $n \in [0, 1, 2, ...]$
Destructive: $pd = (n - \frac{1}{2})\lambda$ where $n \in [1, 2, 3, ...]$

Fringe separation: $\Delta x = \frac{\lambda l}{d}$

where Δx is distance between fringes
l is distance from slits to screen
d is separation between sluts $(= S_1 - S_2)$