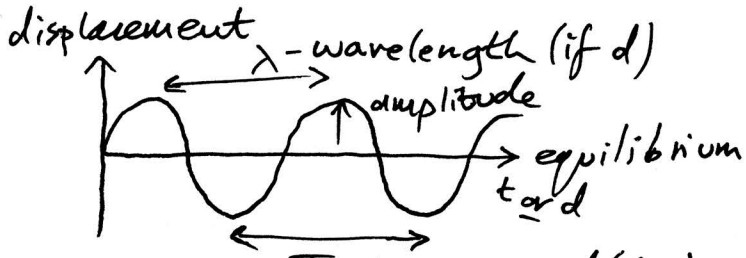
- WAVES TRANSFER ENERGY BUT NOT MATTER.

- LONGITUDINAL: PARTICLES OSCILLATE PARALLEL TO DIRECTION OF ENERGY TRANSFER (COMPRESSIONS & RAREFACTIONS) e.g. SOUND
- TRANSVERSE: PARTICLES OSCILLATE PERPENDICULAR TO DIRECTION OF ENERGY TRANSFER e.g. LIGHT (EM), STRING, WATER.



frequency (Hz): NUMBER OF COMPLETE WAVES PASSING A POINT EVERY SECOND.

$f = \frac{1}{T}$ $v = f\lambda$ or $c = f\lambda$

WAVES

$\text{phase diff} = \frac{\Delta t}{T} \times 2\pi$

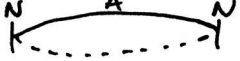
$= \frac{\Delta d}{\lambda} \times 2\pi$

$\frac{1}{2}$ wave $= 180° = \pi$ rad

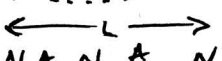
$\frac{1}{4}$ wave $= 90° = \frac{\pi}{2}$ rad

- POLARISATION: TRANSVERSE WAVES CAN BE (PLANE) POLARISED BY FILTER (SMALL LINES) - ONLY LETS HALF OF LIGHT BE TRANSMITTED, ABSORBS REST - SELECTS WAVES OSCILLATING IN PARTICULAR DIRECTION.

- STATIONARY WAVES ARE FORMED WHEN TWO WAVES OF EQUAL FREQUENCY TRAVEL IN OPPOSITE DIRECTIONS + INTERFERE.
- SUPERPOSITIONING: WHEN DISPLACEMENTS SUM AT EVERY POINT.



1st HARMONIC / FUNDAMENTAL $\lambda = 2L$



2nd HARMONIC $\lambda = L$

$f = \frac{1}{2L}\sqrt{\frac{T}{\mu}}$ (T = tension, μ = kgm^{-1} (string))

NODE: ALWAYS DESTRUCTIVE INTF - NO ENERGY TRANSFERRED.

ANTINODE: BOTH CONST + DESTR INTF, E IS TRANSFERRED.

REFRACTION

$n_1 \sin\theta_1 = n_2 \sin\theta_2$

(REFR INDEX)

TIR: angle of inc. > crit angle, & $n_1 > n_2$.

- To find θ_c, $\theta_2 = 90$, $\therefore n_1 \sin\theta_c = n_2$

↳ ALL LIGHT IS REFLECTED.

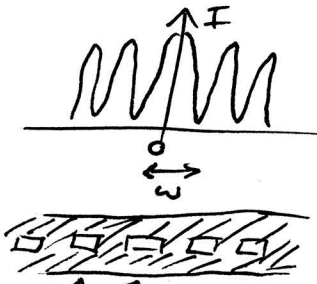
DIFFRACTION

YOUNG DOUBLE SLIT

SINGLE SLIT TO PRODUCE COHERENT SOURCES

↳ "CONSTANT PHASE DIFF"

(WE USE LASER - MONOCHROMATIC)



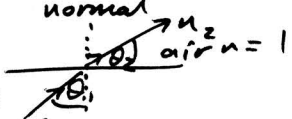
ONE λ

$\omega = \frac{\lambda D}{s}$

ω = fringe separation, s = slit separation

- maxima - constructive interference ≈ = ∿ (in phase)
- minima - destructive interference (dark) ≈ = ⌒ (out of phase)
- MAX: path diff $= n\lambda$
- MIN: path diff $= (n - \frac{1}{2})\lambda$
- SINGLE SLIT

CENTRAL MAX = 2 × WIDTH OF OTHER FRINGES,



GRATING

$n\lambda = d\sin\theta$

(n = order, d = line spacing = 1 / lines per m)

TO FIND MAX ORDER: $\theta = 90°$

e.g. $n = 3.7$ max = 3

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