Cheatography

How waves explain the behaviour of light Cheat Sheet

by cadmiumium via cheatography.com/135751/cs/28766/

Formulas

f=1/T	**v=fλ**
λ=c/f	**v=λ/T**
constructive p.d (antinode) = **nλ**	'loud', 'light band'
or **nλ = |S_1X-S_2X|**	
destructive p.d (node) = **(n-0.5)λ**	'quiet', 'dark band'
or **(n-0.5)λ = |S_1X-S_2X|**	
one free end, one fixed (odd):	**λ=4L/n, f=nv/4L**
fixed ends:	**λ=2L/n, f=nv/2L**
fringe spacing:	**Δx=λL/d**
bigger Δx gives more refraction, more spread out	Δx=fringe spacing (m), λ=wavelength (m), L=distance from slits to screen (m), d=slit separation (m)
refraction & reflection:	**n=c/v**
where; n=speed of light in a vacuum/ speed of light medium	**$n_1v_1=n_2v_2$**
diffraction∝λ/w	**$n_1\sin(\theta_1)=n_2\sin(\theta_2)$**
energy∝fr-equency	**$n_1\sin(\theta_1)=n_2$**

Young's double slit experiment

Young's double slit experiment shows light exhibiting the wave properties of diffraction and interference.

Light can be polarised, observed as white light diffracts and colours are seen as a result. As only transverse waves can be polarised, the wave model of light is proven.

Snell's Law

Wave types

Transverse waves: particle moves along **vertical** axis

Longitudinal waves: particle moves along **horizontal** axis

Coherent waves: waves with the **same frequency**

Mechanical (sound, air, water) waves do not exist in a vacuum, they **require a medium to travel through**

Electromagnetic (light) waves can exist in a vacuum, **do not require a medium**

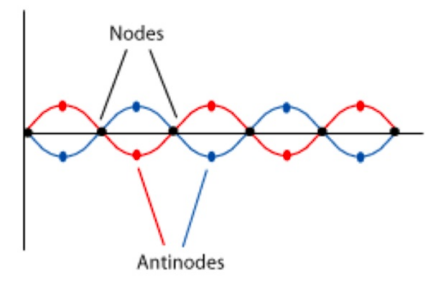
Travelling wave: a wave for which the crests and troughs travel in the direction of wave propagation.

Standing Waves: when 2 wave trains with the same amplitude and wavelength move through each other, the resulting interfering pattern results in a standing wave. Consists of alternating nodes and antinodes that remain in a fixed position, wave appears to be stationary/'standing'

fundamental frequency: **n=1**

formation of standing waves on a string:
1. waves **reflect** at both ends of string
2. reflections travel in opposite directions with the same frequency and amplitude
3. fixed ends are **nodes**, free ends are **antinodes**

Nodes & Antinodes



Constructive Interference: When waves in the same phase overlap, their amplitudes add together

Destructive Interference: When waves of different phases overlap, their amplitudes cancel

Nodes: Points of complete destructive interference

Antinodes: Points of complete constructive interference, largest amplitude

Wave resonance

Waves reflect at the end of a string and are **inverted** if end is fixed

An object or system will resonate if driven at its **natural** frequency

Resonance greatly increases magnitude of oscillation in an object/system

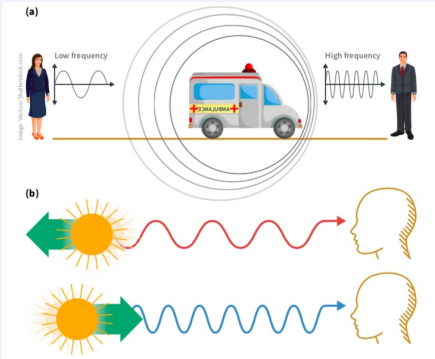
Doppler effect

Doppler effect is the detected frequency change due to the relative motion between a wave source and detector.

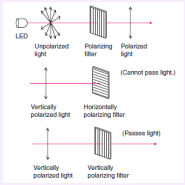
f increases when source and detector move towards each other

f decreases when source and detector move away from each other

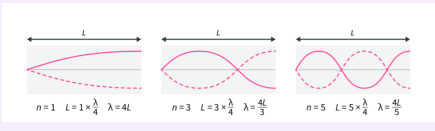
Doppler effect:



Polarising filters



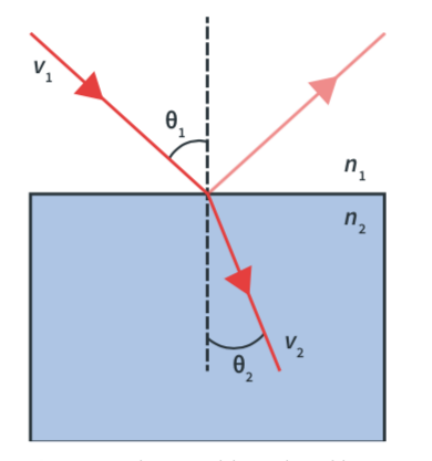
Waves



Variables

independent: variable that is being changed (x-axis)

dependent: variable that is being measured (y-axis)



n_1=refractive index of first medium
θ_1=angle to the normal in first medium
n_2=refractive index of second medium
θ_2=angle to the normal in second medium

By **cadmiumium**

cheatography.com/cadmiumium/

Published 5th August, 2021.
Last updated 5th August, 2021.

Sponsored by **ApolloPad.com**
Everyone has a novel in them. Finish Yours!
https://apollopad.com