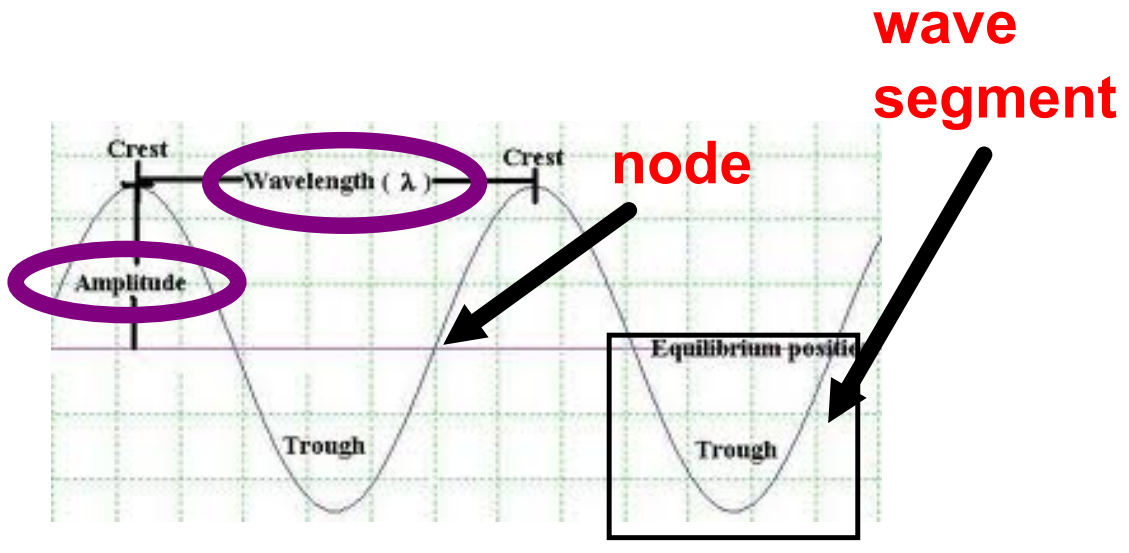
Chapter 16/17 Review

Wave Parts



$T = 1/f$

Types of Waves

Transverse	Longitudinal
	
no medium required	requires medium
fastest in nothing	fastest in solid (due to elasticity)
ex = light	ex = sound and heat

Wave Speed NOT particle speed

$v = \lambda f$ always

$v = \sqrt{F/m/L}$ string

tension

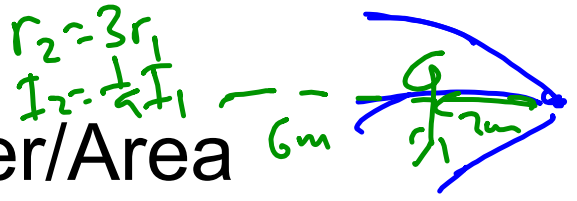
linear density

$v = \sqrt{\gamma kT/m}$ gas

$v = \sqrt{B/\rho}$ density liquid

$v = \sqrt{Y/\rho}$ solid

Sound Intensity



> $I = P/A$ = Power/Area

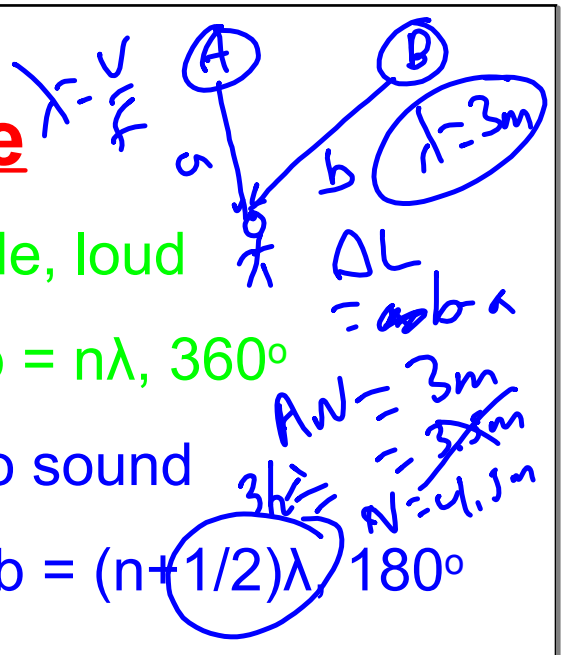
> For points source $I = P/4\pi r^2$ = inverse square law

Sound Intensity Level

> $I_o = 1 \times 10^{-12}$ W/m^2

> **$\beta = 10\log(I/Io)$**

Sound Interference



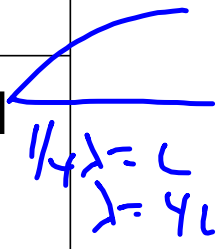
- constructive - antinode, loud
  - full wave shift = a-b = nλ, 360°
- destructive - node, no sound
  - half wave shift = a-b = (n+1/2)λ, 180°
- Beats - $f_b = |f_1 - f_2|$

Doppler

- **APPARENT** shift in frequency due to motion
- **source towards = HIGH f, LOW λ**
- **source away = LOW f, HIGH λ**

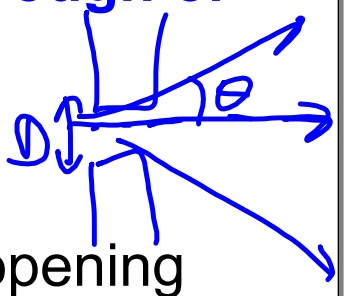
faster = more $\left(1 - \frac{v_o}{v_s}\right) = \Delta$

Standing Waves

Open/Open or Closed/Closed	Open/Closed
 Nodes or antinodes on both ends	 Node at one end and antinode at other end
biggest wave = 1/2λ = L	biggest wave = 1/4λ = L
$f_n = nv/2L$ (n = 1,2,3,....)	$f_n = nv/4L$ (n = 1,3,5...)
ex. guitar string, flute	ex. bottle with water

Diffraction

Bending of wave as it goes through or around a barrier



- Barrier must be close to λ
- $\sin\theta = 1.22(\lambda/D)$ - circular opening
- $\sin\theta = \lambda/D$ - slit
- BIGGER θ = MORE diffraction
- so as D gets smaller, diffraction increases