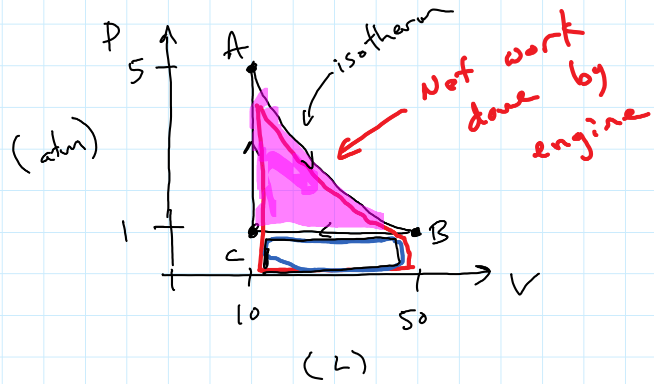
Review for final

Ch 22 #73

1 mol
ideal gas
monatomic



$R = 0.0821 \frac{l\ atm}{mol\ K}$

$R = 8.314 \frac{J}{mol\ K}$

States

	P	V	T	E_{int}
A	5 atm	10 L	609 K	7595 J
B	1 atm	50 L	609 K	7595 J
C	1 atm	10 L	122 K	1521 J

$E = \frac{3}{2} nRT$

Path

	Q	W_{ON}	ΔE_{int}
A → B		negative	0
B → C		$W = P\lvert\Delta V\rvert$ positive	
C → A		0	7595 − 1521 = +6074

$e = \frac{W}{Q_H}$

W ← Net work done

Q_H ← Sum of all +Qs

$Q + W_{on} = \Delta E_{int}$

$$e_c = 1 - \frac{T_c}{T_H}$$

Entropy $$\Delta S = \int \frac{dQ}{T}$$

Constant T (like an ice cube melting)

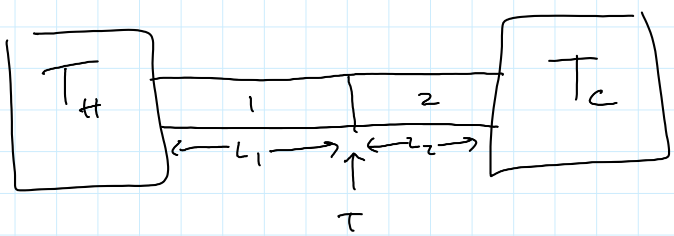
$$\Delta S = \frac{Q}{T} = \frac{m L_f}{T}$$

changing Temp: integrate:

$$\Delta S = \int \frac{dQ}{T} = \int \frac{c\, m\, dT}{T}$$

$$= c\, m \ln \frac{T_f}{T_i}$$

Conduction:



$$P_1 = P_2$$

$$\left(\frac{k \cancel{A} \Delta T}{L}\right)_1 = \left(\frac{k \cancel{A} \Delta T}{L}\right)_2$$

$$\frac{k_1 (T_H - T)}{L_1} = \frac{k_2 (T - T_c)}{L_2}$$

solve for T

Sound

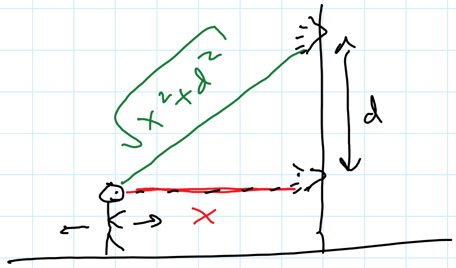
ch 18 #72

but with Numbers: $f = 686$ Hz

$v = 343 \frac{m}{s}$

$d = 2$ m

$v = \lambda f$



if speakers are in phase:

Path difference $= (m+\frac{1}{2})\lambda$ Destructive

path diff. $= m\lambda$ constructive

path diff: $\sqrt{x^2+d^2} - x$

$$\sqrt{x^2+d^2} - x = (m+\tfrac{1}{2})\lambda \qquad m = 0, 1, 2, \ldots$$

$m=0$: $\sqrt{x^2+d^2} = x + \frac{\lambda}{2}$

$$x = \frac{d^2}{\lambda} - \frac{\lambda}{4} = 7\tfrac{7}{8} \text{ m}$$

$m=1$: $x = 2.29$ m

$m=2$: 0.975 m

$m=3$: 0.268 m

$m=4$: ~~-0.236~~ m

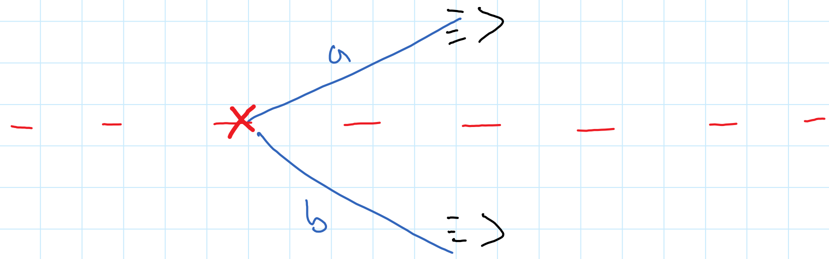
4 times person hears minimum

Constructive: path diff $= m\lambda$

$$\sqrt{x^2+d^2} - x = m\lambda$$

$$x^2 + d^2 = x^2$$

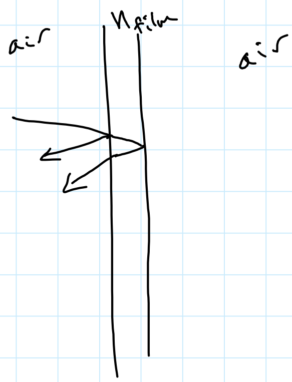
$$d = 0$$



$a = b$

path diff $= 0$ $m = 0$

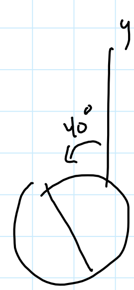
thin film



(path diff) + (phase shifts) = $(m)\,\lambda$ constructive

$(m+\frac{1}{2})\,\lambda$ destructive

(path diff) = $(m+\frac{1}{2})\,\lambda$ const



$\frac{1}{2} \cos^2 60 \quad \cos^2 60 \quad I_0$

$\frac{1}{32} I_0$

$\frac{1}{32} I_0$