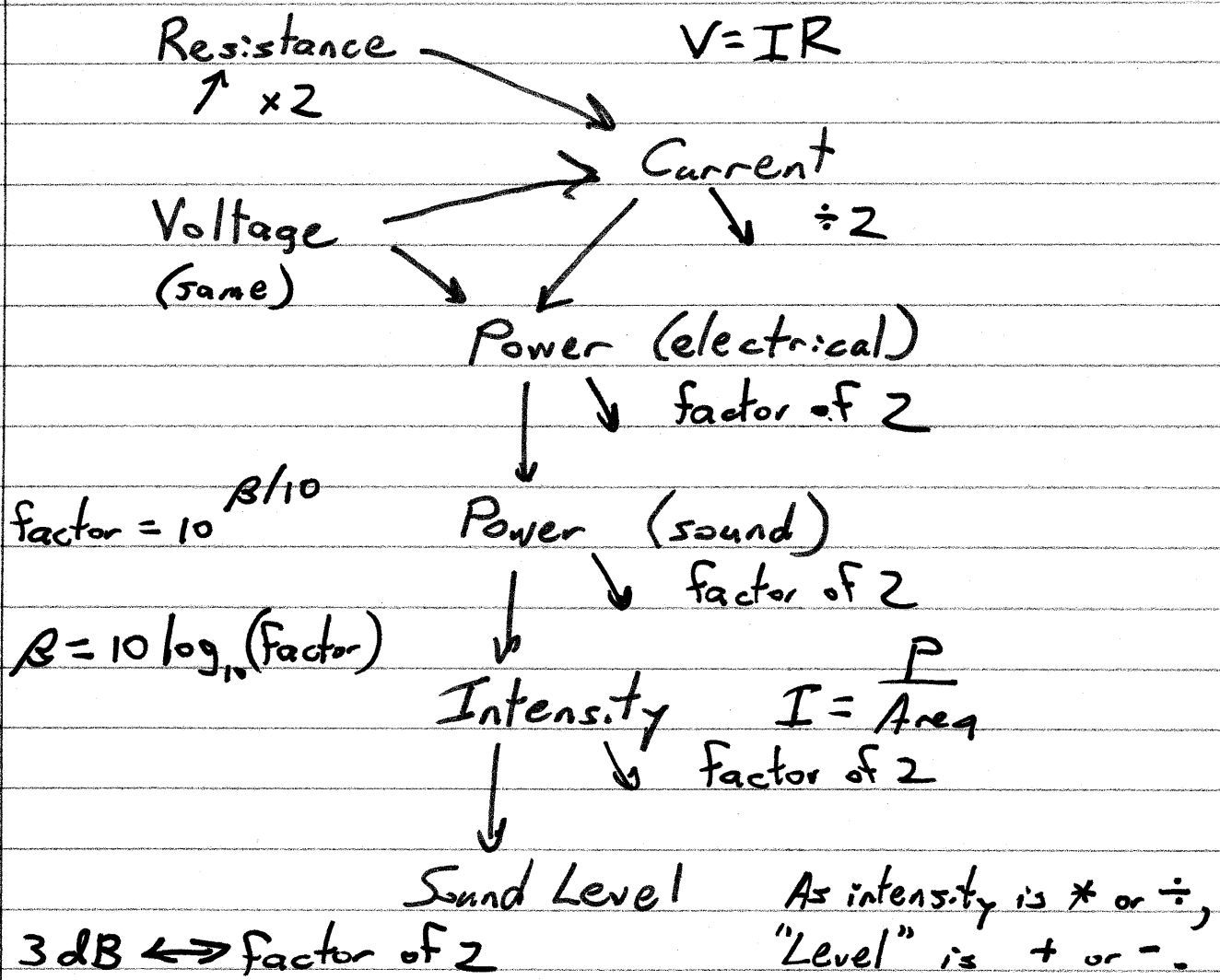
① Phys 1402 2014-11-13

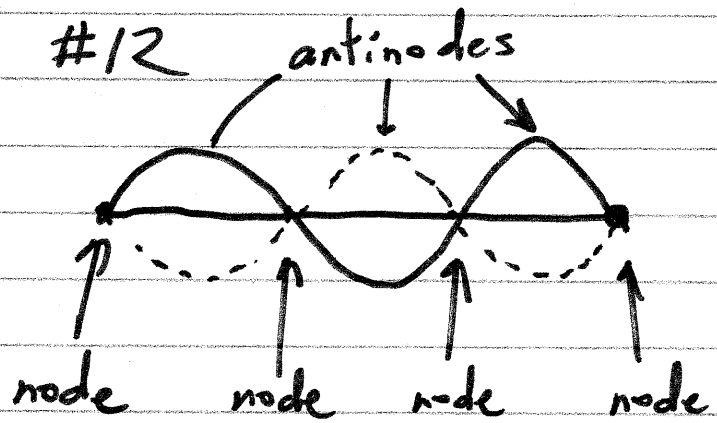
An 8 Ω speaker is hooked up to a 220 Hz AC Source. ~~A~~ A second speaker is placed in ~~parallel~~ series (without changing the source voltage). If the original sound was 70 dB, how loud is the new sound?



New Level is 70 dB − 3 dB = 67 dB

(2)

HW5 #12



$m =$ _____

$L = 2.\#20\ m$

$F_T =$ _____

Node spacing is $\frac{L}{3} = 2.4\ m$

What is frequency of this harmonic?

$\mu =$ linear mass density $= m/L$

$v = f\lambda$

String $v = \sqrt{F_T/\mu}$

$\lambda = \begin{cases} \frac{2L}{i} \\ \frac{4L}{i} \end{cases}$

Sound $v = 340\ m/s$

Light $c = 3 \times 10^8\ m/s$

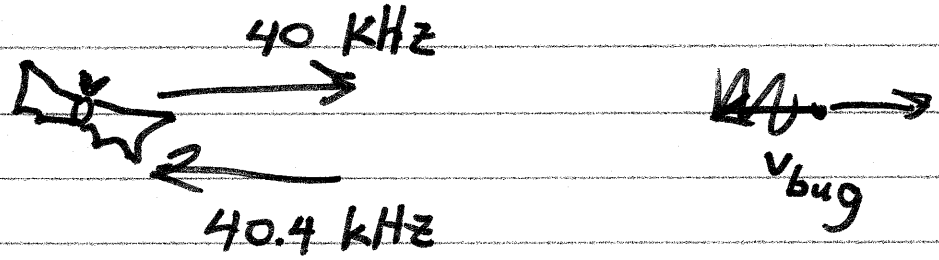
(3)

Doppler Shift

$$\frac{\Delta f}{f} = \frac{v_{rel}}{v_{wave}} \qquad (\times 2 \text{ if reflection})$$

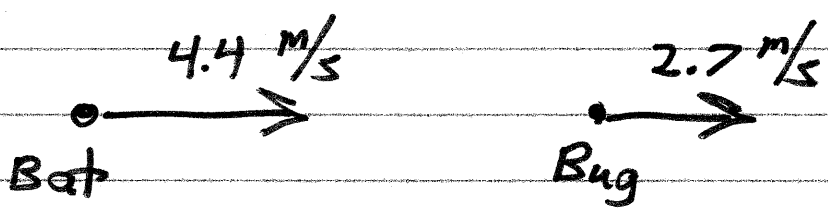
If $f_1 = 40$ kHz

$f_2 = 40.4$ kHz



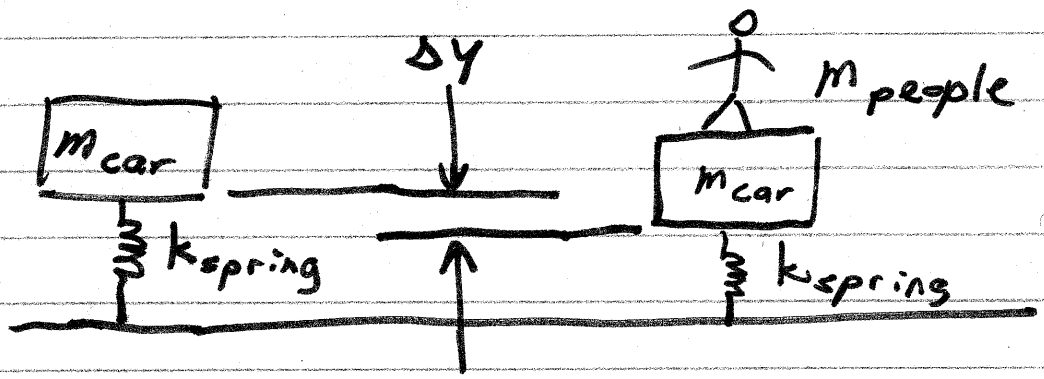
$$\frac{0.4 \text{ kHz}}{40 \text{ kHz}} = \frac{v_{rel}}{340 \text{ m/s}} \cdot 2$$

$v_{rel} = 1.7$ m/s Toward



$$v_{rel} = v_2 - v_1$$

HW5 #3

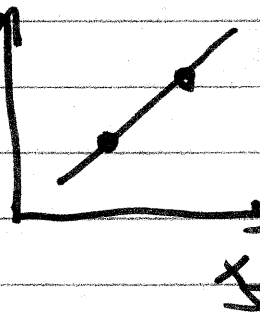


$$F_{spring} = k x_{spring}$$

$$k = \frac{F_{spring}}{x_{spring}} \qquad k = \frac{\Delta F_s}{\Delta x_s}$$

$$\Delta F_s = m_{people}\, g$$

$$\Delta x_s = \Delta y$$



Spring Osc: $f = \frac{1}{2\pi}\sqrt{k/m}$

(5)

Electromagnetic Waves

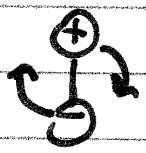
- Made of elec & magnetic fields.
- Why are they significant?

$$E = \frac{kq}{r^2}$$

⊕
q

E is $\frac{1}{4}$ as strong at 2x the distance

E is oscillating



E_{max} is $\frac{1}{2}$ as strong at 2x the distance

Oscillating E ⇄ Oscillating B

- EM Waves don't need a medium.
- Speed is

$$v = c = 3 \times 10^8 \ m/s$$

- Frequency determines type

Low-Freq		High-Freq
radio		ultraviolet
microwave	Visible	X-ray
infrared		Gamma rays