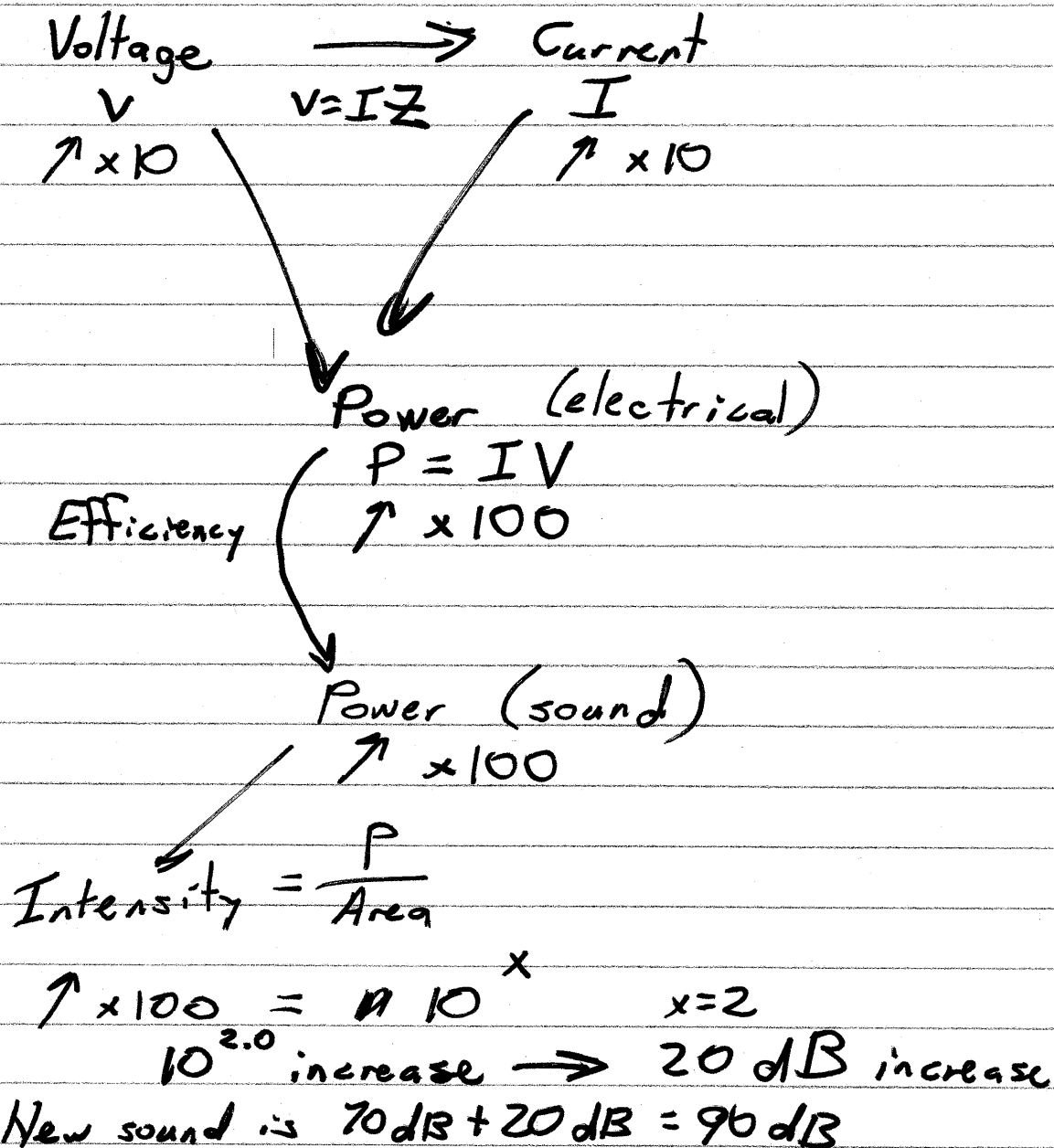
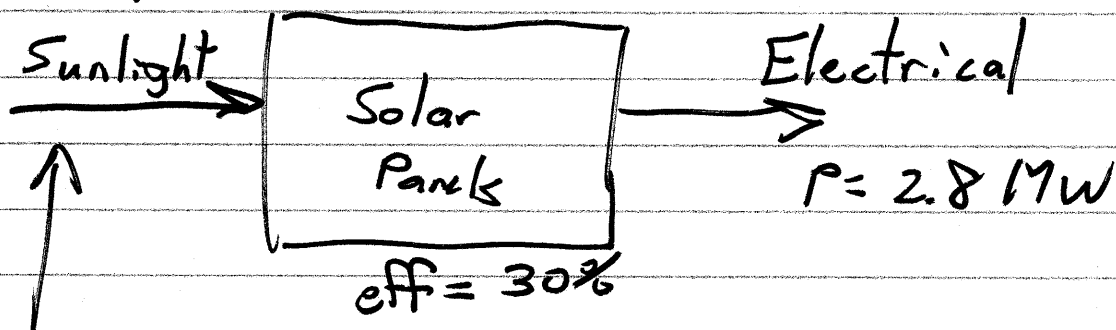


① Phys 2426 2014-11-12

A speaker w/ 8Ω impedance is producing a 70 dB sound 4m away. If the voltage to the speaker is increased by a factor of 10, what happens to the sound?



② HW 5 #19

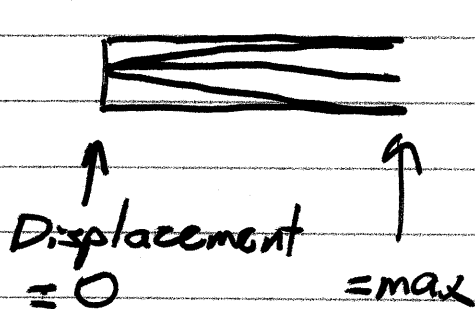


Intensity
 $I = P / \text{Area}$

$$P_{\text{light}} \cdot 0.30 = P_{\text{elec}}$$

Related to #16:

Cardboard tube produces 180 Hz tone when one end is open & other closed.



$$\lambda = \frac{4L}{i} \quad i = \text{odd}$$

Only $\frac{1}{4}$ wave fits w/ node @ one end and peak @ other end.

$$v = f\lambda$$

$(340 \text{ m/s}) = (180 \text{ Hz})\lambda \rightarrow \lambda = 1.89 \text{ m}$

$$L = 0.472 \text{ m} \\ = 47.2 \text{ cm}$$

Measured length $L = 46.8 \text{ cm}$

$$v = (331 \text{ m/s}) \sqrt{1 + \frac{T_c}{273^\circ \text{C}}}$$

③

Electromagnetic waves

- Formed from elec & mag fields.

$$\oplus \text{ makes } E = \frac{kq}{r^2}$$

\ominus

$\oplus \ominus$
Oscillation

$$E = \text{oscillation} \propto \frac{1}{r}$$

Oscillating $E \rightarrow$ generates B

generates $E \leftarrow$ oscillating B

- No material is needed.
- Speed is

$$v_{\text{light}} = c = 3 \times 10^8 \text{ m/s}$$

- Frequency determines type of wave

radio waves

microwaves

infrared

visible light

ultraviolet

x-rays

gamma rays

} Low energy

} High energy

④

Ex: Wavelength of radio waves:

$$f = 101.3 \text{ MHz}$$

$$v = 3 \times 10^8 \text{ m/s}$$

$$v = f\lambda \quad \lambda = \frac{v}{f} = \frac{3 \times 10^8 \text{ m/s}}{101.3 \times 10^6 \text{ Hz}} = 2.96 \text{ m}$$

Recall $\lambda = \frac{4L}{i}$ $L = \frac{\lambda}{4}$

$$L = \frac{3 \text{ m}}{4} = 0.75 \text{ m}$$

Ex: Light is $\lambda = 400 - 750 \text{ nm}$

$$\lambda = 400 \text{ nm} \Rightarrow f = \frac{v}{\lambda} = \frac{3 \times 10^8 \text{ m/s}}{400 \times 10^{-9} \text{ m}}$$

$$= 7.5 \times 10^{14} \text{ Hz}$$

$$= 750 \times 10^{12} \text{ Hz}$$

$$= 750 \text{ THz}$$

$$v = f\lambda$$

$$3 \times 10^8 \text{ m/s} = (750 \text{ THz})(400 \text{ nm})$$

$$\lambda = 750 \text{ nm} \Rightarrow f = 400 \text{ THz}$$