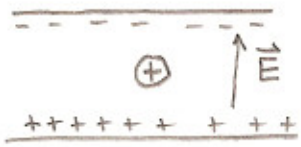
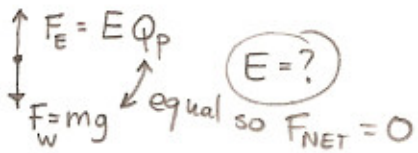
2. I_o = 1 cicada β = ? for 30 cicadas

$$\Rightarrow \beta = 10\log_{10}\frac{I}{I_o} = 10\log_{10}\frac{I_{30\,cicadas}}{I_{1\,cicada}} = 10\log_{10}\frac{30I_o}{I_o}$$

$$= 10\log_{10} 30 = \underline{14.8\ dB}$$

3.





$$E = \frac{mg}{Q_p} = \frac{(1.67\times10^{-27}\,kg)(9.8\,\frac{m}{s^2})}{1.6\times10^{-19}\,C} = \underline{1.02\times10^{-7}\,\frac{N}{C}}\ (UP).$$

---

4. Standing waves on rope fixed at both ends: $\lambda_n = \frac{2L}{n}$

$\lambda_4 = \frac{2L}{4} = \frac{L}{2}$ OK

$\lambda_2 = \frac{2L}{2} = L$ OK

$\lambda_1 = \frac{2L}{1} = 2L$ OK

$\lambda_3 = \frac{2L}{3}$ OK

$\lambda_?$ = 4L NO

---

5. $$\frac{\$0.058}{kW\,hr}\left(\frac{1\,kW}{1000\,W}\right)\left(\frac{75\,W}{1}\right)\left(\frac{24\,hr}{1\,day}\right)\left(\frac{365\,day}{1\,yr}\right)$$

$$= \underline{\$38.11/yr}.$$

---

6. $V_{for\ winter}$ = ? !

$$(1.3)\left(\frac{4.2\times10^7\,kcal}{winter}\right)\left(\frac{1\,BTU}{0.252\,kcal}\right)\left(\frac{ft^3}{1031\,BTU}\right) = \underline{2.1\times10^5\,ft^3}.$$

(1.3) ↑ due to loss