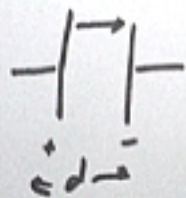


(230)

$$U_E = \frac{1}{2} CV^2 \quad C = \frac{Q}{V}$$

$$= \frac{1}{2} QV \quad V = \frac{Q}{C}$$

$$= \frac{1}{2} C \frac{Q^2}{C^2} = \frac{1}{2} \frac{Q^2}{C}$$



$$Q = \sigma A$$

$$V = \frac{\sigma}{\epsilon_0} d \quad \left. \begin{array}{l} C = \frac{\sigma A}{\frac{\sigma}{\epsilon_0} d} \\ C = \epsilon_0 \frac{A}{d} \end{array} \right\}$$

$$E = \frac{\sigma}{\epsilon_0}$$

$$V = Ed$$

$$C = \epsilon_0 \frac{A}{d}$$



$$C = \frac{Q}{V}$$

$$Q = \lambda \cdot h$$



$$V: \oint \vec{E} \cdot d\vec{A} = \frac{Q_{enc}}{\epsilon_0}$$

$$\oint \vec{E} \cdot d\vec{A} = (2\pi s h) E$$

$$E = \frac{\lambda h}{\epsilon_0 (2\pi s h)}$$

$$\vec{E} = \frac{\lambda}{\epsilon_0 (2\pi s)} \hat{s}$$



$$V = \sum E \delta s$$
$$= \sum \frac{\lambda}{2\pi\epsilon_0} \frac{\delta s}{s}$$

$$V = \frac{\lambda}{2\pi\epsilon_0} \ln\left(\frac{b}{a}\right)$$

$$C = \frac{\lambda h}{\frac{\lambda}{2\pi\epsilon_0} \ln\left(\frac{b}{a}\right)} = 2\pi\epsilon_0 h \ln\left(\frac{b}{a}\right)$$

$$\frac{C}{h} = \frac{2\pi\epsilon_0}{\ln\left(\frac{b}{a}\right)}$$



$$V = \sum E \, ds$$
$$= \sum \frac{\lambda}{2\pi\epsilon_0 s} \, ds$$

$$V = \frac{\lambda}{2\pi\epsilon_0} \ln\left(\frac{b}{a}\right)$$

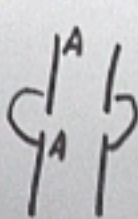
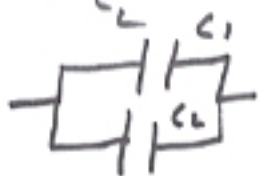
$$C = \frac{\lambda h}{\frac{\lambda}{2\pi\epsilon_0} \ln\left(\frac{b}{a}\right)} = 2\pi\epsilon_0 h \ln\left(\frac{b}{a}\right)$$

$$\frac{C}{h} = \frac{2\pi\epsilon_0}{\ln(b/a)} \quad C = \left| \frac{Q}{V} \right|$$

$\text{⓪} \begin{matrix} \swarrow \varphi \\ \downarrow a \end{matrix} \quad C = \frac{\varphi}{V}$

$$V = k \frac{\varphi}{a}$$

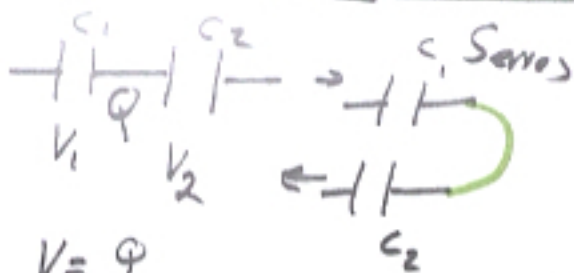
$$C = \frac{\varphi}{k \frac{\varphi}{a}} = \frac{a}{k}$$



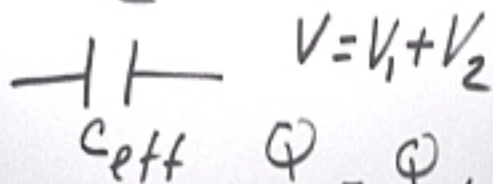
$$C = \epsilon_0 \frac{A}{d}$$

$$C = C_1 + C_2$$

PTT



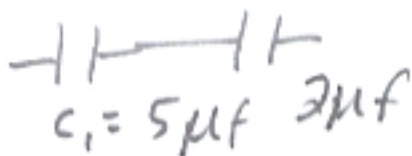
$$V = \frac{Q}{C}$$



$$V = V_1 + V_2$$

$$\frac{Q}{C_{eff}} = \frac{Q}{C_1} + \frac{Q}{C_2}$$

$$\Rightarrow \frac{1}{C_{eff}} = \frac{1}{C_1} + \frac{1}{C_2}$$




$$\frac{1}{C_{\text{eff}}} = \frac{1}{5} + \frac{1}{2}$$

$$= 0.2 + 0.5 = 0.7$$

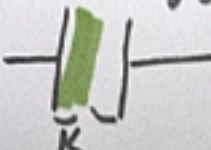
~~$$C_{\text{eff}} = 0.7 \mu\text{F}$$~~

$$C_{\text{eff}} = \frac{1}{0.7} \approx 1.4 \mu\text{F}$$


$$C_{geo} = \epsilon_0 \frac{A}{d}$$


$$C \text{ with material}$$

$$K = \frac{C}{C_{geo}}$$


$$\frac{1}{C_{eff}} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$\frac{1}{C_{eff}} = \frac{1}{K C_{geo}} + \frac{1}{C_{geo}}$$

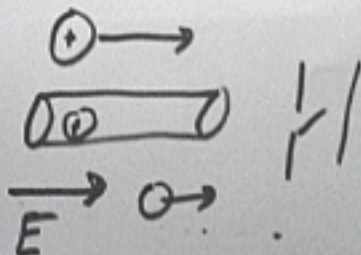
$$\frac{1}{C} + 1)$$

$$\frac{1}{C_{\text{eff}}} = \frac{1}{C_{\text{geo}}} \left(\frac{1}{K} + 1 \right)$$

$$I = \frac{\Delta Q}{\Delta t} \quad 1 \frac{\text{C}}{\text{s}} = 1 \text{A}$$

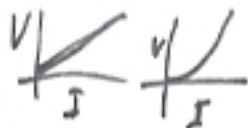
$\odot \rightarrow$ Conventional

$\leftarrow \ominus$ Physical



$$V = IR$$

$$R = \frac{V}{I}$$



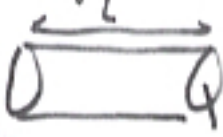
$$R = \frac{\text{Volts}}{\text{Amp}} = \frac{J/C}{C/S}$$

$$1 \Omega = \frac{1V}{1A} = \frac{Js}{C^2}$$

$$= \frac{\frac{N}{C} \cdot m}{\frac{C}{s}} = \frac{Nm s}{C^2}$$

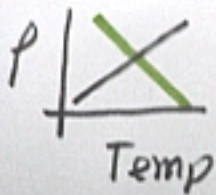
$$V, I \Rightarrow R$$

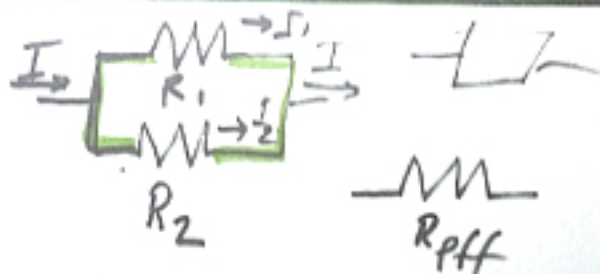
$$\rho \text{ [}\Omega\text{m]}$$



A hand-drawn diagram of a cylinder representing a resistor. A double-headed arrow above the cylinder is labeled 'L', indicating its length. The right circular face of the cylinder is labeled 'A', representing its cross-sectional area.

$$R = \rho \frac{L}{A}$$

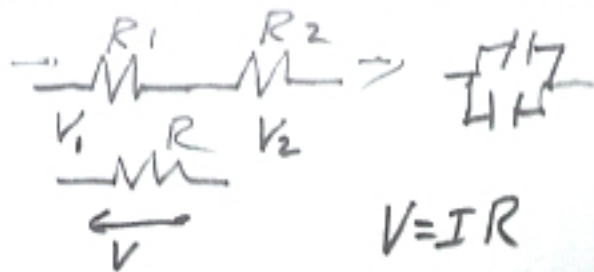




$$I = I_1 + I_2 \quad V = IR$$

$$\frac{V}{R_{eff}} = \frac{V}{R_1} + \frac{V}{R_2} \quad I = \frac{V}{R}$$

$$\Rightarrow \frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2} \quad \text{HHH}$$



$$V = V_1 + V_2$$

$$IR_{\text{eff}} = IR_1 + IR_2$$

$$\Rightarrow R_{\text{eff}} = R_1 + R_2$$