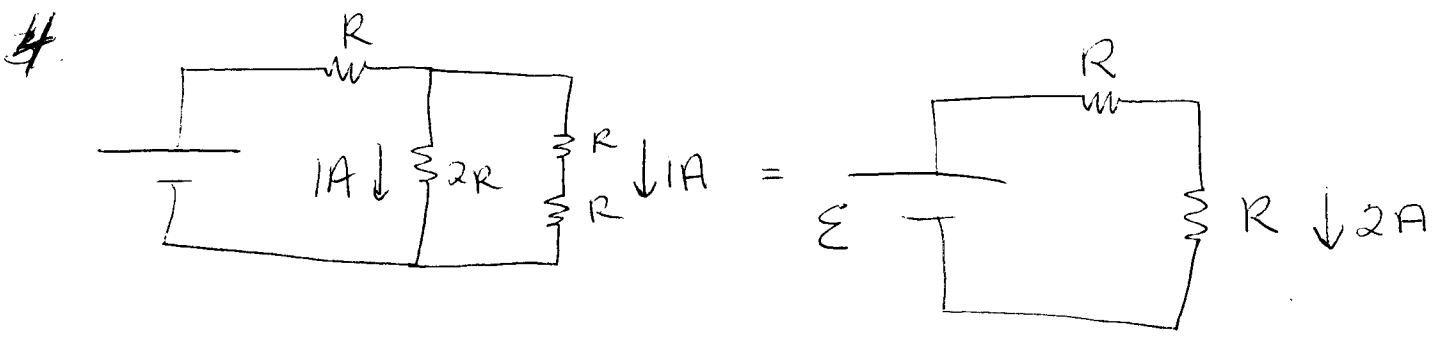


Physics 210 - Solutions to Multiple Choice - Week 7

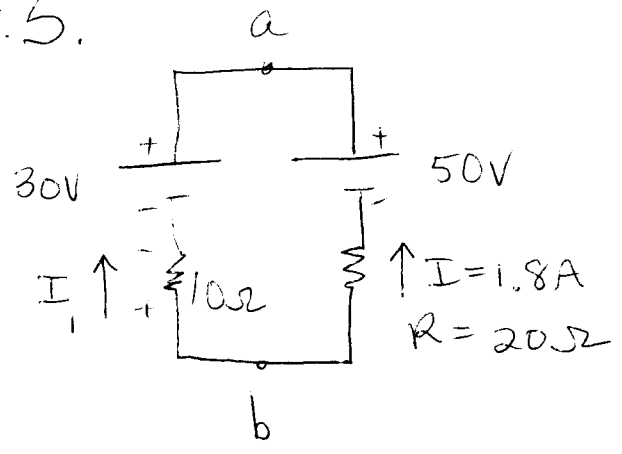
1. $V = IR = \frac{Q}{t} \times R = \frac{5.0 \times 10^{21} e^- \times 1.6 \times 10^{-19} C/s}{10 \text{ min} \times 60 \text{ s/min}} \times 20 \Omega = 27V$

2. $\frac{R_c}{R_{Fe}} = \frac{R_{oc} [1 + \alpha_c \Delta T]}{R_{oFe} [1 + \alpha_{Fe} \Delta T]} = \frac{10 \Omega}{10 \Omega} \left[\frac{1 + (-.5 \times 10^{-3})(-100)}{1 + (5 \times 10^{-3})(-100)} \right] = 2.1$



$P = I^2 R = (1A)^2 (2(3 \Omega)) = 6W$

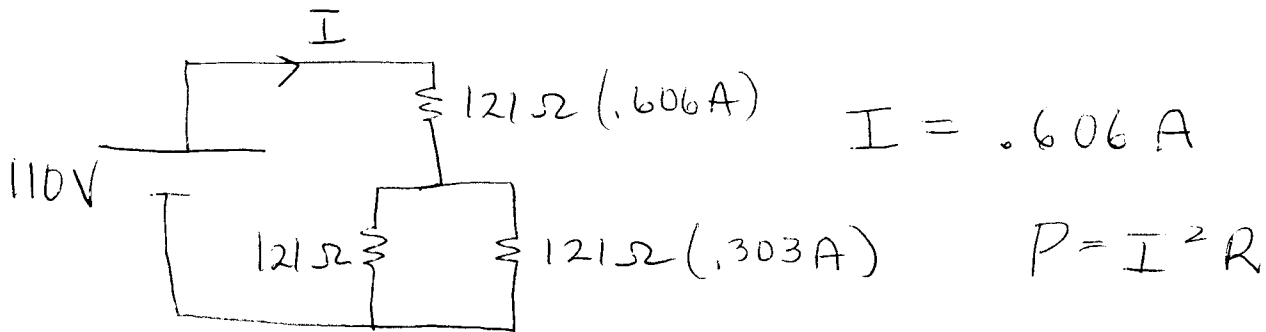
4.5.



$V_{ab} = -50V + 1.8(20) = -14V$
 $= -30V + I_1(10) = -14V$
 $I_1 = 1.6A \quad R \text{ to } L$

$$6. \quad V_{AB} = +20V - 20(1.5) - 12V = -22V$$

$$7. \quad P = 100W = \frac{V^2}{R} \quad R = \frac{(110V)^2}{100W} = 121\Omega$$



\Rightarrow A is brightest
since power is highest

$$8. \quad \vec{F} = q \vec{v} \times \vec{B}$$

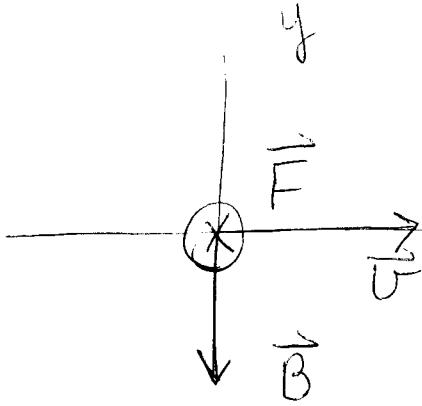
$$\vec{v} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 6 \times 10^6 & 0 & 0 \\ 3 & 1.5 & 2 \end{vmatrix} = -\hat{j}(6 \times 10^6)(2) + \hat{k}(6 \times 10^6)(15)$$

$$\vec{F} = 1.6 \times 10^{-19} C (12 \times 10^6 (-\hat{j}) + 9 \times 10^6 (\hat{k}))$$

$$\vec{a} = \frac{\vec{F}}{m} \quad |\vec{a}| = \frac{1.6 \times 10^{-19}}{9.11 \times 10^{-31} \text{ kg}} \sqrt{(12 \times 10^6)^2 + (9 \times 10^6)^2}$$

$$= 2.6 \times 10^{18} \text{ m/s}^2$$

9.



$$\vec{F} = q \vec{v} \times \vec{B}$$

$$10. \quad \vec{F} = q \vec{v} \times \vec{B}$$

$$= q \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 4 & 6 \\ 0 & B_y & B_z \end{vmatrix} = 4\hat{i} - 20\hat{j} + 12\hat{k}$$

$$= q \left[\hat{i} (4B_z - 6B_y) - \hat{j} (2B_z) + \hat{k} (2B_y) \right]$$

$$(\hat{k}) \Rightarrow q 2B_y = 12 \quad B_y = \frac{12}{2q} = \frac{12}{2(2)} = 3 \text{ T}$$