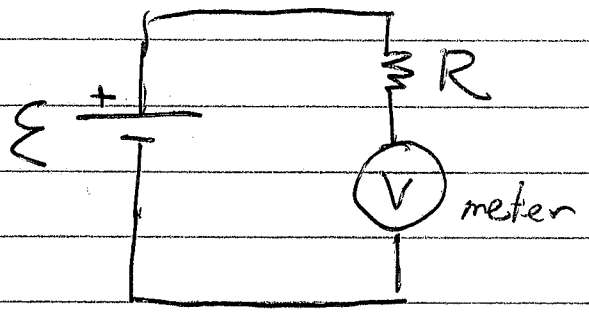
① Phys 2426 2015-10-01 Lec 11

Exam 1 Avg: 59.79%

Next Topic: Magnetism
Read Chap 29, 30

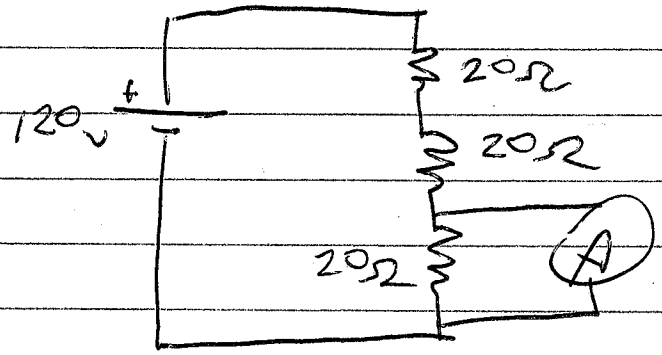
#16



No Current!

$\mathcal{E} = IR + V_{meter}$

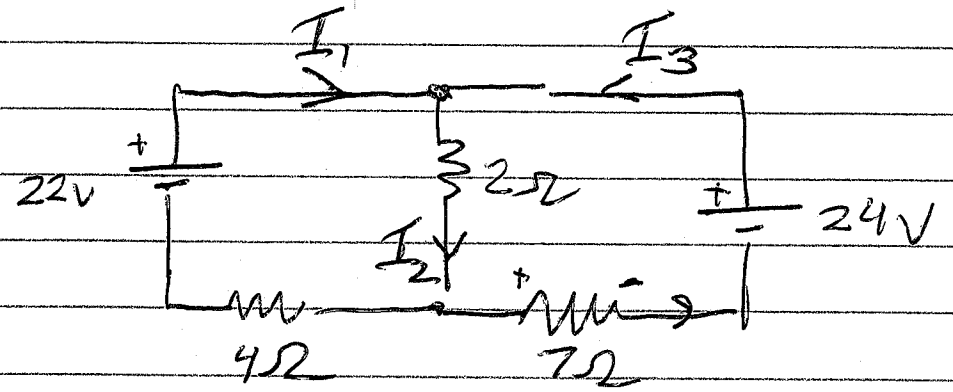
#33



$R_{eq} = 40\Omega$

$I = \frac{120v}{40\Omega} = 3A$

(2)



$I_1 + I_3 = I_2$

Left Loop: $22 - 4I_1 - 2I_2 = 0$

Right Loop: $24 - 7I_3 - 2I_2 = 0$

Outer Loop: $22 - 24 + 7I_3 - 4I_1 = 0$

(2)

$22 - 4I_1 - 2I_1 - 2I_3 = 0$ $\quad 22 - 6I_1 - 2I_3 = 0$

$24 - 7I_3 - 2I_1 - 2I_3 = 0$ $\quad 24 - 2I_1 - 9I_3 = 0$

$(22 - 3 \cdot 24) - 2I_3 + 3 \cdot 9 \cdot I_3 = 0$

$-50 + 25I_3 = 0$ $\quad I_3 = 2A$

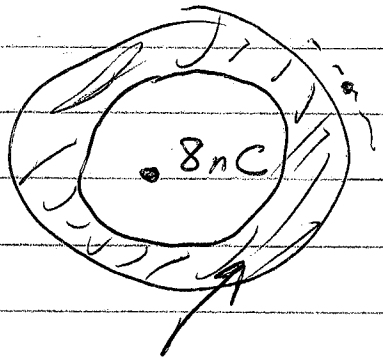
$22 - 6I_1 - 2 \cdot 2 = 0$

$18 - 6I_1 = 0$ $\quad I_1 = 3A$

$I_2 = 2 + 3 = 5A$

③ #27 $\Phi_E = q/\varepsilon_0 = 4\pi k q = 1.8 \times 10^{-8}\ V \cdot m$

#28



$E = ? = \frac{\Phi}{A} = \frac{q_{enc}/\varepsilon_0}{4\pi r^2}$

$E = \frac{4\pi k q_{enc}}{4\pi r^2}$

$= \frac{k q_{enc}}{r^2}$

$= \frac{\left(9 \times 10^9 \frac{Nm^2}{C^2}\right)\left(3 \times 10^{-9}\ C\right)}{(0.06\ m)^2}$

#18

$m = 0.0136\ kg \quad q = -0.69\ \mu C$

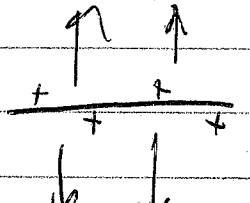
$|F_E| = |F_g|$

$|q|E = mg$

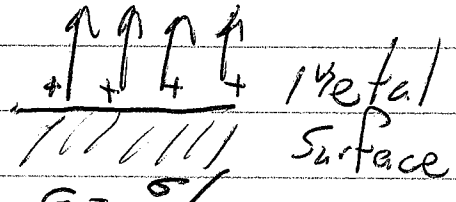
$E = 1.93 \times 10^5\ N/C$

Charge of a sheet: $E = \frac{\sigma}{2\varepsilon_0} = 2\pi k \sigma$

$\sigma = 3.4 \times 10^{-6}\ C/m^2$



$E = \sigma/2\varepsilon_0$



$E = \sigma/\varepsilon_0$

Magnets

Magnetic Field - flow of Mag Flux.
Mag Flux circulates.
Mag Field Lines form loops.

Effects of magnets:
- Attract / Repel
- Can magnetize materials
- Compass
- Motors
- Generators

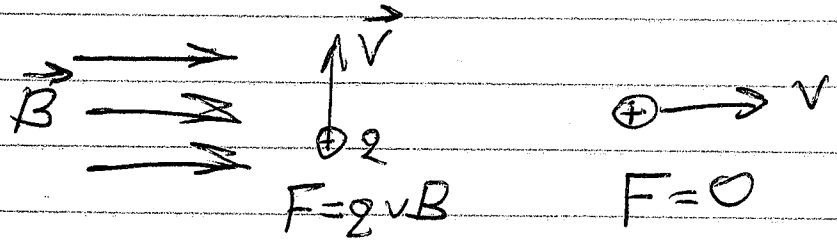
Magnetic Force (cross product)

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

$$|F| = |qvB|\sin\theta|$$

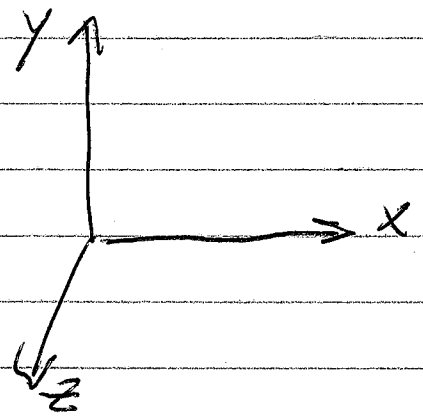
θ = $\vec{v}$ and $\vec{B}$ can't be parallel

$$= qv_{\perp}B = qvB_{\perp}$$



$\vec{F_B}$ is $\perp$ to both $\vec{v}$ and $\vec{B}$

Specifying Directions



Terms:	+x	-x	+y	-y	+z	-z
Paper Space	~~R~~R	L	Top Up	Bot Down	Out	In
Relative:	F	B	R	L	Up	Down
Model Space	E	W	N	S	U	D