$$R = \frac{\rho l}{A}.$$

Name: _____ (1)

PHY 232 Summer 2016 Class Work

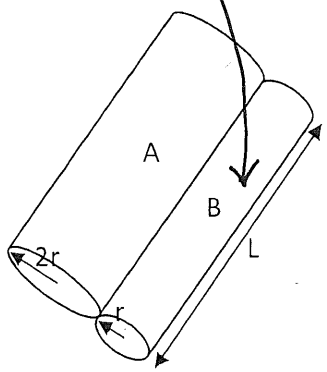
Class 18. Current and Resistance

(a) A and B are made of the same kind of material. If A has a resistance R, what is the resistance of B?

$$\frac{\rho L}{\pi (2r)^2} = R \Rightarrow \frac{\rho L}{\pi r^2} = 4R$$

$$\Rightarrow R_B = 4R.$$

(b) If A and B are touching each other along its length, what is the resultant resistance across the two ends?



① $$R_{AB} = \frac{\rho L}{\pi[(2r)^2 + r^2]} = \frac{\rho L}{\pi \cdot (5r^2)}$$

$$= \frac{1}{5}\left(\frac{\rho L}{\pi r^2}\right)$$

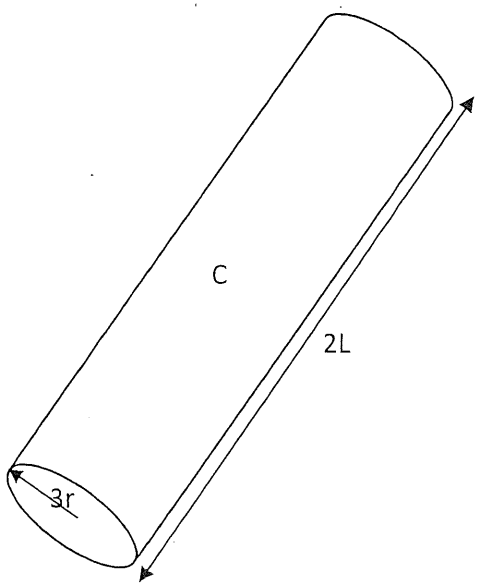
② $$\frac{1}{R_{AB}} = \frac{1}{R_A} + \frac{1}{R_B}$$

$$= \frac{1}{R} + \frac{1}{4R}$$

$$= \frac{1}{R}\left(1 + \frac{1}{4}\right) = \frac{5}{4R} \Rightarrow R_{AB} = \frac{4R}{5}$$

$$= \frac{4R}{5}$$

(c) C is made of the same kind of material as A and B. If A has a resistance R, what is the resistance of ~~B~~ C ?

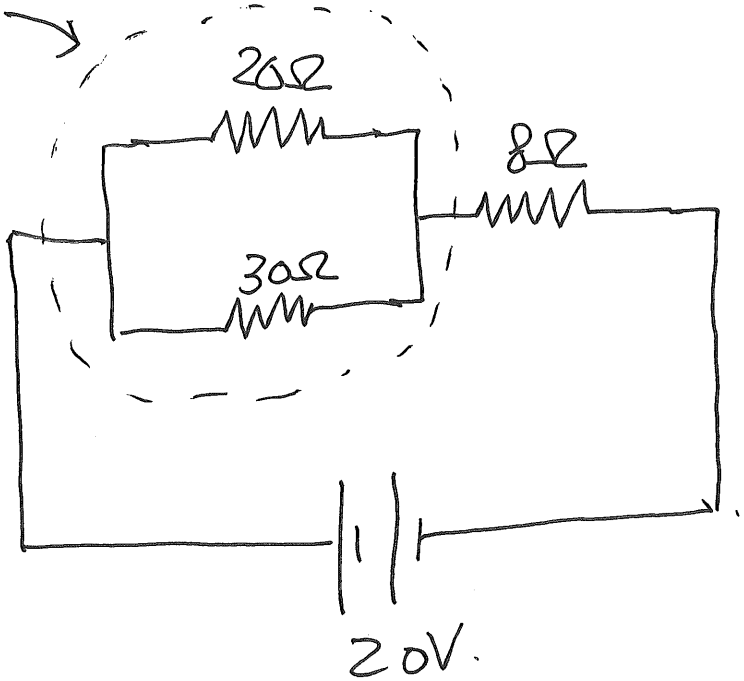


$$\frac{1}{R_p} = \frac{1}{20} + \frac{1}{30}$$

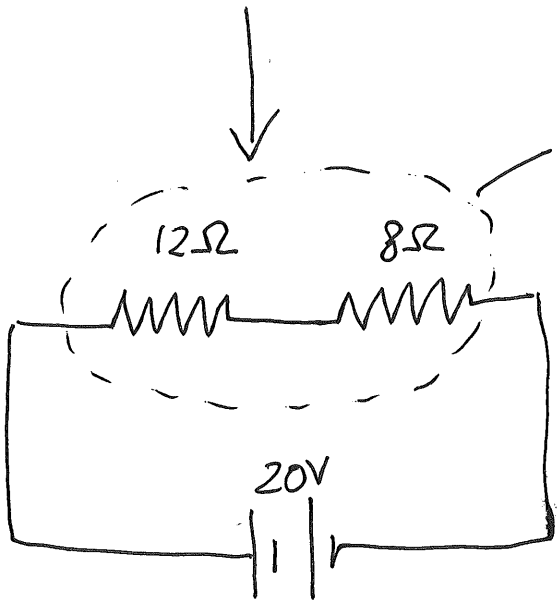
$$= \frac{3+2}{60}$$

$$= \frac{5}{60}$$

$$\Rightarrow R_p = 12\Omega.$$

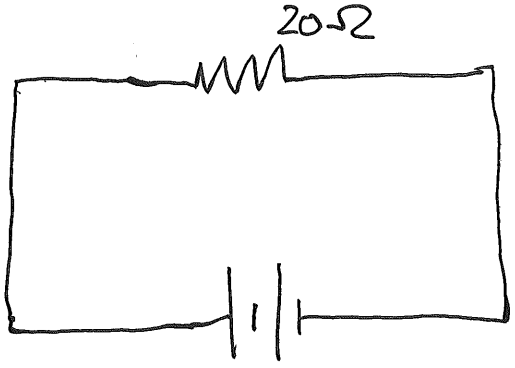


20V.

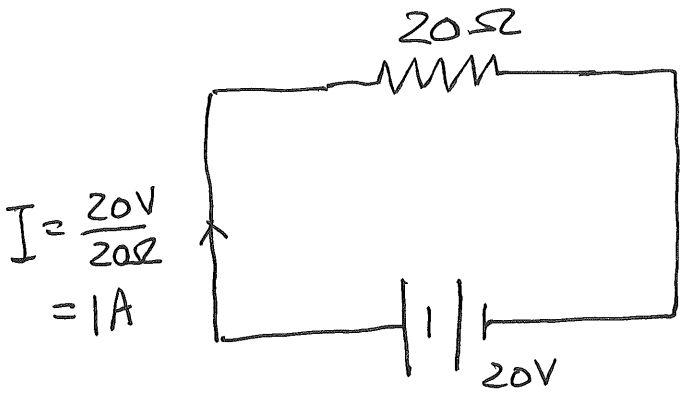


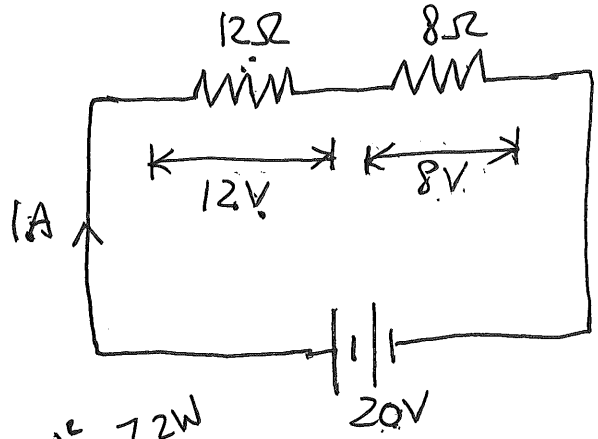
$R_s = 12\Omega + 8\Omega$

$= 20\Omega.$



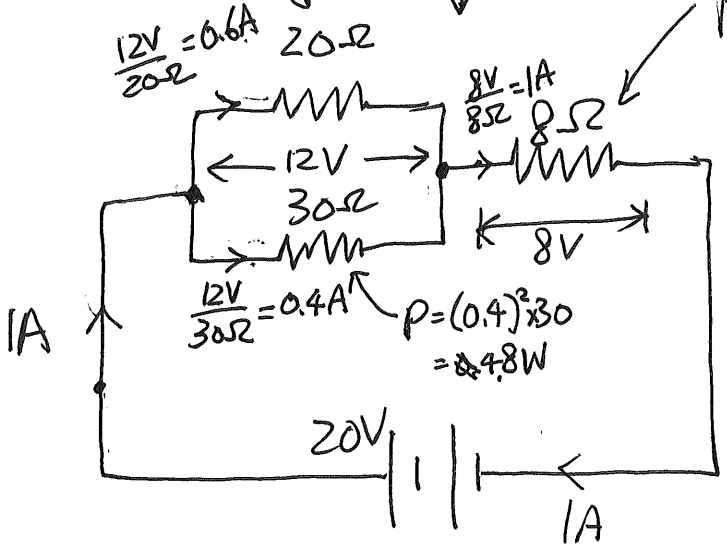
20V.





$P = \frac{(12)^2}{20} = 7.2W$

$P = (8)(1) = 8W.$



Total power dissipation by the three resistors

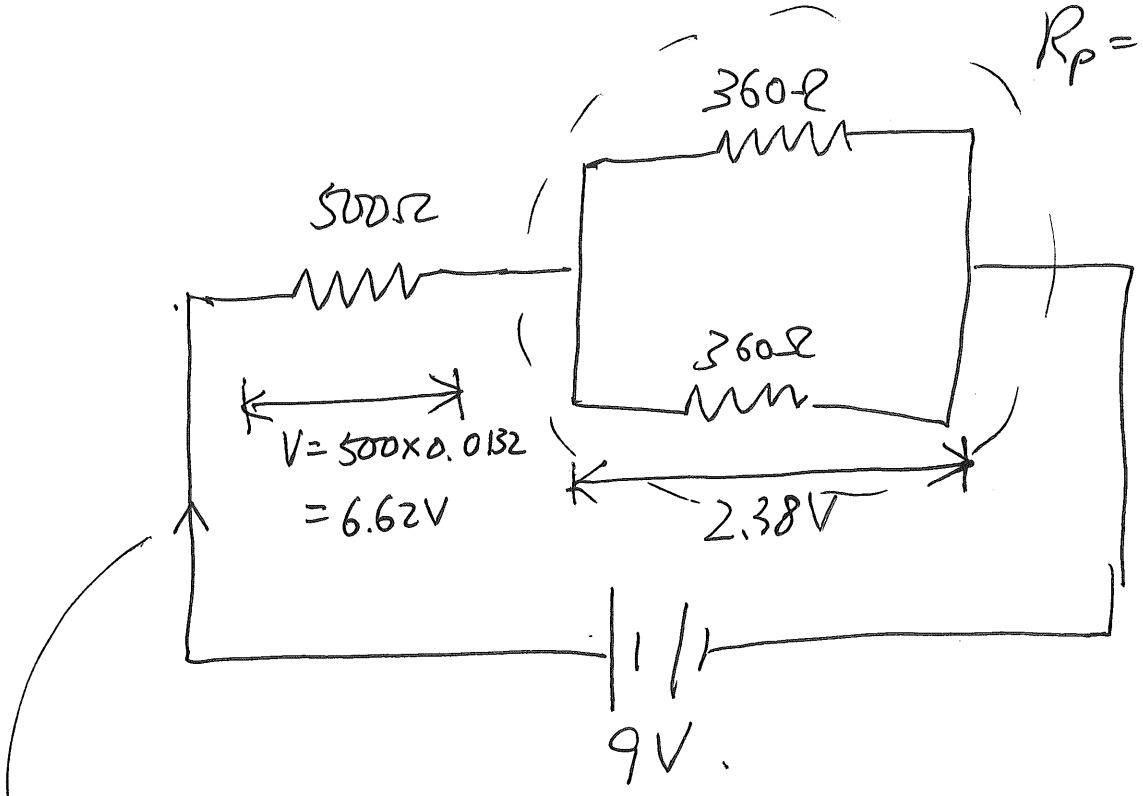
$= (7.2 + 4.8 + 8)$

$= 20W.$

Power delivered by battery $= IV$

$= (1)(20)$

$= 20W.$



$$I = \frac{9}{500 + 180}$$

$$= 0.0132A$$