Name: KEY

Date:

Section C D F

The Masters School
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Physics

Circuitry I

1. A net charge of 51 mC passes through the cross-sectional area of a wire in 14.0 s.

   a. What is the current in the wire? (Your answer should be between 3 – 6 mA)

$$I = \frac{Q}{\Delta t} = \frac{51 \times 10^{-3}\ C}{14\ s} = .00364\ A$$

$$3.64\ mA$$

   b. How many electrons pass the cross-sectional area in 1.0 min? (Your answer should be between 1×10^{15} - 10^{20} electrons)

$$\frac{51 \times 10^{-3}\ C}{14\ s} \times \frac{60\ s}{1\ min} \times \frac{1\ electron}{1.6 \times 10^{-19}\ C} = 1.366 \times 10^{18}\ electrons/min$$

2. How much charge passes through a cross-sectional area of a copper wire in 1.0 s if $I = 6.5$ A? (Your answer should be between 5 – 10 C)

$$I = \frac{Q}{\Delta t} \qquad 6.5\ A = \frac{Q}{1s}$$

$$Q = 6.5\ C$$

3. A nichrome wire with a resistance of 16 Ω is connected across the terminals of a 7.5 V flashlight battery. How much current is in the wire? (Your answer should be between .07 - .7 A)

$$\Delta V = IR$$

$$I = \frac{\Delta V}{R} = \frac{7.5\ V}{16\ \Omega} = .46875\ A$$

4. How much current is drawn by a Sharp Aquos 37" HDTV if it has a resistance of 73.8 Ω and is connected across a potential difference of 120 V? (Your answer should be between 1 – 8 A)

$$\Delta V = IR$$

$$I = \frac{\Delta V}{R} = \frac{120\ V}{73.8\ \Omega} = 1.626\ A$$

5. A potential difference of 3.0 V produces a current of 0.80 A in a piece of copper wire. What is the resistance of the wire? (Your answer should be between 2 – 8 Ω)

$$\Delta V = IR$$

$$R = \frac{\Delta V}{I} = \frac{3}{.8} = 3.75\ \Omega$$

6. The operating potential difference of a light bulb is 120 V. The power rating of the bulb is 115 W.

   a. Find the current in the bulb (Your answer should be between .1 – 1 A)

$$P = IV$$

$$I = \frac{P}{V} = \frac{115}{120} = .9583\ A$$

   b. Find the resistance in the bulb. (Your answer should be between 100 – 200 Ω)

$$P = \frac{V^2}{R}$$

$$R = \frac{V^2}{P} = \frac{120^2}{115} = 125.2\ \Omega$$

7. How much power is needed to operate an Apple *Powerbook* laptop that draws .54 A of current when a potential difference of 120 V is applied across it?

$$P = IV$$

$$P = (.54)(120)$$

$$P = 64.8\ W$$