

Name: _____

Quiz: Current and Electric Circuits

Solve the following problems. Write the answers in the space provided or next to the diagrams.

1. (a) What is meant by electric current? Be as descriptive as possible and use an equation to formalize the definition.

rate of electron flow
 $I = Q/t$

- (b) How is electron flow different from conventional current?

e flow \rightarrow imaginary "+" flow
opposite direction

2. A light bulb draws a current of 0.48 A. How long does it have to be on for 50.0 C of charge to flow through it?

$t = \frac{Q}{I} = \frac{50.0}{0.48} = 104.16 \text{ s} = 1 \text{ min } 44.16 \text{ s}$

3. Recall that $e = 1.6 \times 10^{-19} \text{ C}$. How many electrons flow through the light bulb in the previous question in a one-minute period?

current = $0.48 \text{ A} = 0.48 \text{ C per Sec} = 0.48 \times 60 = 28.8 \text{ C in 1 min}$

$28.8 \text{ C} \times 6.25 \times 10^{18} \text{ e/C} = 1.8 \times 10^{20} \text{ electrons}$

Solve the following problems and write the letter of the correct answer in the space provided.

1. In order to move a charge of 0.75 C from point A to point B in a conductor, 3.26 J of energy is required. What is the electric potential difference between the two points? 4.3 V

- (a) 0.23 V
 (b) 2.4 V
 (c) 2.5 V
 (d) 3 V

none are correct
 $V = \frac{E (J)}{Q (C)}$

$E = 3.26 \text{ J}$
 $Q = 0.75 \text{ C}$

2. What is the potential difference in a circuit if 1000 J of work are done to supply a current of 2.0 A for 100 s? 5.0 V

- (a) 0.2 V
 (b) 2.0 V
 (c) 5.0 V
 (d) 500 V

$V = \frac{W}{Q} = \frac{W}{It} = \frac{1000}{(2)(100)} = 5.0 \text{ V}$

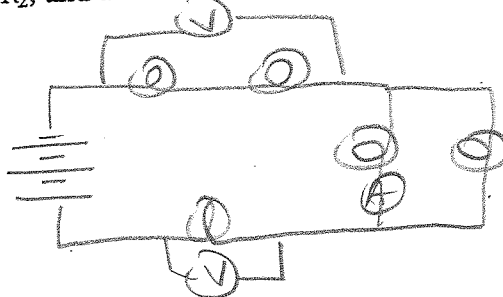
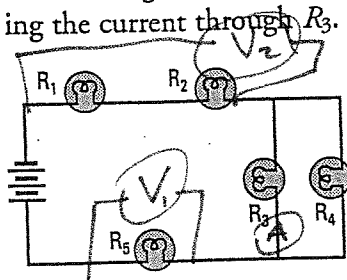
$W = 1000 \text{ J}$
 $Q = It$

3. How much work is done when 50.0 C of charge is moved through a potential difference of 240.0 V? 12000 J

$W = QV$
 $W = 50.0 \times 240.0 = 12000 \text{ J}$

$Q = 50.0 \text{ C}$
 $V = 240.0 \text{ V}$

5. Redraw the circuit shown below in the space at the right of the diagram. Add voltmeter V_1 to show it measuring the voltage across R_5 , voltmeter V_2 to show it measuring the voltage across R_1 and R_2 , and an ammeter to show it measuring the current through R_3 .



6. A potential difference of 13.6 V exists across the terminals of a car battery. When operating a starting motor, it delivers a constant current of 112.5 A for 1.81 s. How much work is done on the charge by the battery? Hint: Think about work and voltage, and about time and current. Notice that units in both pairs have time in common.

$V = 13.6 \text{ V}$
 $I = 112.5 \text{ A}$
 $t = 1.81 \text{ s}$
 ~~$V = \frac{W}{Q}$~~

$W = VQ$
 $W = V(I t)$
 $= (13.6)$
 (1.81)
 (112.5)

$= 2769.3$

$W = 2770 \text{ J}$

$W = 277 \text{ J}$

7. Which of the following diagrams correctly shows a series circuit containing an electrical source, an ammeter, a light bulb, and a voltmeter?

