PHY 621 Current and Voltage Questions

## Electric Current

1. How much electric current is flowing when 12 C of charge pass a point in a conductor is 4.0 s?

2. How much current is flowing through a light bulb when it takes 24 s for 18 C of charge to pass through its filament?

3. How much charge enters the starting motor, if it takes 4.0 s to start a car and a current of 225 A flows during that time?

4. A gold-leaf electroscope with $1.25 \times 10^{10}$ excess electrons is grounded and discharges in 0.50 s. Calculate the average current flowing through the grounding wire.

5. A small electric motor draws a current of 0.40 A. How long will it take for 8.0 C of charge to pass through it?

6. How many electrons pass through a light bulb in each second (1.0 s), if the bulb has a current of 0.50 A flowing through it?

## **Electric Potential**

7. What amount of energy does a kettle use to boil water if it has 800. C of charge passing through it with a potential difference of 120. V?

8. What is the potential difference across a refrigerator if 75 C of charge transfer $9.0 \times 10^3$J of energy to the compressor motor?

9. An electric baseboard heater draws a current of 6.0 A and has a potential difference of 240 V. For how long must it remain on to use $2.2 \times 10^5$ J of electrical energy?

10. A flash of lightning transfers $1.5 \times 10^9$J of electrical energy through a potential difference of $5.0 \times 10^7$ V between a cloud and the ground. Calculate the quantity of charge transferred in the lightning bolt.

11. Calculate the energy stored in a 9.0 V battery that can deliver a continuous current of 5.0 mA for $2.0 \times 10^3$s.

12. If a charge of 0.30 C moves from one point to another in a conductor and, in doing so, releases 5.4 J of electrical energy, what is the potential difference between the two points?

Answers: 1) 3.0 A 2) 0.75 A 3) $9.0 \times 10^2$ C 4) $4.0 \times 10^{-9}$A
5) 20 s 6) $3.1 \times 10^{18}$ e⁻ 7) $9.60 \times 10^4$ J 8)$1.2 \times 10^2$ V
9) $1.5 \times 10^2$ s 10) 30 C 11) 90 J 12) 18 V