Electricity and Magnetism Revision Questions

1.
   (a) Describe how something can be charged by induction.

   (b) If two objects with different affinity for electrons are rubbed together, what happens?

   (c) If a charged object comes close to (but doesn't touch) a neutral object, what may happen?

   (d) If the charged object touches the neutral object, what happens?

   (e) Draw where the charges are on the negatively charged conductor below.
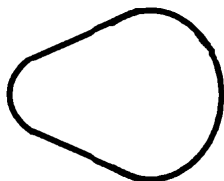
2.
   (a) In Coulomb's Law, F is inversely proportional to r^2. What does this mean physically?

   (b) Calculate the force acting between two charges 84 cm apart, if one is positive and 2.4nC, and the other is negative and 1.9 nC.

3.
   (a) State what electric fields are.

   (b) Draw the electric field between two like charges.

   (c) On the charged conductor for 1(e), draw the electric field lines.

   (d) Draw the electric field lines near two oppositely charged plates.

4.
   (a) Calculate the work that would be done on a proton to push it through a potential difference of 1.5 V.

   (b) Calculate the electric field strength at a point exactly midway between two charges (42 cm away from each) if one is positive and 2.4nC, and the other is negative and 1.9 nC.
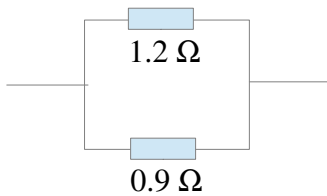
5. State the relationship between electron flow and current flow.

6.
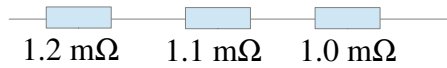   (a) Write Ohms' Law as a sentence in words.

   (b) Calculate the resistance in a circuit that has 6.0 V and 250 mA

   (c) Calculate the power in the same circuit.

7. Calculate the total resistance for these combinations of resistors:

(a)

1.2 Ω

0.9 Ω

(b)

1.2 mΩ   1.1 mΩ   1.0 mΩ

8.

(a) State one similarity and one difference between electric field lines and magnetic field lines.

(b) Draw a diagram to show the magnetic field around a straight wire.

(c) Draw a diagram to show the magnetic field around a loop of wire.

(d) Determine the direction of force on a current-carrying wire in a magnetic field if the current is going to the right and the magnetic field is going into the page.

(e) Calculate the force on the wire below, if the current is 1.5 A, the magnetic field strength is 3.2 T, and the length of wire in the magnetic field is 20 cm.

I

B

30°
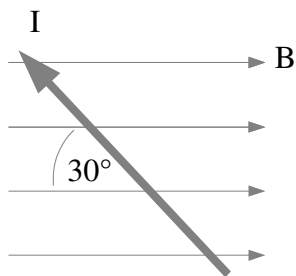
9. Explain how an electromagnet works.

10. Describe how an electric motor works.