Physics 112
Sample Exam Questions #2

1. Two large parallel conducting plates are separated by a distance d, placed in a vacuum, and connected to a source of potential difference ΔV. A particle with charge $2e$ starts from rest on the surface of one plate and accelerates to the other. The final kinetic energy of the charge is:

   A. $e\Delta V/2$
   B. $e\Delta V/d$
   C. $e\Delta Vd$
   D. $\Delta Vd/e$
   E. $2e\Delta V$

2. You are told to go into a room and measure the electric field magnitude at a point one meter from the center of the room. The room is completely empty (the source charges producing the field are somewhere outside). You use a test charge and measure the electric field magnitude one meter from the center of the room to be "E." When you leave, taking your test charge with you, someone else comes in and measures the field at the ***same*** location using a different test charge, one which has ***twice*** the charge of your own. The electric ***field*** magnitude that they will measure will be:

   A. 0.25 E
   B. 0.5 E
   C. E
   D. 2 E
   E. 4 E
   F. There is not enough information to answer this question.

3. A small charged object (a "source" charge) is located in the center of a room. When a test charge is located 10 cm from the charged object, it experiences a force of magnitude 2 N (about half a pound). If that same test charge is moved to a distance three and a third meters from the charged object, which of these values will be ***closest*** to the magnitude of the force on it now?

   A. 0.0002 N
   B. 0.002 N
   C. 0.02 N
   D. 0.06N
   E. 0.2 N
   F. 2 N
   G. 20 N
   H. 66 N
   I. 200 N
   J. 2000 N

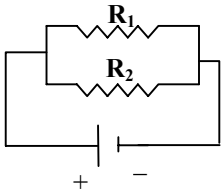
4. A positive charge Q is fixed on the y axis at y = 6 m. Another positive charge q is located on the x axis at x = 8 m; its potential energy there is 60 J. How much energy is required for you to push the charge q over to the origin, starting from the original location?

A. 10 J
B. 20 J
C. 30 J
D. 40 J
E. 50 J
F. 60 J
G. 90 J
H. 120 J
I. 180 J

5. A positive charge is moving freely (no external forces) in the presence of an electric field. As it moves, which of these could be true: ***TWO CORRECT ANSWERS – WRITE <u>BOTH</u>; HALF CREDIT FOR EACH ONE.***

A. Its speed increases while it moves toward a region of higher electric potential.
B. Its speed increases while it moves toward a region of lower electric potential.
C. Its speed increases while it moves along an equipotential line.
D. Its speed decreases while it moves toward a region of higher electric potential.
E. Its speed decreases while it moves toward a region of lower electric potential.
F. Its speed decreases while it moves along an equipotential line.

6. In the circuit shown, resistor R_2 is a *variable* resistor whose resistance may be changed. As the resistance of resistor R_2 is ***decreased,*** what will happen to the power dissipated by resistor R_1?



A. It will increase.
B. It will decrease.
C. It will remain the same.
D. It will increase for a while, and then it will remain constant.
E. It will decrease for a while, and then it will remain constant.
F. Whether it increases, decreases, or remains the same will depend on the ratio of R_2 to R_1.

7. The electric field vector is shown at one point in this diagram. Draw electric field vectors at points A, B, C, and D in the same diagram. Make sure the relative lengths of the arrows correspond to the respective magnitudes of the electric field at those points.