Physics 112
Answers to Sample Exam Questions #2

1. $|\Delta KE| = |\Delta PE| = |q\Delta V| = (2e)\,\Delta V$

2. The electric field magnitude is E; a different test charge won't change the electric field at that point.

3. The distance is increased from 0.10 m to 3.33 m, a factor of 33.3. Therefore, the force has decreased by a factor of $(33.3)^2 = 1100$, so the force is now less than two one-thousands of a newton, or 0.002 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?

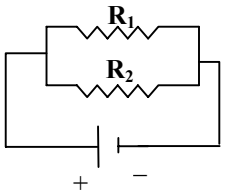
Initial distance between charges (in meters) is $(6^2 + 8^2)^{1/2} = 10$ *m;*
$W = \Delta TE = \Delta PE = PE(final) - PE(initial) = kQq/r_{final} - kQq/r_{initial} = kQq/6 - kQq/10 = (4/60)\,kQq = (2/3)\,(kQq/10) = (2/3)\,(60\ J) = 40\ J.$

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.***

Its speed increases while it moves toward a region of lower electric potential.
Its speed decreases while it moves toward a region of higher electric potential.

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?

It remains the same since the current through R_1 remains constant $I_1 = \Delta V_{bat}/R_1$ which is unchanged.



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. *Electric field vectors are perpendicular to equipotential lines; magnitude is greater where equipotential lines are closer; electric field points toward* ***lower*** *potential.*