Name: (please print) _____

1. You must show ALL work in a clear and organized manner in order to receive full credit. Insufficient work or incomplete explanations will result in a loss of points.
2. Cheating will be dealt with severely. Keep your eyes on your own paper, and do not attempt to talk or communicate to any student around you. Students who are involved in any kind of cheating will receive a ZERO on this test, and will be referred to the Dean of Students for disciplinary action.
3. Except for a simple numerical mistake in adding points, any appeals regarding how this exam was graded must be submitted in writing (return the exam also) within 3 class meetings after the test was handed back.

Test #2 Raw Score: ____ / 65 Test #2 Grade: _____ / 100

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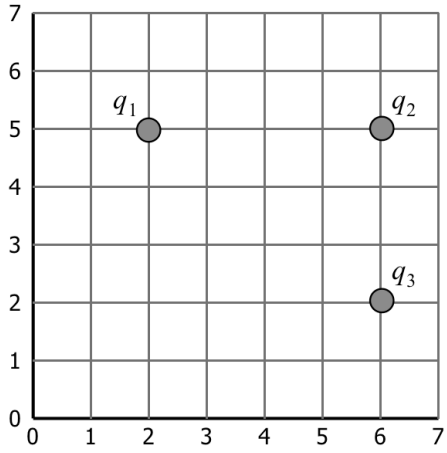
1. (10 pts) Fill in the blanks for the following sentences.

   If a charged particle is placed in an electric field it will experience a _____, and this will cause the charged particle to _____ . While accelerating, the charged particle will move through a _____, which means that the force is doing _____ on the charged particle. If the force and displacement are in the same direction, the work done by the electric field is _____ . Positive work causes the kinetic energy of the charged particle to _____ and the potential energy to _____. Electric potential is defined as the potential energy per unit _____. Only _____ in electric potential are important. When calculating the change in potential between two locations the _____ does not matter.

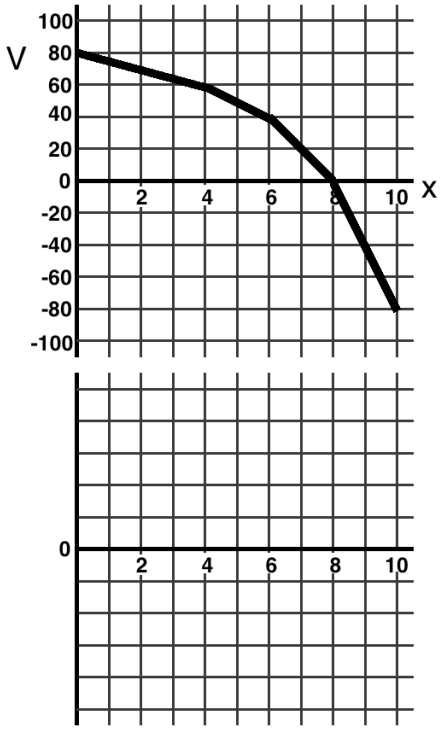
   If a charged particle is moved through a potential difference, the particle will experience a change in _____ _____. ***Write this sentence as an equation***.

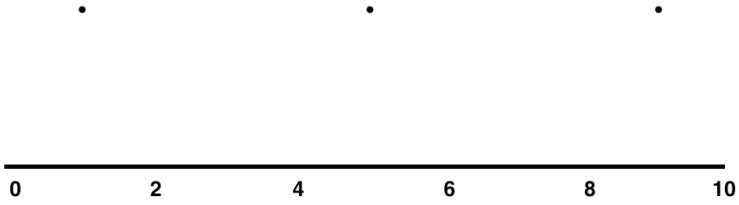
   If a potential difference exists between two locations, than an _____ _____ must also exist in that region, and this electric field points in the direction of _____ _____ _____ . ***Write this sentence as an equation***.

2. (10 pts) Determine the amount of potential energy stored in the three charge system shown in the figure if $q_1 = 36\mu C$, $q_2 = 28\mu C$ and $q_3 = 54\mu C$ and distances are in meters.



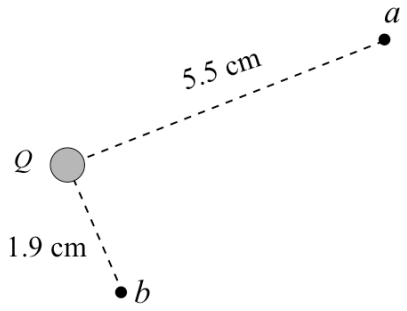
3. (10 pts) The plot below shows the electric potential as a function of position.
   a. Draw equipotential contour lines with with $\Delta V = 20V$ in the space on the right.
   b. Draw vectors to represent the electric field at the locations of 1m, 5m and 9m.
   c. Sketch (using correct numbers) the graph of the electric field versus position in the blank graph.



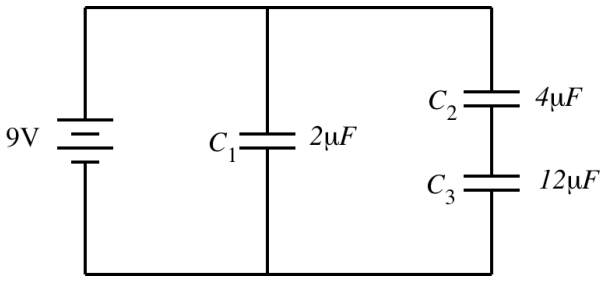


4. (10 pts) A 2.0m long copper wire with a diameter of 0.002m has a potential difference of 3.4V between its ends. If the conductivity of copper is $\sigma = 1.7 \times 10^{-8}$ Ωm, determine the electric field in the wire.

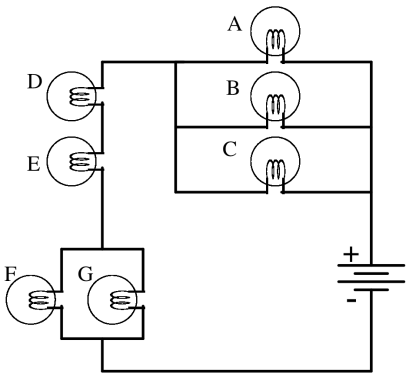
5. (10 pts) A proton moves from point *a* to point *b* in the vicinity of a point charge $Q = 7.3 \times 10^{-9}$C. If the proton's speed at point *a* is $v_a = 7.5 \times 10^5$m/s, what is its speed at point *b*?



6. (5 pts) Three capacitors are connected to a battery as shown. What is the equivalent capacitance of this combination?



7. (10 pts) Six identical light bulbs are connected as shown. All the bulbs are glowing.



   a. (7 pts) Rank in order, from brightest to dimmest, the brightness of the bulbs. *Explain how you arrived at your ranking.*

   b. (3 pts) Bulb B is removed from its socket. What happens to the brightness of bulb D? *Explain*