Physics 1214 - General Physics II

Midterm - 2015.02.27

Name: _____

Instructions: In Part I, you are to to attempt each of problems 1 through 5, they are worth 20 points each, for a total of 100 points. In Part II, you are only required to attempt one problem, worth 20 points. Solving the other two problems from Part II can earn you up to 10 extra points per problem. It is not required that you attempt all three problems on Part II. Please denote which problem you wish graded from Part II in the problems list below, and ON the actual problem page.

Problem	Points Possible	Points Earned
1	20	
2	20	
3	20	
4	20	
5	20	
6		
7		
8		
Totals	120	

← Mark your problem from Part II.

Part I - Do all of problems 1–5

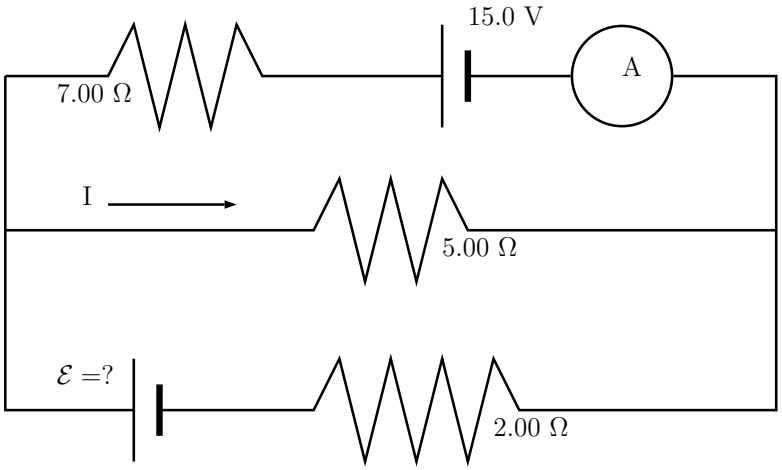
1. Three point charges are arranged on a line. Charge $q_3 = +5.00$ nC and is located at the origin. Charge $q_2 = -3.00$ nC and is at $x = +4.00$ cm. Charge q_1 is at $x = +2.00$ cm. What is q_1 (magnitude and sign) if the net force on q_3 is zero?

2. Consider a 9.60 μC point charge. (a) If the point charge is at the center of a hollow sphere of radius $r = 0.5$ m, what is the electric flux through the surface of this sphere due to the point charge? (b) If the point charge is at the center of a cube with sides of length $l = 0.5$ m, what is the electric flux through the surface of the cube due to the point charge?

3. A hollow conductor carries a net charge of +13 nC. In its cavity, insulated from the conductor, is a small, isolated object with a net charge of −5 nC. (a) How much charge is on the outer surface of the hollow conductor? (b) How much is on the wall of the cavity?

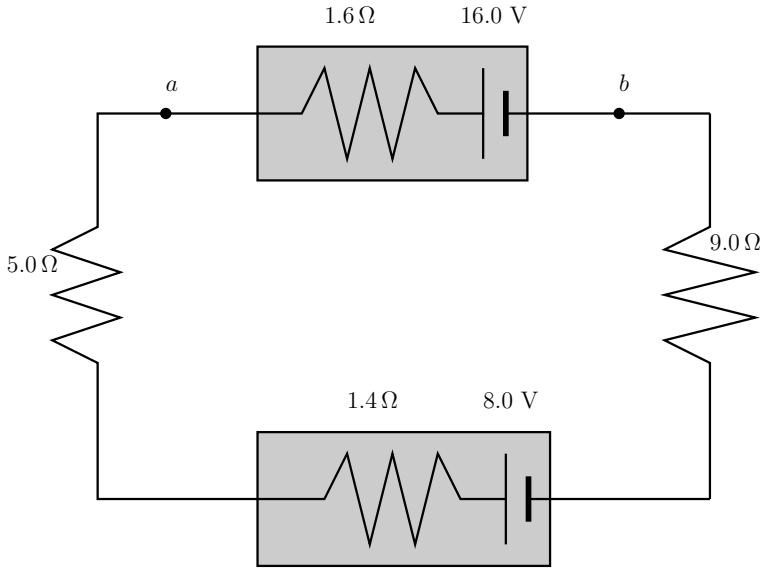
4. A charge of +28.0 nC is placed in a uniform electric field that is directed vertically upward and that has a magnitude of 4.00×10^4N/C. What work is done by the electric force when the charge moves (a) 0.450 m to the right; (b) 0.670 m upward; (c) 2.60 m at an angle of 45.0° downward from the horizontal.

5. In the circuit below, the current flows through the 5.0Ω resistor in the direction shown, and the resistor is measured to be consuming power at a rate of 20.0 W. If we assume the batteries have no resistance, what current does the ammeter A read?



Part II - Do at least one of problems 6, 7, and 8.

6. The circuit below contains two batteries, each with an emf and an internal resistance, and two resistors. Find (a) the current in the circuit (magnitude and direction) and (b) the terminal voltage V_{ab} of the 16.0 V battery.



7. An electron is to be accelerated from 3.00×10^6 m/s to 8.00×10^6 m/s. Through what potential difference must the electron pass to accomplish this?

8. For the system of capacitance shown below, a potential difference of 25 V is maintained across ab. (a) What is the equivalent capacitance of this system between a and b? (b) How much charge is stored in this system? (c) How much charge does the 6.5 nF capacitor store?