**Physics 9C-A** **Midterm Exam #2** **Winter 2008**

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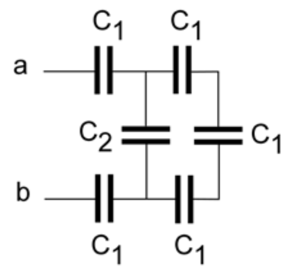
1. In the following circuit, the capacitance for $C_1$ is 9 μF, and that for $C_2$ is 6 μF.

(a) (10 points) Find the equivalent capacitance of the network between *a* and *b*;

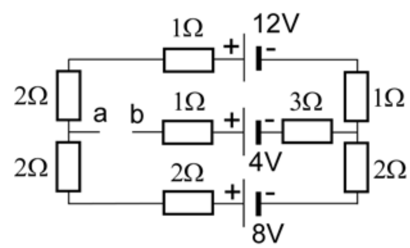
(b) (10 points) When $V_{ab} = V_a - V_b = 120V$, find the charge on the $C_2$ capacitor.



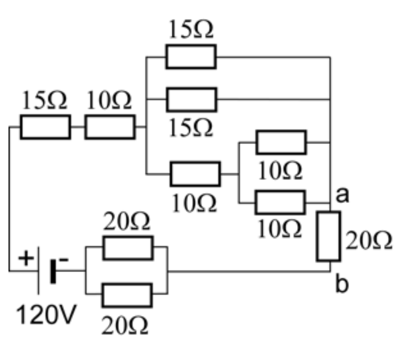

2. In the following circuit,

(a) (10 points) Find the potential of point *a* with respect to point *b*, $V_{ab} = V_a - V_b$;

(b) (15 points) When points *a* and *b* are connected with a wire, find the direction and magnitude of the current flowing through the 12-V battery.



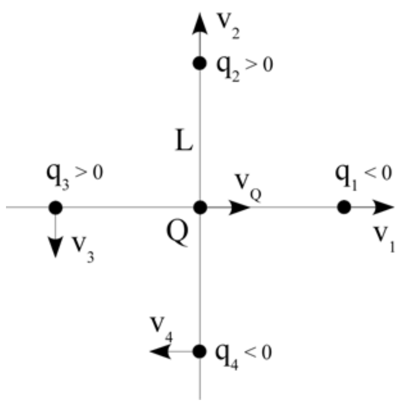

3. (15 points) In the following circuit, find the power dissipated in the 20-Ω resistor between point *a* and point *b*,

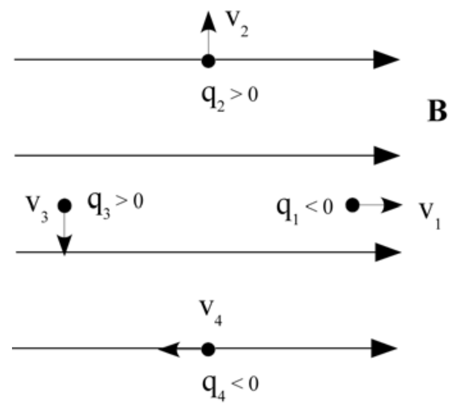


4. In the following figures,

(a) (10 points) find the direction and magnitude of the magnetic forces on moving charged particles $q_1$, $q_2$, $q_3$, $q_4$ exerted by a moving charge Q (explain your answers.) Q is at the same distance L away from these four charges. You can ignore other forces exerted on these charges.

(b) (10 points) find the direction of acceleration for charged particles $q_1$, $q_2$, $q_3$, $q_4$ in a uniform magnetic field **B** pointing from left to right. You can ignore other forces exerted on these charges.




5. The cube in the following figure, 0.5 m on a side, is in a uniform magnetic field **B** of 0.5 T pointing along the positive x-direction. The wire *a-b-c-d-e-f* carries a current of I = 6A in the direction as indicated.

(a) (10 points) Find the direction and magnitude of the net magnetic force on the entire wire.

(b) (5 points) If you add another straight wire of 0.5 m long to connect point *f* to point *a* and let the 6A current flows from *f* back to *a*, find the force on this extra piece of wire *f-a*, and show explicitly that it equals to the negative of the force on the original wire *a-b-c-d-e-f* (the result of part (a)).