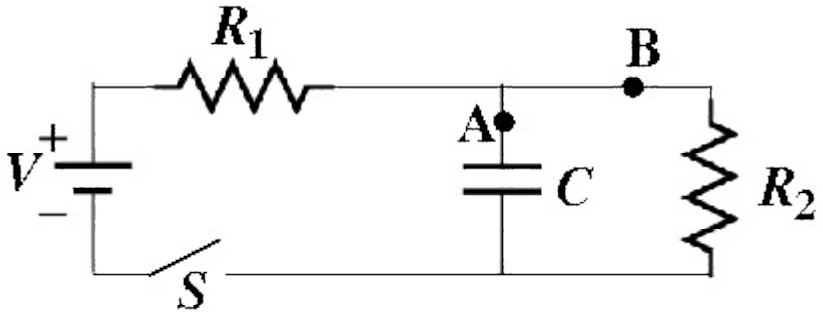
Physics 2B, Electricity and Magnetim -- Spring 2009 Instructor: B. Grinstein
Quiz # 6

INSTRUCTIONS: Fill, tear and return the bottom strip of the front page with your scantron. Keep the top portion of the front page and the rest of the quiz. Use a pencil #2 to fill your scantron. Write your code number and bubble it in under "EXAM NUMBER". Bubble in the quiz form (see letter A--D at bottom of page) in your scantron under "TEST FORM"

Useful numbers: $K = 9.0 \times 10^9\ Nm^2/C^2$, $\varepsilon_o = 8.85 \times 10^{-12}\ C^2/Nm^2$, $e = 1.60 \times 10^{-19}\ C$, $m_e = 9.11 \times 10^{-31}\ kg$
$\mu_o = 4\pi \times 10^{-7}\ T\,m/A$

1) Initially, in the circuit bellow, the switch *S* has been open for a long time, so that there is no charge on nor current through the capacitor *C*. Then the swicth *S* is closed.



A long time after the switch is closed the current at the point labeled "A" is

A) $\frac{V}{R_1+R_2}$

B) $\frac{V}{R_1}$

C) $\frac{V}{R_2}$

D) 0

E) $V\left(\frac{1}{R_1}+\frac{1}{R_2}\right)$

2) A rechargeable battery that is completely drained of electrical energy can be completely charged by applying 7.0 mA of current for 1.0 h. Immediately after charging begins the battery acquires an emf of 2.0 V and this potential difference remains throughout the charging process. How much energy is the battery capable of storing?

A) 0.30 kJ B) 14 mJ C) 50 J D) 3.9 μJ

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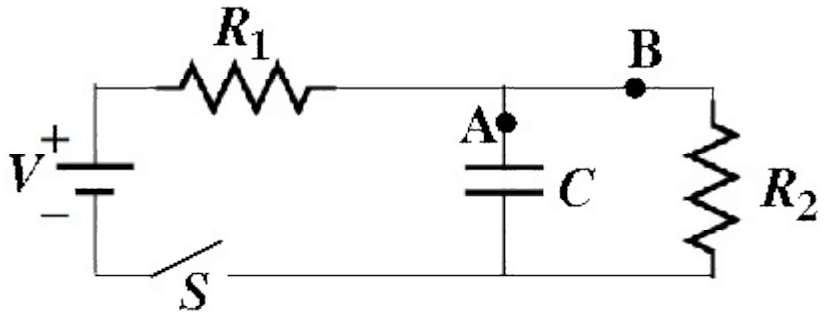
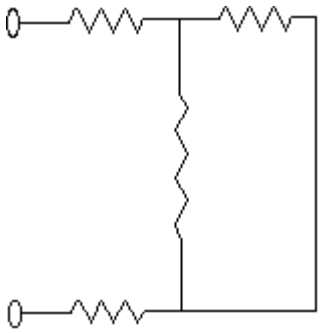
3) Initially, in the circuit bellow, the switch *S* has been open for a long time, so that there is no charge on nor current through the capacitor *C*. The potential difference between the negative and positive terminals of the battery is *V*. At some instant the swicth *S* is closed.



Long after the switch is closed the potential difference between the negative terminal of the battery and the wire at the point labeled "A" is

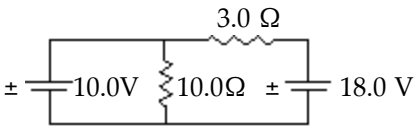
A) 0 B) $\frac{R_2}{R_1+R_2}$ V C) $\frac{R_1}{R_1+R_2}$ V D) $\frac{R_1}{R_2}$ V E) $\frac{R_2}{R_1}$ V

4) Each of the resistors in the circuit shown have a resistance of 160.0 Ω. What is the equivalent resistance of the circuit?



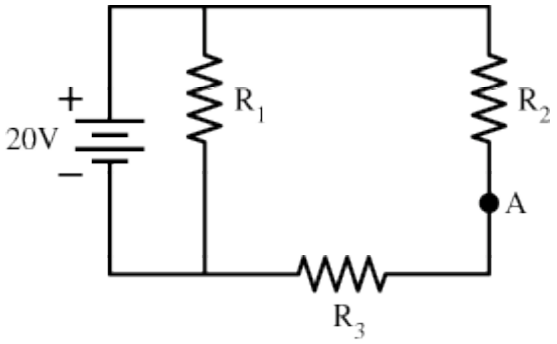
A) 480.0 Ω B) 400.0 Ω C) 160.0 Ω D) 640.0 Ω

5) Refer to the figure bellow. What is the current through the 3.0 Ω resistor?



A) 2.7 A B) 1.4 A C) 6.0 A D) 0.62 A

6) In the circuit below, the resistor R_2 is adjustable.



As its resistance is made larger, the voltage at point A (relative the negative terminal of the battery)

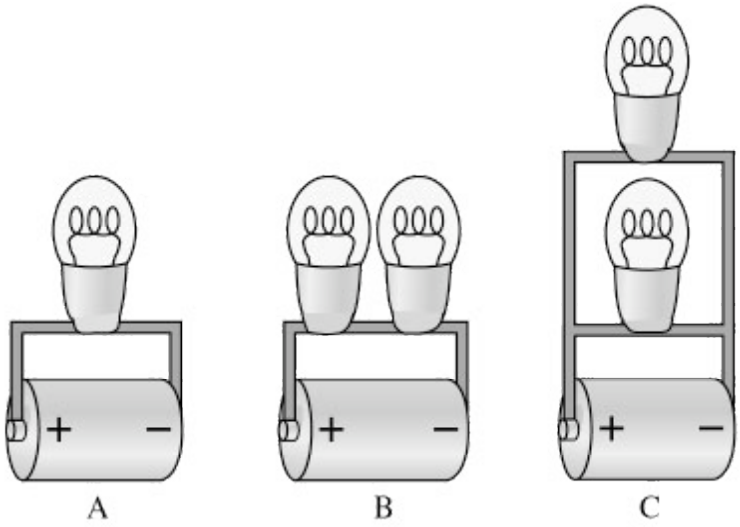
A) increases.

B) decreases or increases depending on whether $R_1 > R_3$ or vice versa ($R_3 > R_1$).

C) decreases.

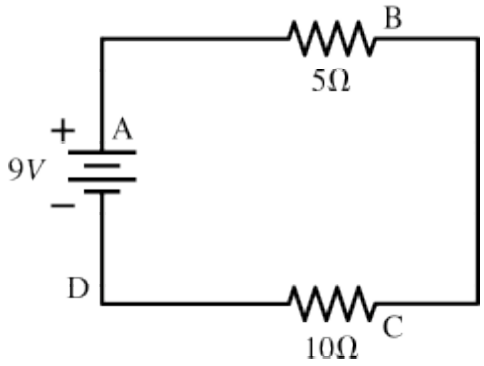
D) does not change.

7) Identical light bulbs are attached to identical batteries, as shown below. Rank order from dimmest to brightest the groups (A, B , C) of light bulbs.



A) C, B, A B) B, A, C C) C, A, B D) A, B, C E) A, C, B

8) A 9 Volt battery is hooked up to two resistors in series. One has a resistance of 5 Ohms, and the other has a resistance of 10 Ohms. Several locations along the circuit are marked with letters, as shown below. Which statement is true?



A) The current at A is equal to the current at B, which is equal to the current at C, which is equal to the current at D.
B) The current at A is greater than the current at B, which is greater than the current at C, which is greater than the current at D.
C) The current at A is smaller than the current at B, which is smaller than the current at C, which is smaller than the current at D.
D) The current at A is smaller than the current at B, which is equal to the current at C, which is smaller than the current at D.
E) The current at A is greater than the current at B, which is equal to the current at C, which is greater than the current at D.

Answer Key
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1) D
2) C
3) B
4) B
5) A
6) C
7) B
8) A

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