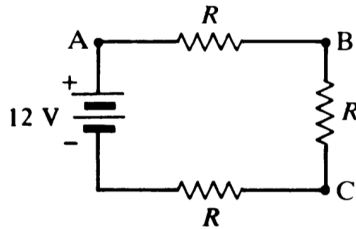
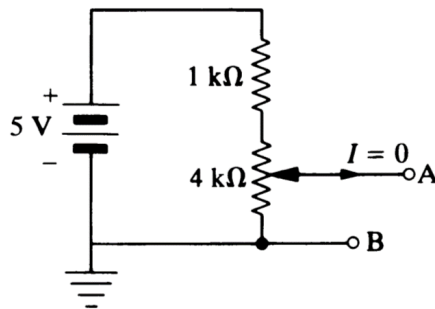


Physics 4700 HOMEWORK 1  
Due January 27

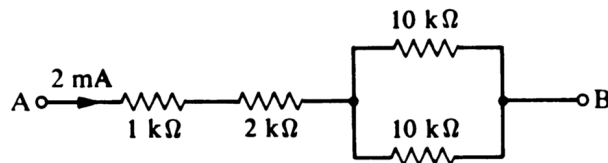
1. Calculate how many electrons flow per second past a fixed point in a wire carrying 10 mA of current. If the current moves from left to right, which way do the electrons move?
2. Calculate the voltage at points A, B, and C, if
  - a. A is grounded
  - b. B is grounded
  - c. C is grounded



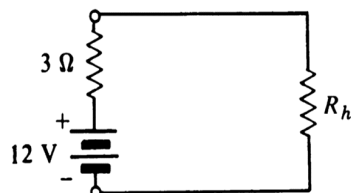
3. A fixed  $1.0\text{ k}\Omega$  resistor and a  $4.0\text{ k}\Omega$  potentiometer are connected in series across a 5 V battery of negligible internal resistance. Calculate the maximum and minimum values of  $V_{AB}$  as the potentiometer shaft is rotated.



4. Calculate the voltage between A and B. What is the polarity of  $V_{AB}$ ?



5. An automobile battery has a terminal voltage of 12.8 V with no load. When the starter motor (which draws 90 A) is being turned over by the battery, the terminal voltage drops to 11 V. Calculate the internal resistance of the battery.
6. How large should the heater resistance  $R_h$  be to draw maximum power from a 12 V battery with an internal resistance of  $3\text{ }\Omega$ ? Calculate the power dissipated in the heater and in the battery under such conditions.

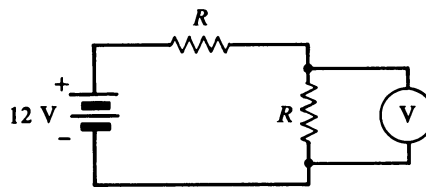


7. Calculate the voltmeter reading for

a.  $R = 1 \text{ k}\Omega$

b.  $R = 1 \text{ M}\Omega$

You may assume the voltmeter is an oscilloscope with a  $1 \text{ M}\Omega$  input resistance. What's the largest value  $R$  can be if we want the voltmeter to always be within 10% of the correct voltage?



8. Find the current going through each resistor and the voltage drop across each resistor. The resistor values are in Ohms.

