

Name:

Group Members:

CIRCUITS GALORE!

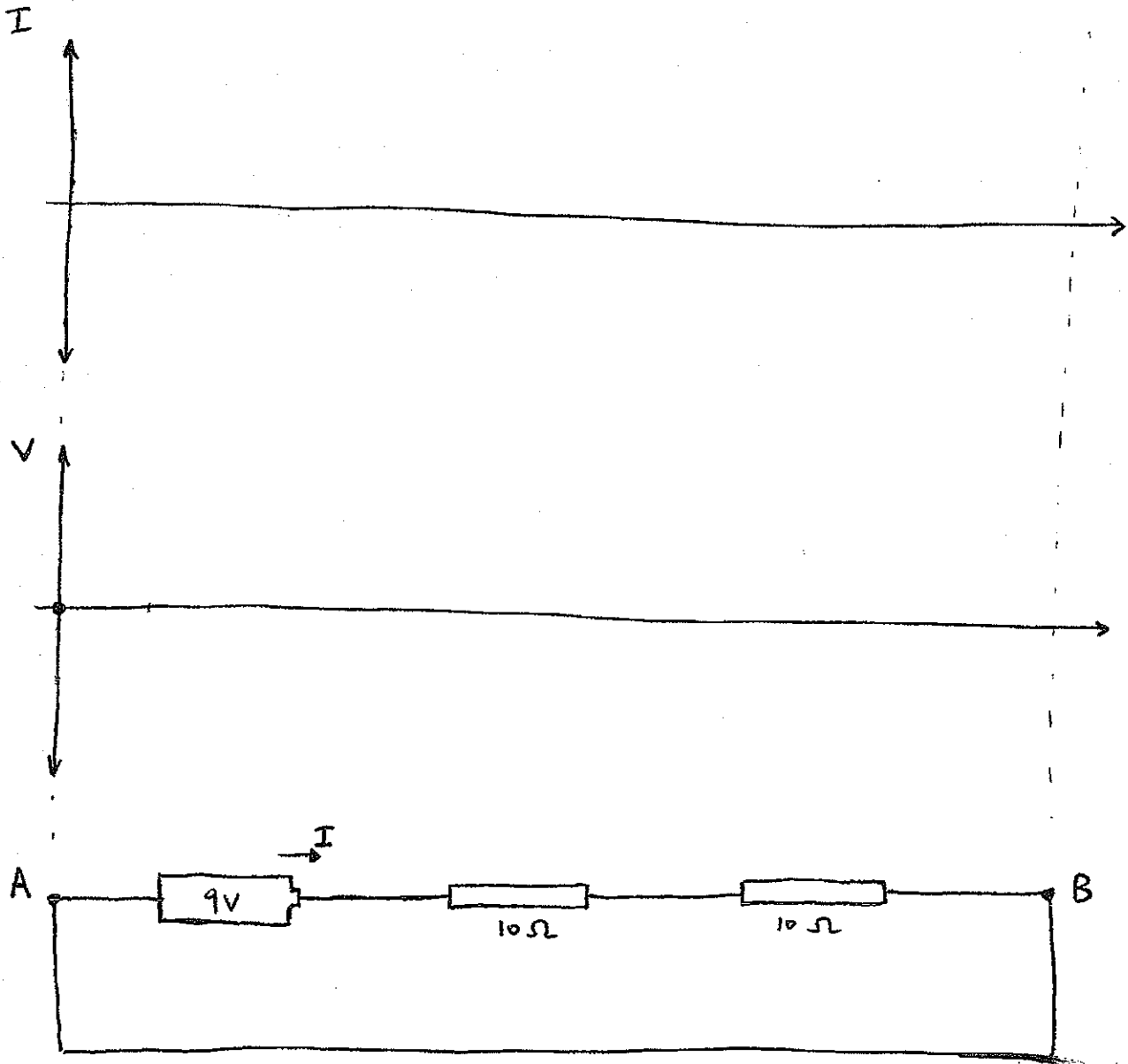
Problem 1

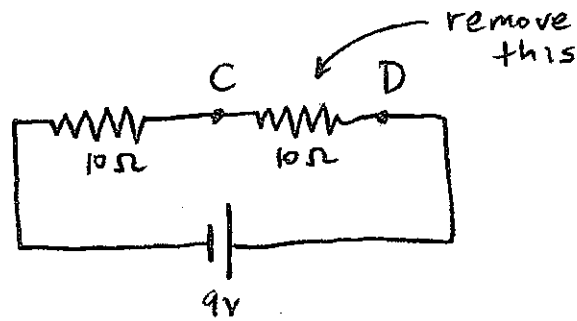
Using the circuit simulator, construct a circuit that will make a lightbulb glow. If the blue dots represent electrons, which side of the battery is the + side (higher potential)? Explain. Use the voltage meter to check your answer (the meter shows the potential of the red probe minus the potential of the black probe).

Using the voltmeter and an ammeter (or a non-contact ammeter), determine the resistance of the lightbulb (no cheating!). Explain your method.

Problem 2

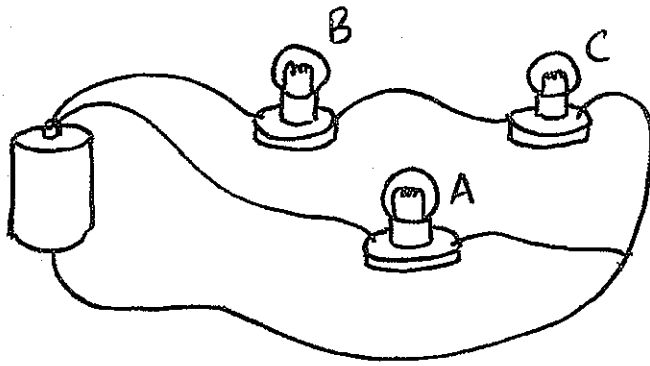
In the circuit shown below, the battery is 9V and each resistor is 10 Ohms. On the graphs below, plot the current and the potential as a function of position between the points A and B, assuming the potential at A is zero volts. Use the circuit simulator to check your results (your graphs should include the regions inside the resistors, though the voltmeter can't measure the potential there).





Problem 3

In the same circuit from problem 2 (shown schematically above) what is the potential difference between points C and D? Predict what the potential difference will be after you remove the indicated resistor. Use the simulator to check your result. Explain this result.



Problem 4

In the diagram shown, predict what will happen to the brightness of bulbs A and B when bulb C is removed. Test your prediction with the simulator. Explain the results.

Bulb A prediction:

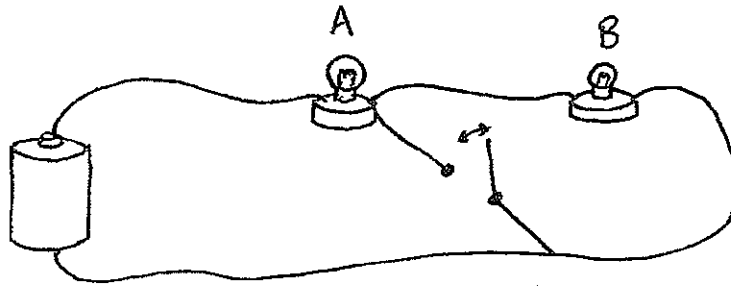
Actual result:

Explanation:

Bulb B prediction:

Actual result:

Explanation:



Problem 5

In the diagram shown, predict what will happen to the brightness of bulbs A and B when the switch is closed. Test your prediction with the simulator. Explain the results.

Bulb A prediction:

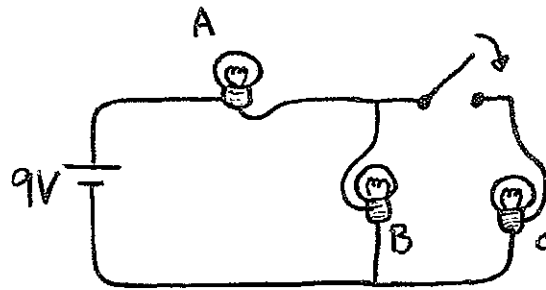
Actual result:

Explanation:

Bulb B prediction:

Actual result:

Explanation:



each bulb
is 10Ω

Problem 6

In the circuit shown, predict what will happen to the brightness of bulb A when the switch is closed. Test your prediction with the simulator. Explain the results.

Prediction:

Actual result:

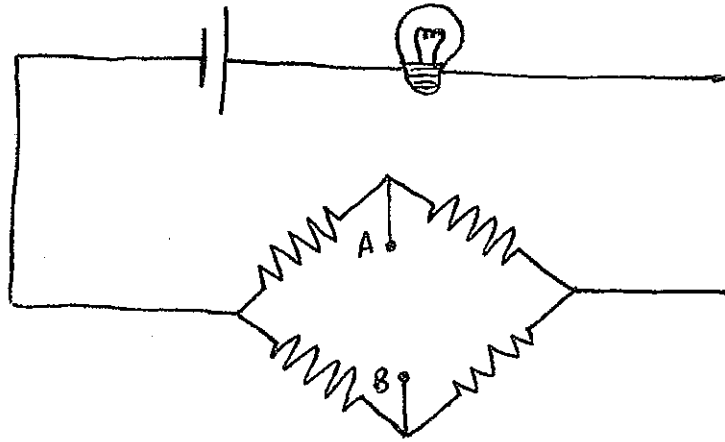
Explanation:

Without using the simulation, predict the magnitude of the current through each bulb after the switch is closed. (explain your work)

$$I_A =$$

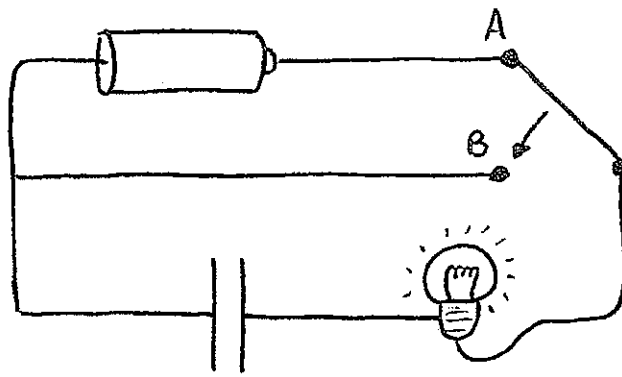
$$I_B =$$

$$I_C =$$



Problem 7

In the circuit shown above, a new resistor is added between points A and B. Does the light bulb get brighter, dimmer, or stay the same? Check your prediction. Explain the result.



Problem 8

The circuit shown above includes a light bulb, a battery, and a capacitor. Predict what will happen when the switch is moved from A to B. Check your prediction using the real circuit components. Explain why the process you observe is not instantaneous, and explain how you could estimate the amount of time it takes based on the capacitance (how much charge there is on the capacitor for a given voltage) and the resistance of the bulb.