

Phys122

HW 6: Due Thursday, March 30, 2006

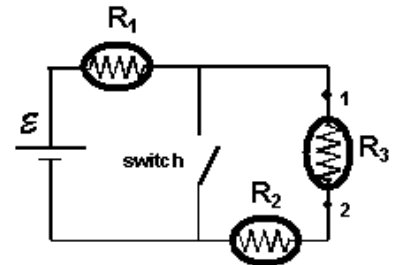
Chapter 18

Conceptual Questions: 6, 12

Problems: 6, 14, 22, 30, 40, 47, 48, 50

What happens to the bulbs?

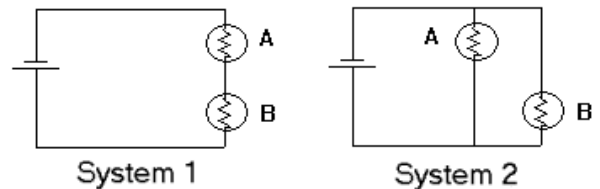
In the figure at the right is shown an electrical network containing a battery with EMF = \mathcal{E} , and three resistors with resistances R_1 , R_2 , and R_3 . All three resistances are identical and have a resistance R . In the circuit is a switch, which is open when we start. In addition, two points in the network are marked with dots and the numbers "1" and "2".



- If the switch is open, rank the brightness of the bulbs.
- If the switch is open, calculate the current through the battery. (Express your answer in terms of the symbols given.)
- If the switch is closed, what happens to the brightness of each bulb? (Increase, Decrease, Same) Now rank the brightness of the three bulbs. Briefly explain your reasoning.

A battery and two bulbs

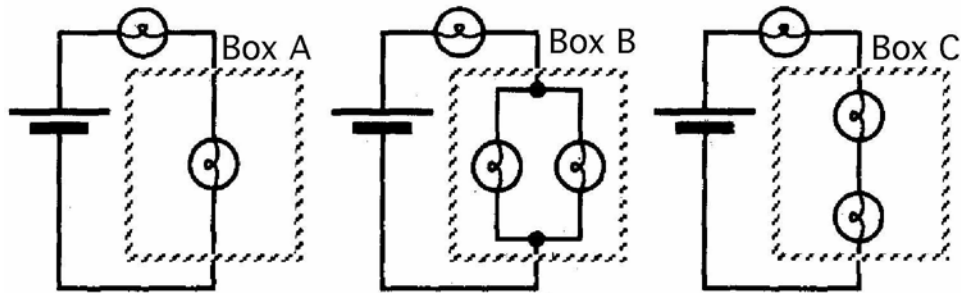
Consider the two arrangements of batteries and bulbs shown at the right. All four bulbs are identical and have resistance R . The two batteries are identical and maintain a potential difference (EMF) = \mathcal{E} . Answer the following questions and explain why you believe your answer. (Most bulbs are brighter when there is more current through them. Assume that is the case for these bulbs.)



- In system 1, which bulb is brighter?
- In system 1, what is the current through each bulb, the voltage drop across each bulb, and the power dissipated by each bulb?
- In system 2, which bulb is brighter?
- In system 2, what is the current through each bulb, the voltage drop across each bulb, and the power dissipated by each bulb?
- Which bulbs are brighter, those in system 1 or those in system 2?
- If one bulb in each system burns out, will the other go out as well? Why? If the other bulb doesn't go out will it get brighter or stay the same when the first bulb in the circuit burns out?

Tutorial Problem

1. In tutorial, you compared the relative brightness of the bulbs in the three circuits shown. In the diagrams, boxes have been drawn around the networks of bulbs in each circuit.



On the basis of your observations and the rule you developed at the end of the tutorial relating current through the battery to total resistance, rank the networks (boxes) A-C according to their equivalent resistance. Explain your reasoning on the basis of the model. (Do not use math.)

2. Use the rule for electric current to rank the networks shown below in order according to resistance. Explain your reasoning.

