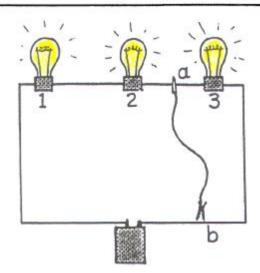
Next-Time Question

The simple series circuit consists of three identical lamps powered by a battery. When a wire is connected between points a and b.

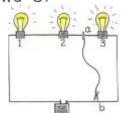


- a) what happens to the brightness of Lamp 3?
- b) does current in the circuit increase, decrease, or remain the same?
- c) what happens to the brightness of Lamps 1 and 2?
- d) does the voltage drop across Lamps 1 and 2 increase, decrease, or remain the same?
- e) is the power dissipated by the circuit increased, decreased, or does it remain the same?



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Answers:

CONCEPTUAL Physics

- a) Lamp 3 is short-circuited. It no longer glows because no current passes through it.
- b) The current in the circuit increases. Why? Because the circuit resistance is reduced. Whereas charge was made to flow through 3 lamps before, now it flows through only 2 lamps — 2/3 resistance results in 3/2 the current (neglecting temperature effects).
- c) Lamps 1 and 2 glow brighter because of the increased current through them.
- d) The voltage drop across lamps 1 and 2 is greater. Whereas voltage supplied by the battery was previously divided between 3 lamps, it is now divided between only 2 lamps. So more energy is now given to each lamp.
- e) The power output of the 2-lamp circuit is greater because of the greater current. This means more light will be emitted by the 2 lamps in series than from the 3 lamps in series. Three lamps connected in parallel, however, put out more light. Lamps are most often connected in parallel.

