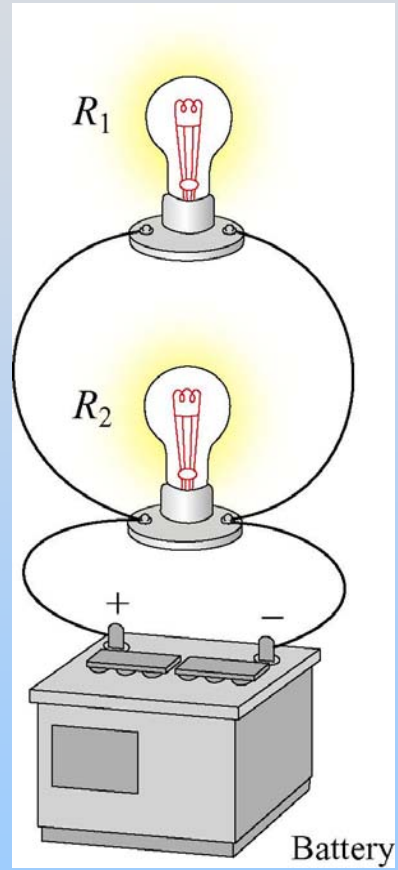
Concept Question: Power

An ideal battery is hooked to a light bulb with wires. A second identical light bulb is connected in parallel to the first light bulb. After the second light bulb is connected, the power output from the battery (compared to when only one bulb was connected)



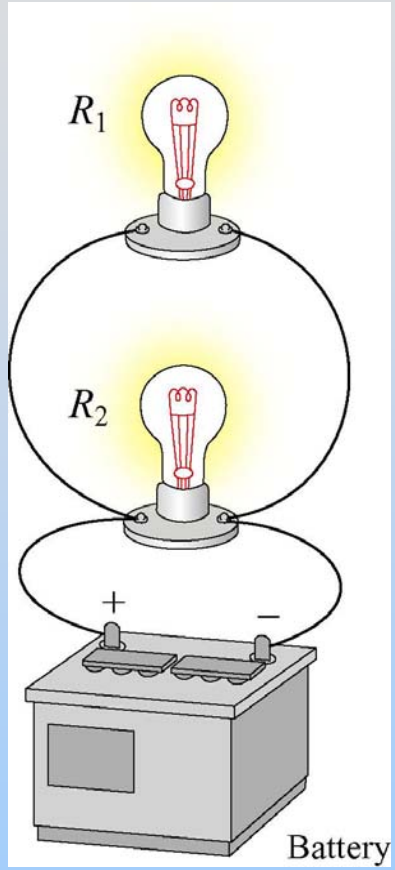
1. Is four times higher
2. Is twice as high
3. Is the same
4. Is half as much
5. Is ¼ as much
6. Don’t know

Concept Question Answer: Power

Answer: 2. Is twice as high

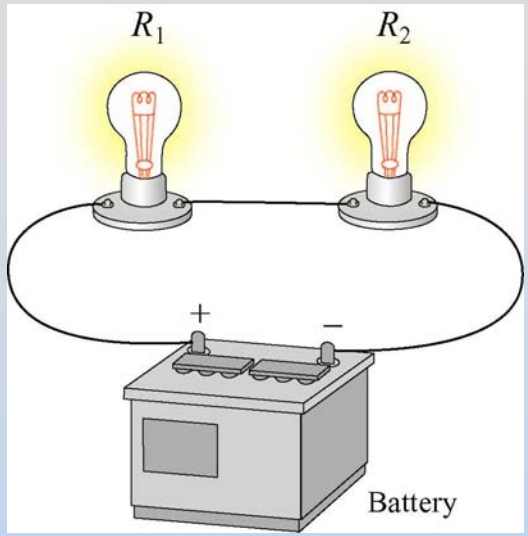
The current from the battery must double (it must raise two light bulbs to the same voltage difference) and

$$P = I V$$



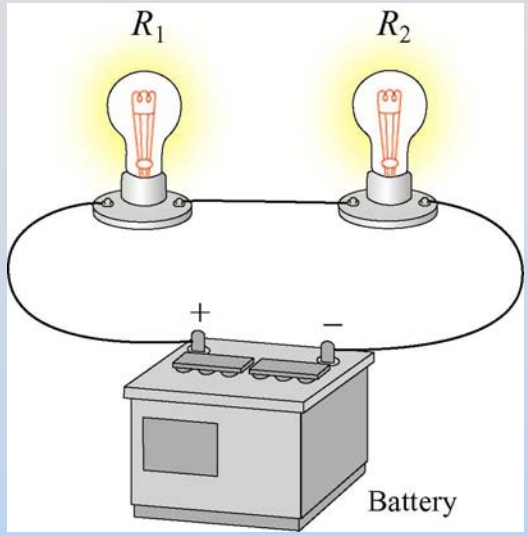
Concept Question: Power

An ideal battery is hooked to a light bulb with wires. A second identical light bulb is connected in series with the first light bulb. After the second light bulb is connected, the light (power) from the first bulb (compared to when only one bulb was connected)



1. Is four times higher
2. Is twice as high
3. Is the same
4. Is half as much
5. Is ¼ as much
6. Don't know

Concept Question Answer: Power



Answer: 5. Is 1/4 as bright

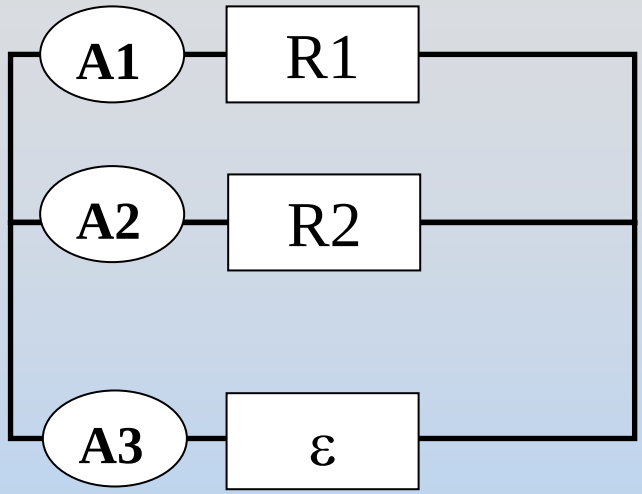
R doubles → current is cut in half. So power delivered by the battery is half what it was. But that power is further divided between two bulbs now.

Alternatively,

$$P = I^2R$$

Concept Question: Measuring Current

If R1 > R2, compare the currents measured by the three ammeters:

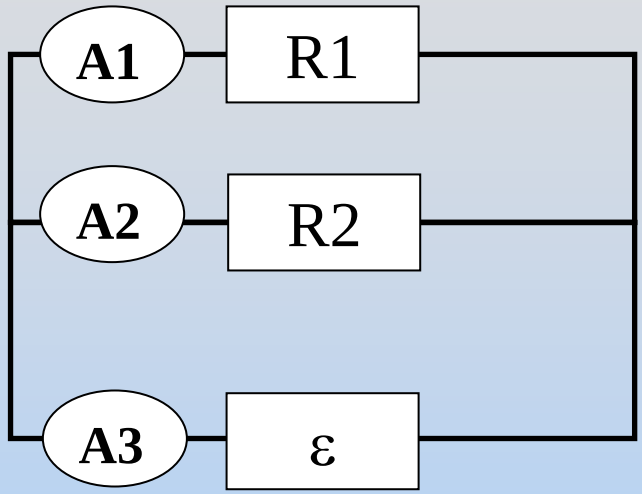


1. A1 > A2 > A3
2. A2 > A1 > A3
3. A3 > A1 > A2
4. A3 > A2 > A1
5. A3 > A1 = A2
6. None of the above
7. I don't know

Concept Question Answer: Measuring Current

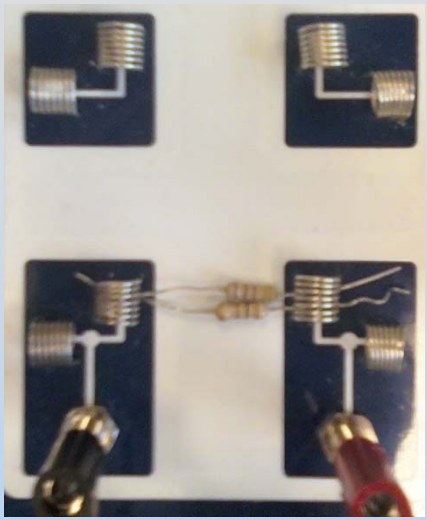
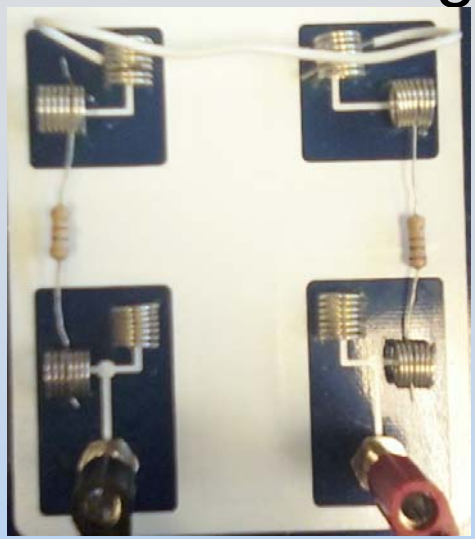
Answer: 4. A3 > A2 > A1

The total current must add to the two individual currents, so A3 must be largest. Most current prefers to go through the smaller resistor so A2 > A1.



Concept Question: Expt. 1

In the experiment you built the following circuits:

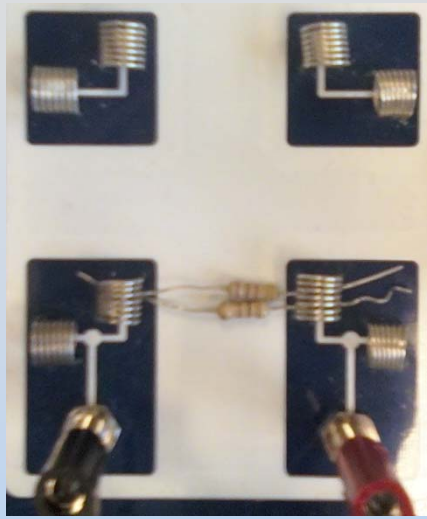
#1  #2 

How much current flowed in circuit 1 relative to circuit 2?

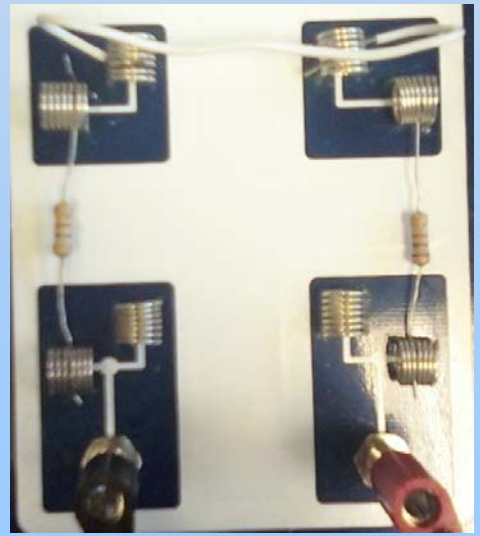
1. Four times as much
2. Twice as much
3. The same
4. Half as much
5. One quarter as much

Concept Question Answer: Expt. 1

Answer: 1. Four times as much



Putting the resistors in series doubled the resistance of a single resistor, while putting them in series halved it. So four times as much current flowed in parallel (#1) than as in series (#2).



8.02SC Physics II: Electricity and Magnetism

Fall 2010