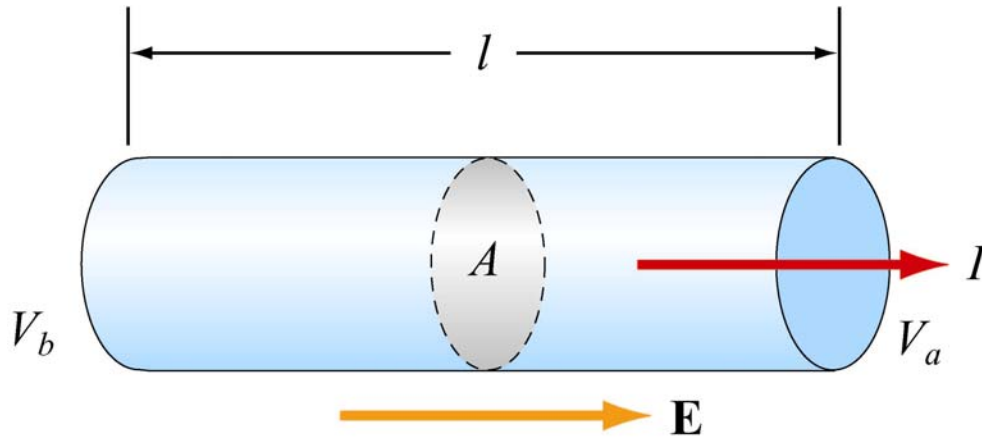


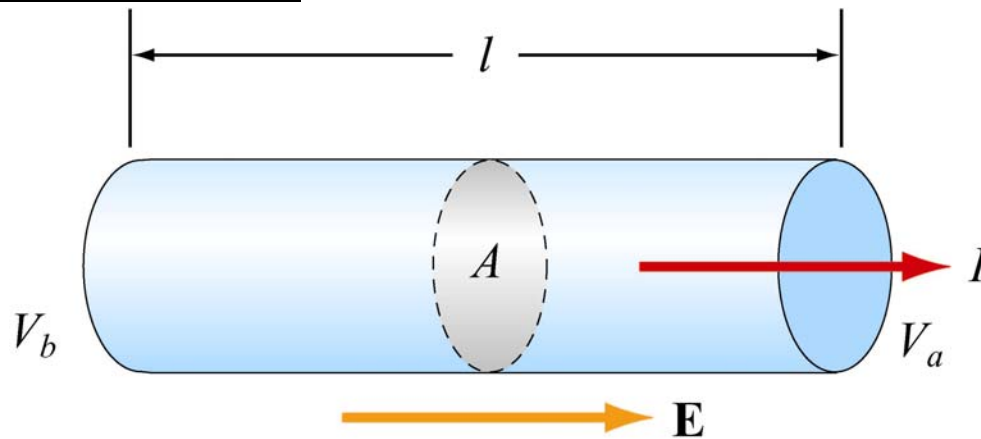
Resistance



When a current flows in a wire of length L and cross sectional area A , the resistance of the wire is

1. Proportional to A and inversely proportional to L .
2. Proportional to both A and L .
3. Proportional to L and inversely proportional to A .
4. Inversely proportional to both L and A
5. Do Not Know

Resistance



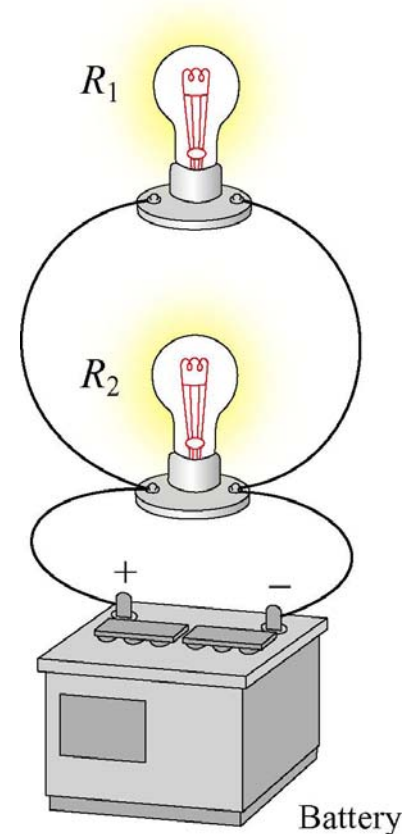
(3) Proportional to L and inversely proportional to A .

The longer the wire the higher the resistance. The bigger the cross-sectional area of the wire, the more ways that current can flow through it, so the lower the resistance. In equations, if the resistivity of the material is ρ , then

$$R = \frac{\rho L}{A}$$

Bulbs and Batteries

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 current from the battery compared to when only one bulb was connected.



1. Is Higher
2. Is Lower
3. Is The Same
4. Don't know

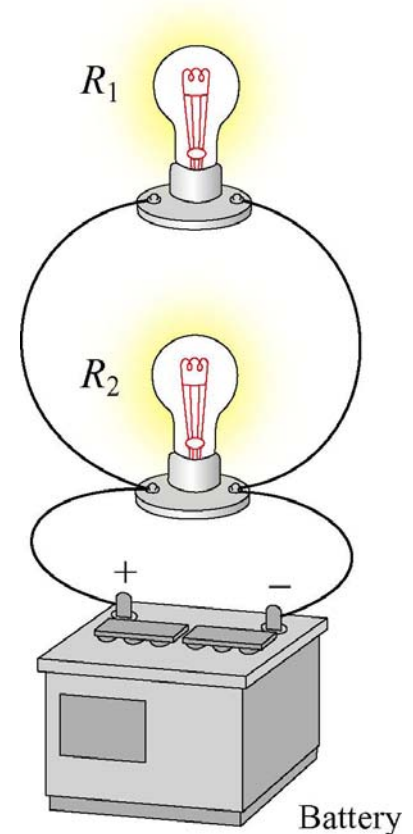
Bulbs and Batteries

(1) More current flows from the battery

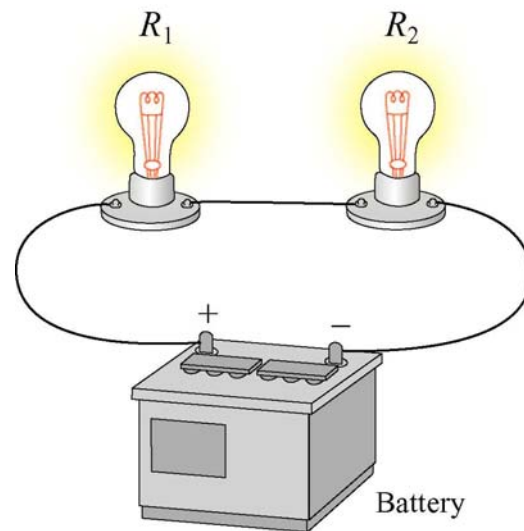
There are several ways to see this:

(A) The equivalent resistance of the two light bulbs in parallel is half that of one of the bulbs, and since the resistance is lower the current is higher, for a given voltage.

(B) The battery must keep two resistances at the same potential \rightarrow I doubles.



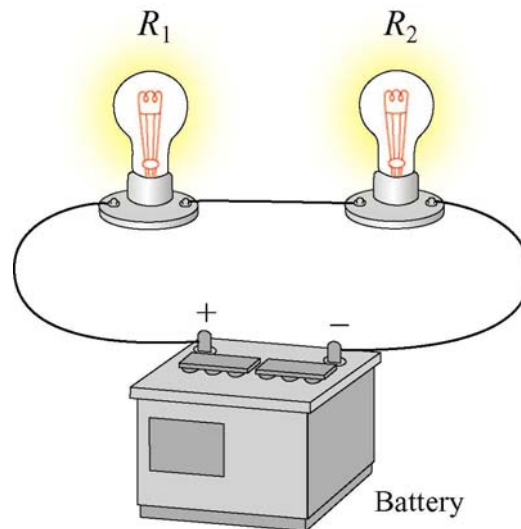
Bulbs and Batteries



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 current from the battery compared to when only one bulb was connected.

1. Is Higher
2. Is Lower
3. Is The Same
4. Don't know

Bulbs and Batteries



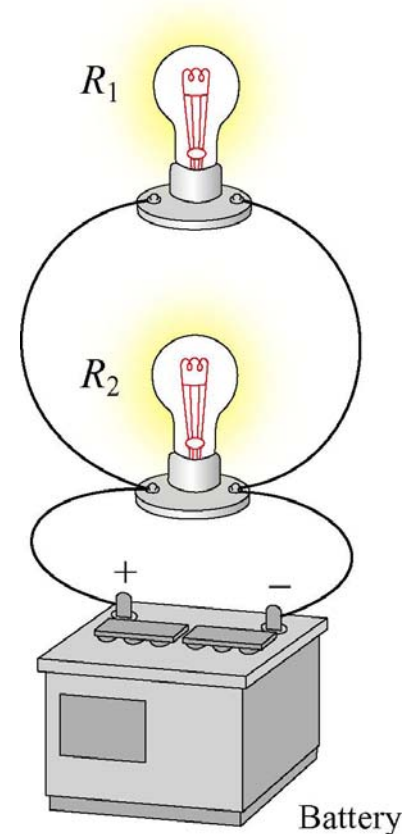
(2) The current from the battery is lower

The equivalent resistance of the two light bulbs in series is twice that of one of the bulbs, and since the resistance is higher the current is lower, for a given voltage.

(Translation) The ski slope just got twice as hard so half as many skiers take it.

Bulbs and Batteries

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)



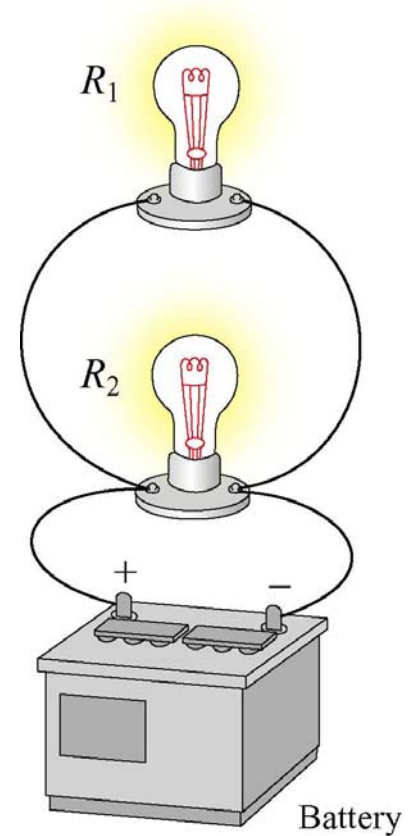
1. Is four times higher
2. Is twice as high
3. Is the same
4. Is half as much
5. Is one quarter as much
6. Don't know

Bulbs and Batteries

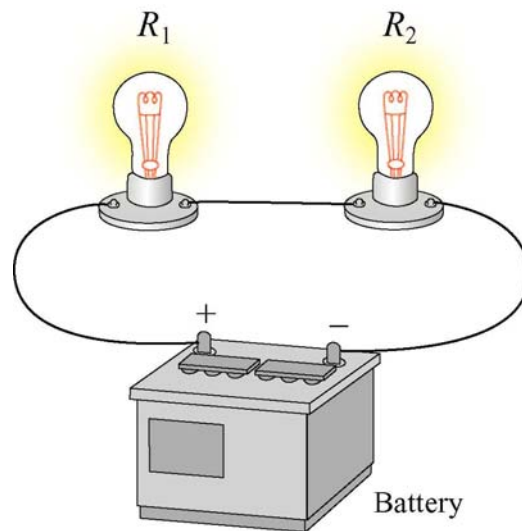
(2) Twice as much

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

$$P=IV$$



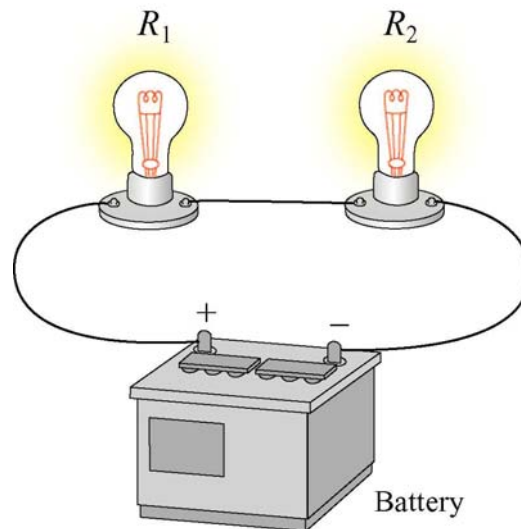
Bulbs and Batteries



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 from the first bulb (compared to when only one bulb was connected)

1. is four times as bright
2. is twice as bright
3. is the same
4. is half as bright
5. is one quarter as bright

Bulbs and Batteries



(5) The light is $\frac{1}{4}$ as bright

The resistance in the circuit doubled so the current is cut in half. This means that the power delivered by the battery is half what it was. But that power is further divided between two bulbs now.

Alternatively,

$$P = I^2 R$$