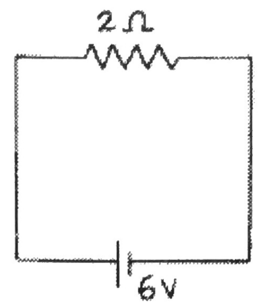
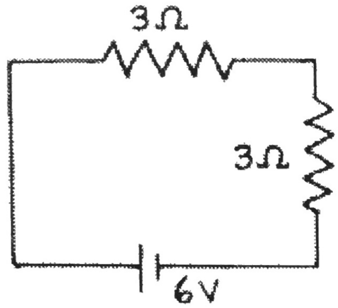
Series Circuits



1. In the circuit shown at the right, a voltage of 6 V pushes charge through a single resistor of 2 Ω. According to Ohm's law, the current in the resistor (and therefore in the whole circuit) is ___3___ A.



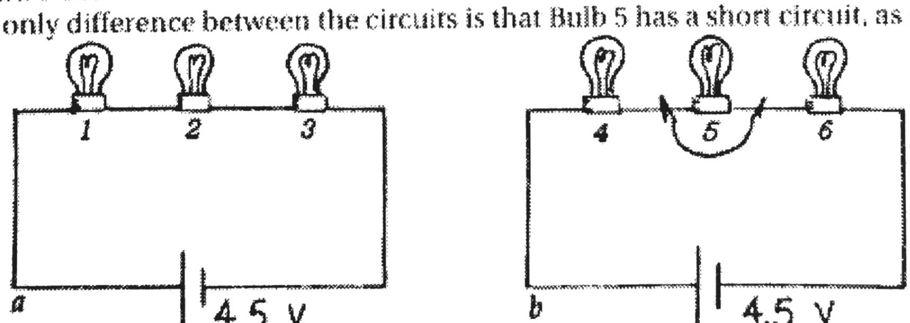
2. If a second identical lamp is added, as on the left, the 6-V battery must push charge through a total resistance of ___6___ Ω. The current in the circuit is then ___1___ A.

3. The equivalent resistance of three 4-Ω resistors in series is ___12___ Ω.

4. Does current flow *through* a resistor, or *across* a resistor? ___through___
   Is voltage established *through* a resistor, or *across* a resistor? ___Across___

5. Does current in the lamps occur simultaneously, or does charge flow first through one lamp, then the other, and finally the last in turn?
   ___simultaneously (speed of light)___

6. Circuits *a* and *b* below are identical with all bulbs rated at equal wattage (therefore equal resistance). The only difference between the circuits is that Bulb 5 has a short circuit, as shown.



   a. In which circuit is the current greater? ___b___
   b. In which circuit are all three bulbs equally bright? ___a___
   c. What bulbs are the brightest? ___4 & 6___
   d. What bulb is the dimmest? ___5 (not lit)___
   e. What bulbs have the largest voltage drops across them? ___4 & 6 (2.25 V each)___
   f. Which circuit dissipates more power? ___b (↑ current, more V)___
   g. What circuit produces more light? ___b (more power)___

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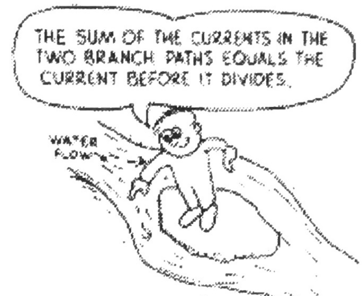
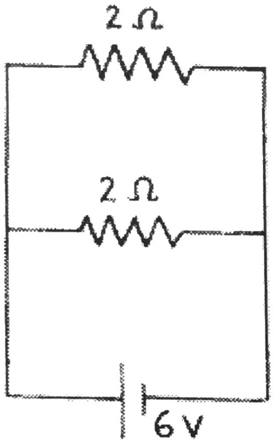
Parallel Circuits



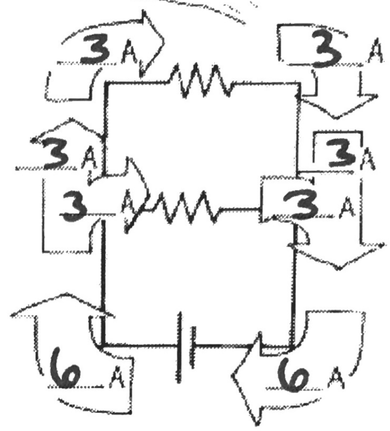
1. In the circuit shown below, there is a voltage drop of 6 V across *each* 2-Ω resistor.



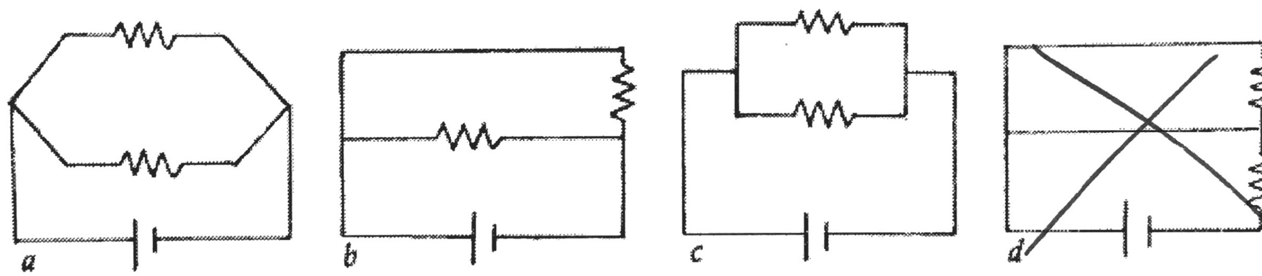
   a. By Ohm's law, the current in *each* resistor is __3__ A.

   b. The current through the battery is the sum of the currents in the resistors, __6__ A.

   c. Fill in the current in the eight blank spaces in the view of the *same circuit* shown again at the right.



2. Cross out the circuit below that is *not* equivalent to the circuit above.

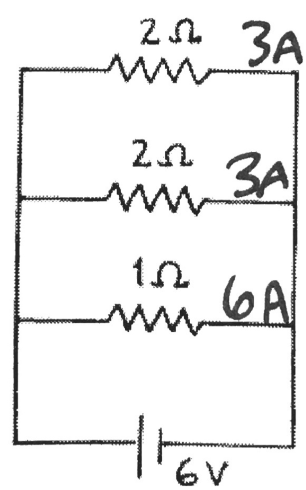


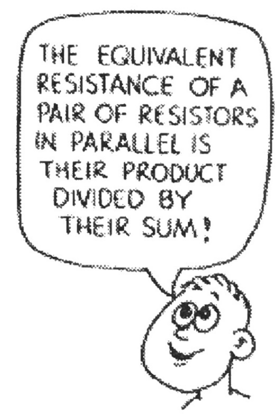
3. Consider the parallel circuit at the right.
   a. The voltage drop across each resistor is __6__ V.

   b. The current in each branch is:
   2-Ω resistor __3__ A
   2-Ω resistor __3__ A
   1-Ω resistor __6__ A

   b. The current through the battery equals the sum of the currents which equals __12__ A.

   c. The equivalent resistance of the circuit equals __0.5__ Ω.





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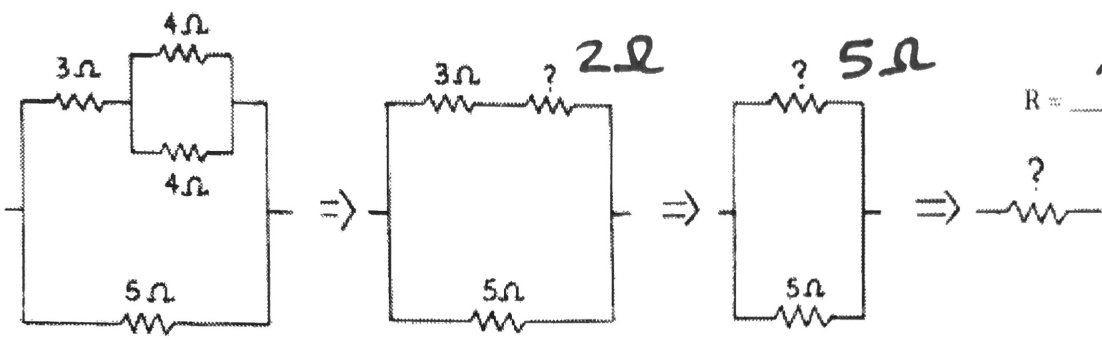
Compound Circuits

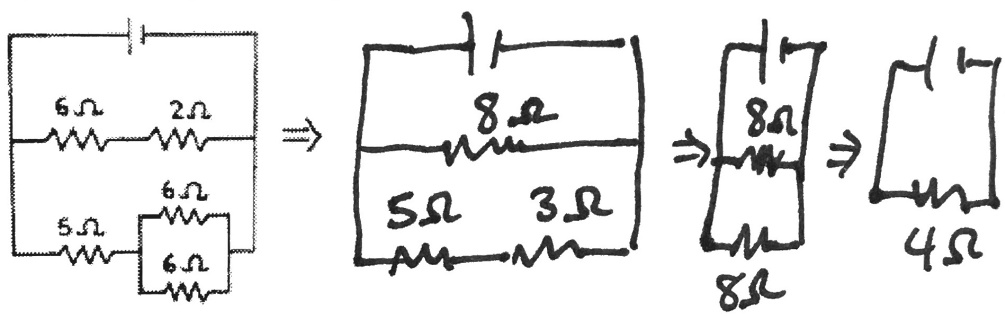
1. The initial circuit, below left, is a compound circuit made of a combination of resistors. It is reduced to a single equivalent resistance by the three steps, the circuits to its right, *a*, *b*, *c*. In step *a*, show the equivalent resistance of the parallel 4-Ω resistors. In step *b* combine this in series with the 3-Ω resistor. In step *c*, combine the last parallel pair to obtain the equivalent resistance of the circuit. (Note the similarity of this circuit and Figure 35.10 in your textbook.)



Initial Circuit *a.* *b.* *c.*

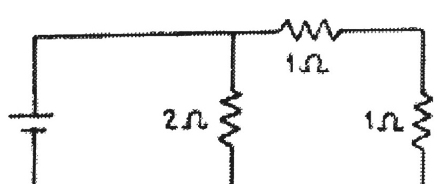
R = 2.5Ω

2. The circuit below is similar to Figure 35.11 in your textbook. In three successive steps, as in Question 1, replace each pair of resistors by a single resistor of equivalent resistance.



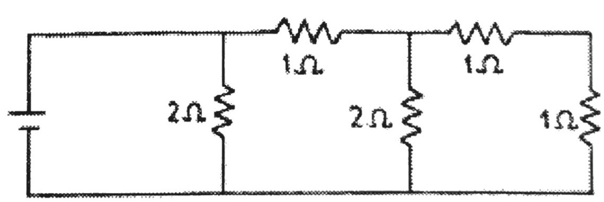
R = 4Ω

3. Find the equivalent resistance of these three circuits.



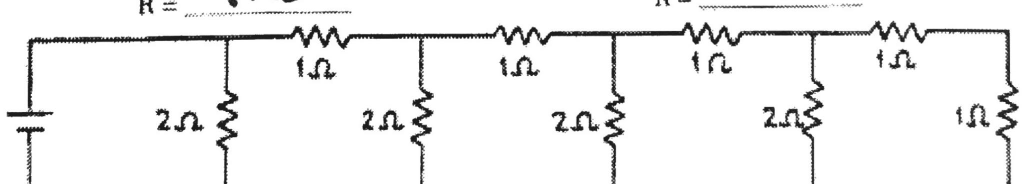
a

R = 1Ω



b

R = 1Ω



c

R = 1Ω

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