Electromagnetism Worksheets (p. 1)– Answer completely on your own paper

1. What condition is necessary for the sustained flow of water in a pipe? What analogous condition is necessary for the sustained flow of charge in a wire?

2. What is an ampere?

3. Why is a current-carrying wire normally not electrically charged?

4. Does charge flow through a circuit or into a circuit? Does voltage flow through a circuit, or is voltage established across a circuit?

5. Will water flow more easily through a wide pipe or a narrow pipe? Will current flow more easily through a thick wire or a thin wire?

6. Does heating a metal wire increase or decrease its electrical resistance?

7. If the voltage impressed across a circuit is held constant while the resistance increases, what change occurs in the current?

8. If the resistance of a circuit remains constant while the voltage across the circuit decreases, what change occurs in the current?

9. What is the error in saying that electrons in a common battery driven circuit travel at about the speed of light?

10. What is the error in saying the source of electrons in a circuit is the battery or generator?

11. What is an electric circuit?

12. How much current flows in a 1000 ohm resistor when 1.5 volts are impressed across it?

13. If the filament in an automobile headlamp is 3 ohms, how many amperes does it draw when connected to a 12 volt battery?

14. How much resistance allows an impressed voltage of 6 V to produce a current of 2 A

15. What is the voltage across a 100 ohm circuit that draws a current of 2 amperes?

16. What is the power when 120 V drives a 2 ampere current through a CD player?

17. What is the current in a typical 60 watt light bulb which is plugged into a 120 V socket?

18. If part of a circuit dissipates energy at a rate of 6 watts when it draws a current of 3 amperes, what voltage is impressed across it?

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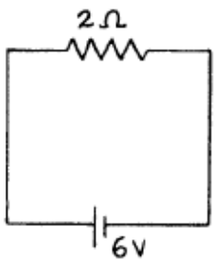
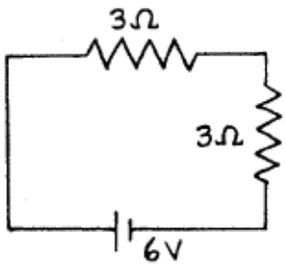
Series Circuits

19 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

_____ A.



20 

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

21 The equivalent resistance of three 4-Ω resistors in series is _____ Ω.

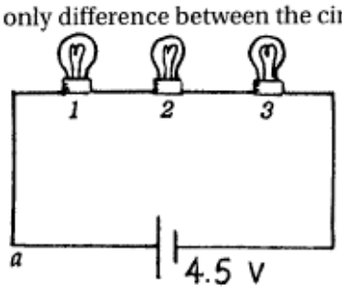
22 Does current flow *through* a resistor, or *across* a resistor? _____

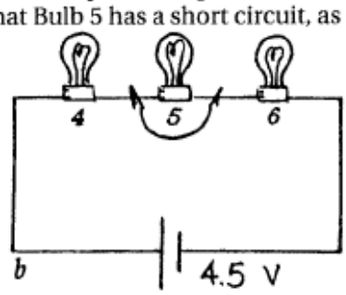
Is voltage established *through* a resistor, or *across* a resistor? _____

23 Does current in the lamps occur simultaneously, or does charge flow first through one lamp, then the other, and finally the last in turn?

_____

24 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. In which circuit are all three bulbs equally bright? _____

c. What bulbs are the brightest? _____

d. What bulb is the dimmest? _____

e. What bulbs have the largest voltage drops across them? _____

f. Which circuit dissipates more power? _____

g. What circuit produces more light? _____

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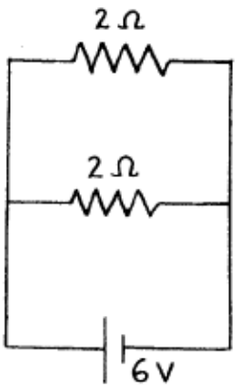
Parallel Circuits

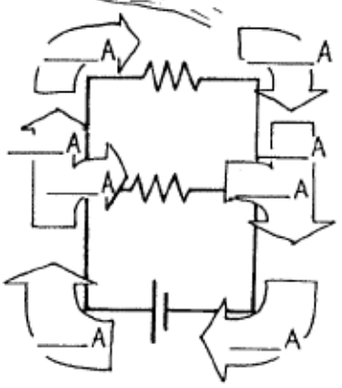
25 In the circuit shown below, there is a voltage drop of 6 V across *each* 2-Ω resistor.



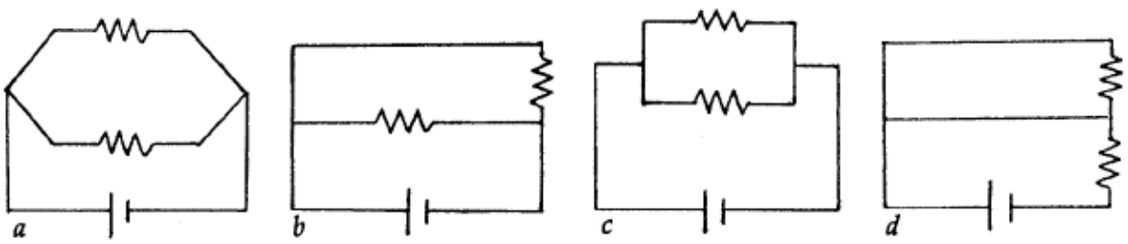
a. By Ohm's law, the current in *each* resistor is _____ A.

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

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



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



27 Consider the parallel circuit at the right.

a. The voltage drop across each resistor is _____ V.

b. The current in each branch is:

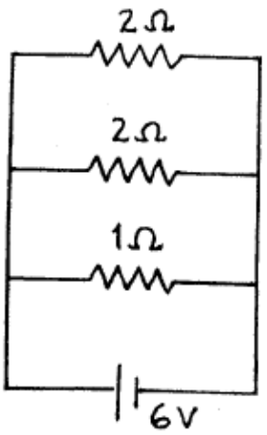
2-Ω resistor _____ A

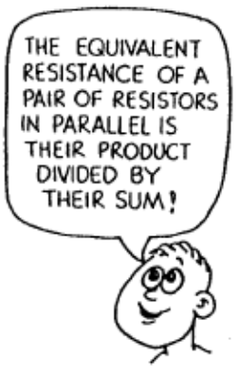
2-Ω resistor _____ A

1-Ω resistor _____ A

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

c. The equivalent resistance of the circuit equals _____ Ω.





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Electromagnetism Worksheets (p. 4)– Answer completely on your own paper

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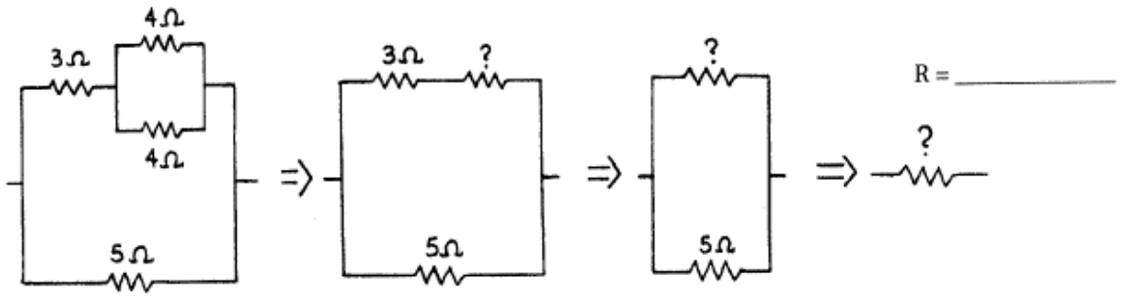
Compound Circuits

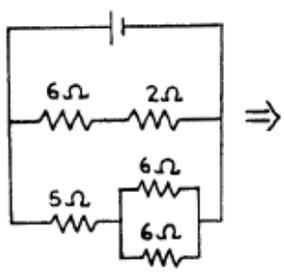
28 The initial circuit, below left, is a compound circuit made of a combination of resistors. It is reduced to a single equivalent resistance by the three steps, the circuits to its right, *a, b, c.* In step *a,* show the equivalent resistance of the parallel 4-Ω resistors. In step *b* combine this in 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.)



R = _____

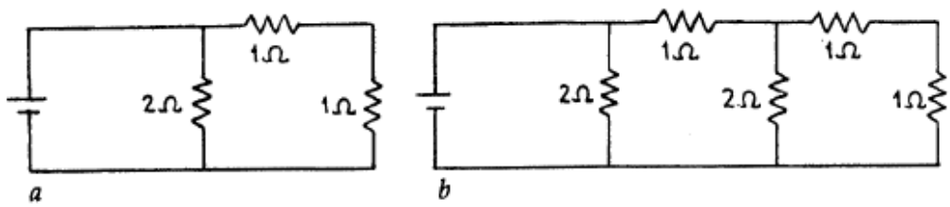
Initial Circuit *a.* *b.* *c.*

29 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.

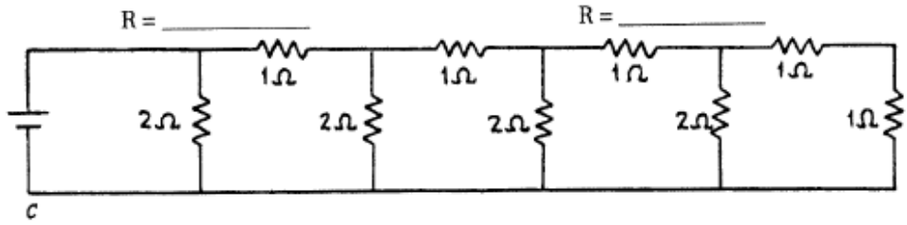


R = _____

30 Find the equivalent resistance of these three circuits.



R = _____ R = _____



R = _____

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