

48. The manufacturer of a 90-W halogen outdoor spotlight claims that it produces the same light as an ordinary 150-W spotlight.  
 a) Explain this claim.  
 b) What current passes through the halogen spotlight when it is operating?  
 c) What are the resistances of the halogen spotlight and a regular 150-W spotlight?
49. Your school is staging an evening outdoor event. The student in charge of lighting asks you how many spotlights can be connected in parallel in a circuit that has a 15-A circuit breaker.  
 a) How many 150-W regular spotlights can be connected?  
 b) How many 90-W halogen spotlights can be connected?
50. A large home heated by electricity consumes 9000 kW·h of electrical energy in a two-month period in the winter. If the unit cost is 9.4¢/kW·h, what is the electrical energy bill for the two months?
51. Draw Figure 7 in your notes and sketch the direction of the magnetic field lines around each conductor. The arrows represent the direction of current flow.
52. Locate and label the north and south poles for each of the electromagnets shown in Figure 8.
53. An electromagnet can exert a force of 600 N on a metal block. If the current through the electromagnet must be reduced to one-quarter of its initial value,  
 a) what would the force become?  
 b) what must happen to the number of turns per centimetre if the strength of the magnet is to remain at 600 N?
54. An electromagnet contains 2000 turns in its length. A current of 2.5 A provides a lifting force of 100 N.  
 a) What current would be required to provide a lifting force of 300 N?  
 b) If the current is 2.5 A, how many turns would be required to provide a lifting force of 600 N?
55. When a certain electromagnet contains 1000 turns in its length and carries a current of 10 A, it can exert a force on an iron block of 2000 N. If the electromagnet is rewound such that it contains 5000 turns in the same length and carries a current of 25 A, what force could it exert on the block?
56. a) Describe three separate ways by which you could increase the strength of an electromagnet 10 times.  
 b) If you made all three changes, by what factor would the strength of the electromagnet increase?
57. An AC generator is rotating at 10 Hz. Sketch a graph of induced current against time for 4 cycles.
58. A transformer has 100 turns on the primary coil and 1000 turns on the secondary coil. If the primary voltage and current are 115 V and 2.00 A, respectively, determine the secondary voltage and current.
59. A transformer is to decrease a potential difference from 115 V AC to 9.0 V AC. If the primary coil has 500 turns, how many should be on the secondary coil?
60. A generating plant provides a town with electrical energy at the rate of 4.0 MW and a potential difference of 800 kV. If the transmission line has a resistance of  $2.4 \Omega$ , what is the rate of energy loss in the transmission lines?

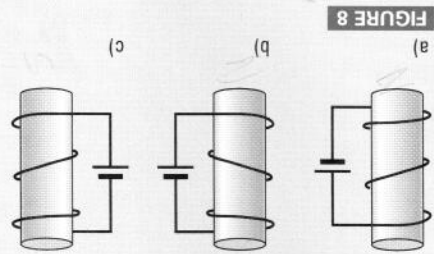


FIGURE 8

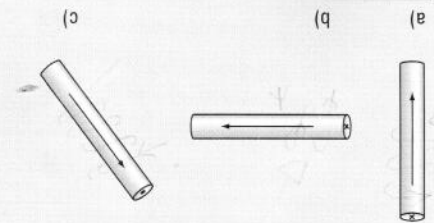


FIGURE 7