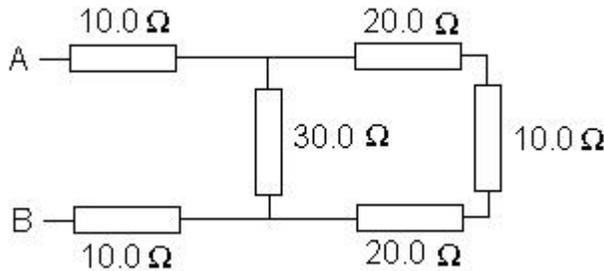
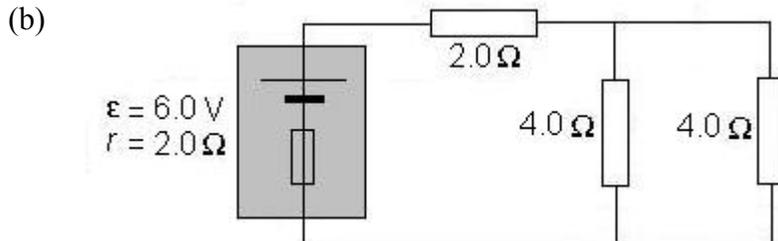
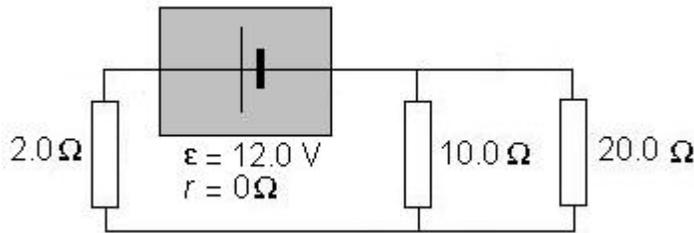


## Electric Circuits Worksheet

1. By what factor does the resistance of a wire change if its radius is doubled?
2. A resistor obeying Ohm's law is measured to have a resistance of  $12\ \Omega$  when a current of  $3\ \text{A}$  flow in it. What is the resistance when the current is  $4\ \text{A}$ ?
3. The resistance of a fixed length of wire of circular cross-section is  $10.0\ \Omega$ . What will be the resistance of a wire of the same length made of the same material but with only half the radius?
4. The filament of an ordinary  $120\ \text{W}$  light bulb has a resistivity of  $2.0 \times 10^{-6}\ \Omega\text{m}$ .
  - (a) What is its resistance when it is connected to a source of  $220\ \text{V}$ ?
  - (b) If the radius of the filament is  $0.03\ \text{mm}$ , find its length.
5. What is the resistance between A and B in the following resistor circuit?



6. A wire that has resistance  $R$  is cut into two equal pieces. The two parts are joined in parallel. What is the resistance of the combination?
7. Find the current in, and potential difference across, each resistor in the following circuits.
  - (a)



8. Six light bulbs, each of constant resistance  $3.0 \Omega$ , are connected in parallel to a battery of emf =  $9.0 \text{ V}$  and negligible internal resistance. The brightness of one light bulb is proportional to the power dissipated in it. Compare the brightness of one light bulb when all six are on, to that when only five are on, the sixth having burned out.
9. A toaster is rated as  $1200 \text{ W}$  and a mixer as  $500 \text{ W}$  both at  $220 \text{ V}$ .
- If both appliances are connected in parallel to a  $220 \text{ V}$  source, what current does each appliance draw?
  - How much energy do these appliances use if both work for one hour?
10. An electric kettle rated as  $2000 \text{ W}$  at  $220 \text{ V}$  is used to warm  $2.0 \text{ L}$  of water from  $15^\circ\text{C}$  to  $90^\circ\text{C}$ .
- How much current flows in the kettle?
  - What is the resistance of the kettle?
  - How long does it take to warm the water? (Specific heat capacity of water =  $4200 \text{ J kg}^{-1} \text{ K}^{-1}$ )
  - How much does this cost if the power company charges  $\$ 0.10$  per kWh?