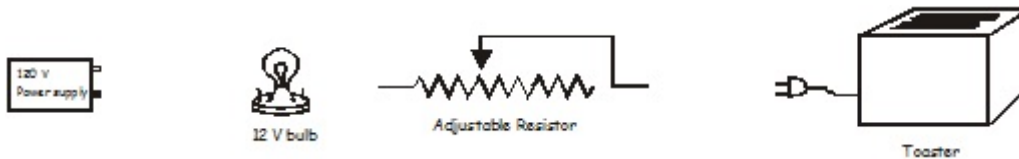


4. A certain light bulb is designed to dissipate 6.00 W when it is connected to a 12.0 V source.
- Calculate the resistance of the light bulb.
 - If the light bulb functions as designed and is lit continuously for 30 days, how much energy is used?

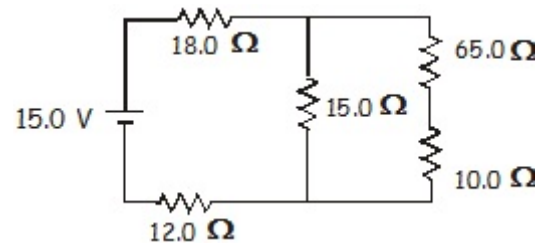
The 6.00 W, 12.0 V bulb is connected in a circuit with a 1 500 watt, 120 V toaster; an adjustable resistor; and a 120 V power supply. The circuit is designed so that the bulb and the toaster operate at the given values and, if the light bulb fails, the toaster will continue to function at these values.

- On the drawing below draw in wires connecting the components shown to make a complete circuit that will function as described above.



- Determine the value of the adjustable resistor that must be used in order for the circuit to work as designed.
- If the resistance of the adjustable resistor is increased, what will happen to the following?
 - The brightness of the bulb – explain your response.
 - The power dissipated by the toaster. Explain your reasoning.

5. A circuit is set up as shown. (a) What is the total current? (b) What is the total resistance? (c) What is the power dissipated by the $10.0\ \Omega$ resistor?



6. An electron is accelerated through 2400 V from rest and then enters a region in which there is a uniform 1.70 T magnetic field. What are (a) the maximum and (b) the minimum magnitudes for the magnetic force this charge can experience?
7. A duck flying horizontally due north at 15 m/s passes over Atlanta, where the magnetic field of the earth is 5.0×10^{-5} T in a direction 60.0° below a horizontal line running north and south. The duck has a positive charge of 4.0×10^{-8} C. What is the magnetic force acting on the duck?