

EXERCISES WEEK 1

W1-1: How many joules equal one kWh? Show every step of your calculation.

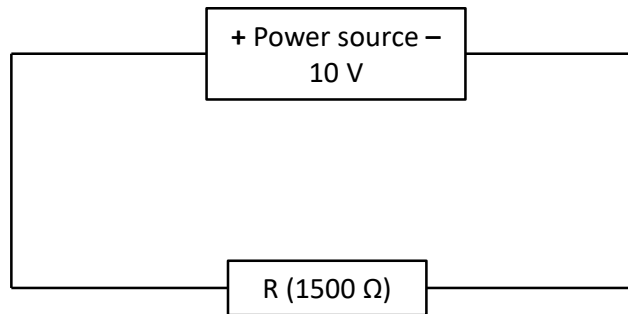


Figure 1.

W1-2: Consider the circuit in Figure 1. Calculate the power dissipation over the resistor.

W1-3: Consider the circuit in Figure 1. Calculate the number of electrons that have flowed through the circuit during a time period of 1h.

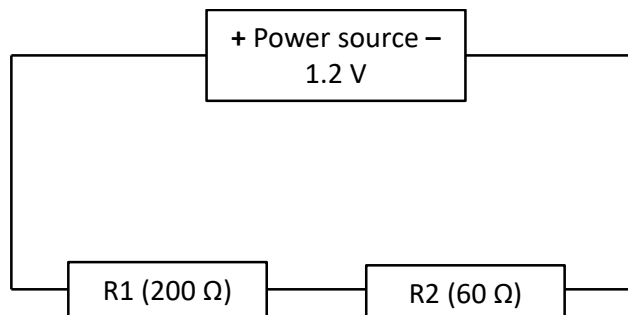


Figure 2.

W1-4. Consider the circuit in Figure 2. How much energy has been dissipated over resistor 1 under a time period of 24h?

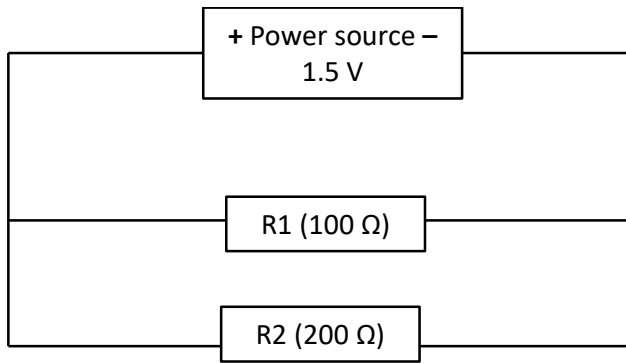


Figure 3.

W1-5. Consider the circuit in Figure 3. Calculate the charge that has passed through resistor 2 under a time period of 2 h.

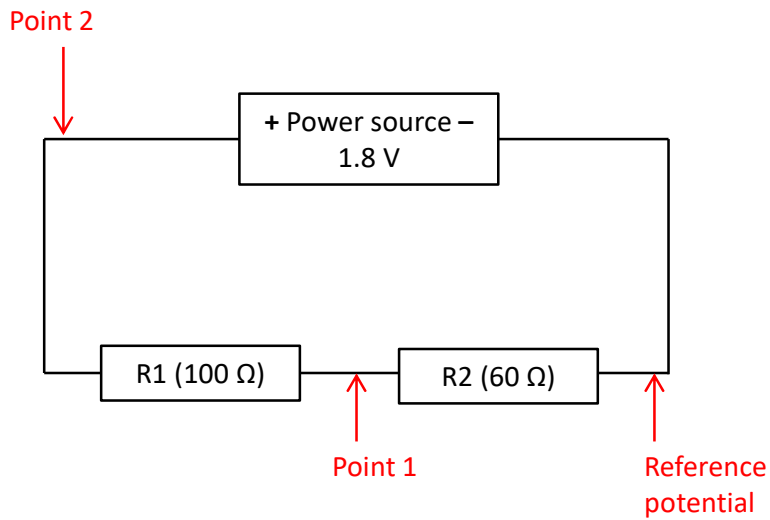


Figure 4.

W1-6. Consider the circuit in Figure 4. What are the electric potentials at point 1 and point 2 in relation to the reference point?

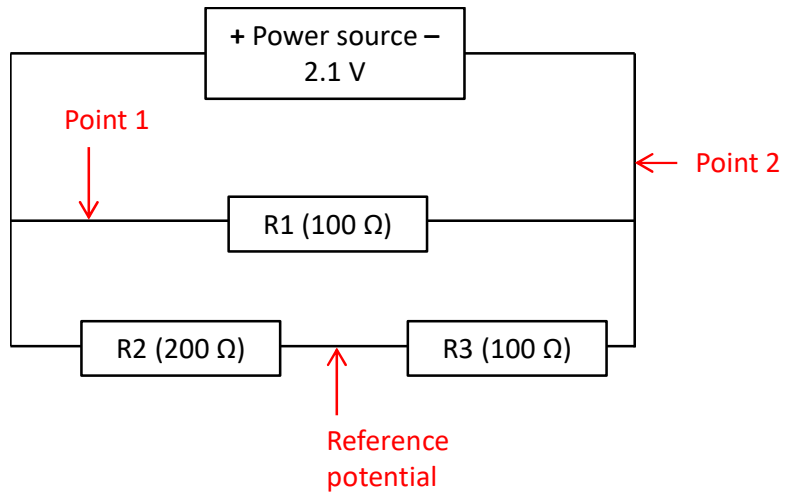


Figure 5.

W1-7. Consider the circuit in Figure 5. What are the electric potentials at point 1 and point 2 in relation to the reference point?

W1-8. Consider a hydrogen fuel cell. How much charge could theoretically be liberated by the oxidation of 1.5 litres of hydrogen gas at 25°C and atmospheric pressure? (Use the ideal gas law)

W1-9. Considering a fuel cell which is operating with oxygen reduction at the cathode ($O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$). The operating output voltage of the fuel cell is 0.5 V and the power output is 15 mW. How many grams of oxygen would be consumed at the cathode during a time period of 1 week?

W1-10. Consider a metal electrowinning process in which Cu^{2+} is reduced to solid Cu on the cathode. How many grams of Cu could potentially be recovered in 1 day if the current flowing in the electrolytic cell was 10 mA?