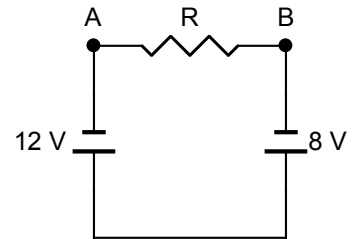


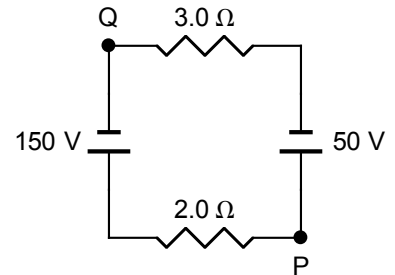
1. Calculate the average time between collisions and the average number of atoms passed between collisions for electrons in aluminum. Aluminum has an effective valence of 3 (meaning 3 electrons per atom are available for conduction).

IMPORTANT NOTE: SOLVE THE PROBLEMS BELOW USING THE JUNCTION RULE AND THE LOOP RULE. DO NOT USE FORMULAS FOR ADDING RESISTORS IN SERIES OR PARALLEL.

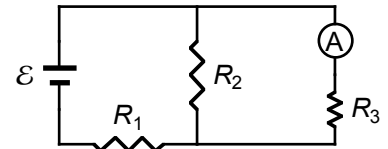
2. (a) What is the direction of the current in the resistor? (b) Which battery is doing positive work? (c) Which point (A or B) is at the higher potential?



3. The potential at point P is 100 V. What is the potential at point Q?



4. (a) Find the reading on the ammeter. The battery emf is 5.0 V, and the resistors are $R_1 = 2.0 \Omega$, $R_2 = 4.0 \Omega$, and $R_3 = 6.0 \Omega$. (Assume the battery has no internal resistance and the ammeter has negligibly small resistance.) (b) The battery and the ammeter are now physically interchanged. Show that the ammeter reading remains unchanged.



5. What current, in terms of \mathcal{E} and R , does the ammeter read? Neglect any internal resistance of the battery or the ammeter.

