

PHYSICS 1020

Homework #4

(Due April 12, 2021)

1. You are given resistors of resistance $10.00\text{ k}\Omega$, $25.00\text{ k}\Omega$, $30.00\text{ k}\Omega$, and $45.00\text{ k}\Omega$. What is the equivalent resistance if these resistors are connected: (a) in series; (b) in parallel?
2. (KJF 22-29)
 - a. How long must a 0.60-mm -diameter copper wire be to carry a 0.50 A current when connected to the terminals of a 1.5 V flashlight battery?
 - b. What is the current if the wire is half this length?
3. (KJF 22-60) A wire is 2.3 m long and has a diameter of 0.38 mm . When connected to a 1.2 V battery, there is a current of 0.61 A . What material is the wire most likely made of?
4. What is the resistance of a 2.5-meter length of 22-gauge (AWG) solid copper wire at a temperature of 45°C ?
5. You need a resistance of $50\text{ k}\Omega$, but you don't happen to have a $50\text{ k}\Omega$ resistor. You do have a $75\text{ k}\Omega$ resistor. What additional resistor do you need to produce a total resistance of $50\text{ k}\Omega$? Should you join the two resistors in parallel or in series?
6. In a charging RC circuit (Fig. 27.1 in the course notes), suppose the resistor is $R = 50\text{ k}\Omega$ and the capacitor is $C = 200\text{ }\mu\text{F}$. Find the level of charge of the capacitor (i.e. its charge at time t divided by its charge when fully charged) at times: (1) $t = 5\text{ sec}$; (2) $t = 10\text{ sec}$; (3) $t = 30\text{ sec}$; (4) $t = 60\text{ sec}$.
7. Find the current through, and voltage across, each of the five resistors in this circuit. Use the values: $V = 18\text{ V}$; $R_1 = 10\text{ }\Omega$; $R_2 = 30\text{ }\Omega$; $R_3 = 5\text{ }\Omega$; $R_4 = 7\text{ }\Omega$; and $R_5 = 20\text{ }\Omega$. Show your work.

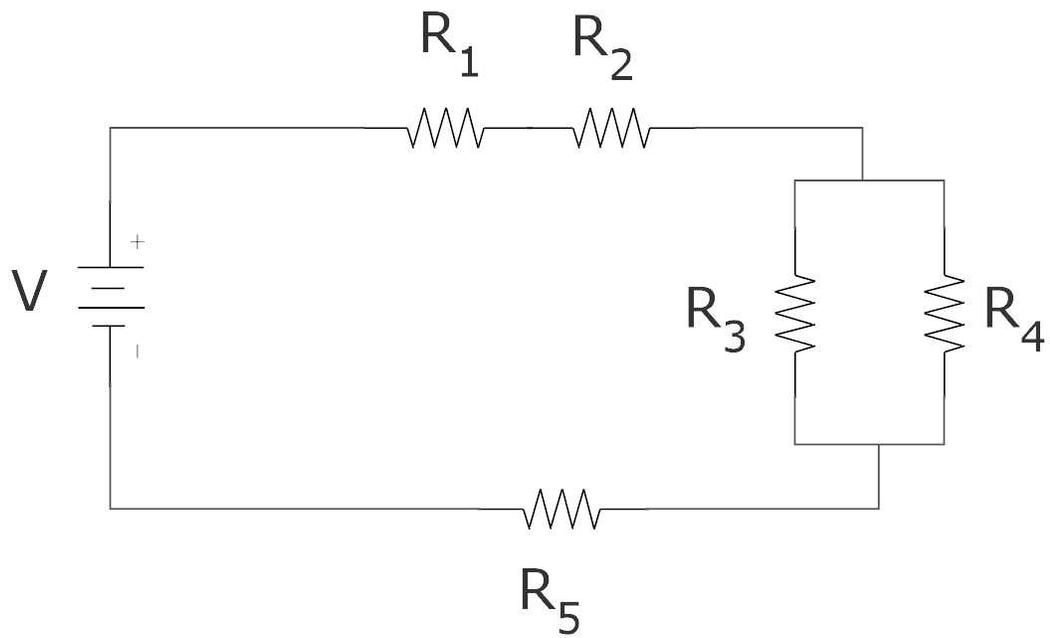


Figure 1: Problem 7.