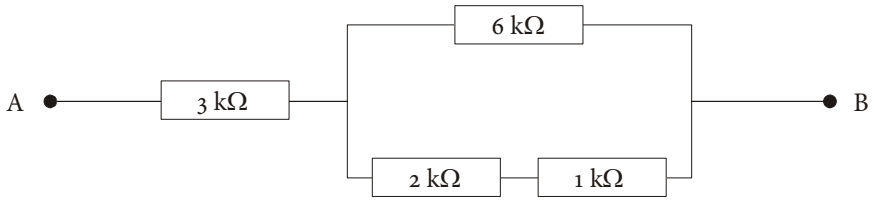
Circuits with Resistors

Basic Problems

1. Two resistors have resistances that differ by 100 Ω. Their equivalent resistance in series wiring is 400 Ω. What are the two resistances?
2. The equivalent resistance of two resistors in parallel wiring is one third of the first and 60 Ω smaller than the second resistance. Calculate the resistances.
3. Two resistors in series are connected to 12 V. The voltage across the second resistor is 5 V and the electric current 1 mA. Calculate the resistances.
4. Two resistors with resistances 200 Ω and 300 Ω are connected in parallel to a voltage supply. The current through the first is 4 mA greater than that through the second one. Calculate the partial currents and the applied voltage.
5. Can the formula for series wiring be applied to circuits with light bulbs? What about the formula for parallel wiring? (Hint: Characteristic of a light bulb)
6. Find the equivalent resistance between points A and B for the circuit below:



7. The resistance of an ammeter is 1 % of the resistance of the consumer load in a simple electric circuit. What is the current measured by the meter when the current through the consumer load alone is 1.00 A?
8. A battery has an emf of 4.5 V and an internal resistance of 25 Ω. It is connected to a 50 Ω resistor. What is the terminal voltage?

Additional Problems

9. A circuit with three resistors is placed in a closed box with three connectors (A, B und C). The resistance measured between A and B is 5 kΩ, between A and C it is 7 kΩ and between B and C 8 kΩ. Draw the diagram for a possible circuit and calculate the resistance of each resistor.
10. Three resistors of 1 kΩ each can be combined (series and parallel wiring) to obtain four different values for the equivalent resistance. Draw the four combinations and calculate the resistance. How many possibilities can you find with four equal resistors?
11. An ammeter with resistance 50 Ω has maximum deflection for 2 mA. How can an additional resistor be connected to allow for the measuring of greater currents? Calculate the additional resistance for a maximum current of 10 A.
12. A battery's terminal voltage on a load resistance 10 Ω is 4.5 V and on 20 Ω it increases to 5.0 V. Calculate the internal resistance and the emf of the battery.

Solutions to Basic Problems: 1. 150 Ω/250 Ω; 2. 180 Ω /360 Ω; 3. 7 kΩ/5 kΩ; 4. 12 mA, 8 mA, 2.4 V; 6. 5 kΩ; 7. 0.99 A; 8. 3.0 V