

Series Circuit Rules:

$$R_{\text{total}} = R_1 + R_2 + \dots \quad (\text{Resistance})$$

$$I_{\text{total}} = I_1 = I_2 = \dots \quad (\text{Current})$$

$$V_{\text{total}} = V_1 + V_2 + \dots \quad (\text{Voltage})$$

Parallel Circuit Rules:

$$I_{\text{total}} = I_1 + I_2 + \dots \quad (\text{Current})$$

$$V_{\text{total}} = V_1 = V_2 = \dots \quad (\text{Voltage})$$

$$R_{\text{total}} < R_{\text{smallest}} \quad (\text{Resistance})$$

$$\text{Core Equation: } V = I \times R$$

Section A: Circuit Rules Recall

1. Complete the sentences below by choosing the correct circuit type (Series or Parallel) and rule for current:

- a) In a _____ circuit, the current is _____ at all points.
 b) In a _____ circuit, the total current is the _____ of the currents in each branch.

2. Complete the sentences below by choosing the correct circuit type (Series or Parallel) and rule for voltage:

- a) In a _____ circuit, the total voltage is the _____ of the voltages across each component.
 b) In a _____ circuit, the voltage across each branch is _____ as the supply voltage.

3. Complete the sentences below by choosing the correct circuit type (Series or Parallel) and rule for resistance:

- a) In a _____ circuit, the total resistance is the _____ of the individual resistances.
 b) In a _____ circuit, the total resistance is always _____ the smallest individual resistance.

Section B: Series Circuit Calculations

Figure 1 shows a series circuit connected to a 9.0 V power supply.

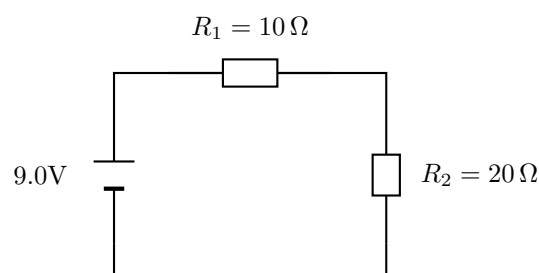


Figure 1: Series Circuit

4. Answer the following questions based on the circuit in Figure 1:

- a) Calculate the total resistance of the circuit.

- b) Calculate the total current flowing through the circuit. Show your working and state the unit.

- c) State the current flowing through resistor R_1 . Explain your reasoning.

- d) Calculate the potential difference across resistor R_2 .

Section C: Multi-Step Challenges

5. A circuit contains two resistors, $R_A = 15\ \Omega$ and $R_B = 25\ \Omega$, connected in series to a 12 V power supply.

- a) Calculate the total current flowing through the circuit and the power dissipated by resistor R_A . Show all your working.

- b) The two resistors, R_A and R_B , are now reconnected in parallel to the same 12 V power supply.

Explain how the total current drawn from the power supply changes when the resistors are connected in parallel compared to when they were in series. Refer to the total resistance in your explanation.
