Step 1: Identify the Configuration

We have **four resistors**, with:

- **Two resistors in series**: $R_1 = 100\Omega\ and\ R_2 = 100\Omega$
- **Two resistors in parallel**: $R_3 = 100\Omega\ and\ R_4 = 50\Omega$

We assume that the **series and parallel groups are combined in series**.

Step 2: Solve the Parallel Resistors First

For resistors in **parallel**, the equivalent resistance ($R_{parallel}$) is given by:

$$\frac{1}{R_{parallel}} = \frac{1}{R_3} + \frac{1}{R_4}$$

Substituting values:

$$\frac{1}{R_{parallel}} = \frac{1}{100} + \frac{1}{50}$$

Find a common denominator:

$$\frac{1}{100} + \frac{2}{100} = \frac{3}{100}$$

Now, take the reciprocal:

$$R_{parallel} = \frac{100}{3} \approx 33.3\Omega$$

Step 3: Solve the Series Resistors

For resistors in **series**, the total resistance is simply:

$$R_{series} = R_1 + R_2 = 100 + 100 = 200\Omega$$

Step 4: Combine the Series and Parallel Sections

Now, the total resistance of the circuit is the sum of:

$$R_{total} = 200 + 33.33 = 233.33\Omega$$

Final Answer:

$$233.33\Omega$$

The **overall resistance** of the circuit is **233.33Ω**, but this does not mean that every point in the circuit has the same resistance. Let's analyze it in more detail.

Key Concepts:

1. **Total Resistance (**R_{total}**)**:
    - The **total resistance** of the circuit (233.33Ω) is what an **external power source** (like a battery) would "see" if it were connected across the entire circuit.
2. **Different Resistance in Different Parts**:
    - The **series part** (100Ω + 100Ω) has a total of **200Ω**.
    - The **parallel part** (100Ω and 50Ω) has an **equivalent resistance of 33.33Ω**.
    - These two sections are **not at the same resistance** at every point in the circuit.

Voltage and Current Distribution:

- **Current is the same in a series circuit**: The same current flows through both the **200Ω series section** and the **33.33Ω parallel section**.
- **Voltage is different across different sections**:
    - The **series section (200Ω) will have a higher voltage drop** than the **parallel section (33.33Ω)** because voltage drop depends on resistance.
    - The **parallel resistors (100Ω and 50Ω)** each get a different **current**, since **current splits in a parallel circuit**.

Detailed Resistance View at Different Points:

1. **Before the first resistor in the series section**: The total resistance seen by the source is **233.33Ω**.
2. **Between the two series resistors**: The resistance up to this point is **100Ω**, but the circuit continues beyond this.
3. **After the series section but before the parallel section**: The total resistance seen **from this point onward** is **33.33Ω** (since we only consider the parallel section from here).
4. **Inside the parallel section**: If you look at each branch separately:
    - The **100Ω resistor** alone has a resistance of **100Ω**.
    - The **50Ω resistor** alone has a resistance of **50Ω**.
    - But **together**, their effective resistance is **33.33Ω** (since they are in parallel).

A great way to summarize the key difference between **series** and **parallel** circuits:

- **In a series circuit**, all components **share the same current** (because there's only one path for the current to flow).
- **In a parallel circuit**, all components **share the same voltage drop** (because they are connected across the same two points).

Analogies for Intuition

- **Series: Current is the same** → Like water flowing through a single pipe with different restrictions; each restriction (resistor) gets the same amount of water.
- **Parallel: Voltage is the same** → Like multiple branches of a river at the same height; each branch gets the same water pressure (voltage), but the flow (current) can be different.

Conclusion:

- **The entire circuit has an effective resistance of 233.33Ω when viewed as a whole.**
- **At different points in the circuit, different resistances exist** depending on how far into the circuit you go.
- **Inside the parallel section**, the two resistors have their **own local resistances**, and the total equivalent resistance is lower than either of them.
- **Current and voltage behave differently** in the series and parallel sections.