202: Principles of electrical science  
**Worksheet 4: Resistors in series**

**Answer guide**

1. Complete the following table for resistors that are all connected in series.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **R1** | **R2** | **R3** | **R4** | **RT** |
| **a** | 7 Ω | 10 Ω | 8 Ω | 15 Ω | 40 Ω |
| **b** | 7 Ω | 16 Ω | 8 Ω | 19 Ω | 50 Ω |
| **c** | 1.5 Ω | 5.6 Ω | 8.2 Ω | 7.3 Ω | 22.6 Ω |
| **d** | 0.03 Ω | 0.105 Ω | 1.06 Ω | 2.007 Ω | 3.202 Ω |
| **e** | 15 MΩ | 21.3 MΩ | 1.4 MΩ | 5.3 MΩ | 43 MΩ |
| **f** | 15 mΩ | 83 mΩ | 26 mΩ | 9 mΩ | 133 mΩ |
| **g** | 2 Ω | 500 mΩ | 1 kΩ | 1.2 MΩ | 1,201,002.5 Ω |

1. Calculate the value of resistor to be connected in series with two resistors each of 1.8Ω and 5.6Ω to give a total resistance of 10Ω.

2.6Ω

1. How many resistors of 0.27Ω must be connected in series to give a total resistance of 3.51Ω?

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1. Two resistors connected in series have a combined resistance of 89.75Ω. If the resistance of one resistor is 23.5Ω, what is the value of the other resistor?

66.25Ω

1. Six resistors of equal value are connected in series. Calculate the value of the individual resistors if the total resistance is 14.4Ω.

2.4Ω

1. Four resistors in series have voltage drops across them of 37V, 55V, 19V and 9V. Calculate the supply voltage.

120V

1. Four resistors with values of 3Ω, 4Ω, 6Ω and 10Ω are connected in series to a supply of 230 volts. Calculate the voltage drop across each resistance in the circuit.

30V

40V

60V

100V

1. Four resistors with values of 8Ω, 17Ω, 9Ω and 6Ω are connected in series. The 9Ω resistor has a volt drop of 27 volts across. Calculate: (a) the total current, (b) the total resistance, (c) the voltage drop across the other three resistors and (d) the supply voltage.

3A

40Ω

24V, 51V, 18V

120V

1. When four resistors are connected in series across 110V supply, a current of 2A flows. Three of the resistors have values of 5Ω, 23Ω and 10Ω. Calculate: (a) the value of the fourth (unknown) resistor and (b) the voltage drop across all the resistors and prove Kirchhoff’s law.

17Ω

10V, 34V, 46V, 20V

1. Four resistors, each of 5Ω, 20Ω, 45Ω and 10Ω, are connected in series across a d.c. supply. If the voltage across the resistors is 15, 60 and 135 volts, respectively, calculate: (a) the voltage across the 10Ω resistor and (b) the supply voltage.

30V

240V