202: Principles of electrical science  
**Worksheet 5: Resistors in parallel**

**Answer guide**

1. Calculate the total resistance of each branch if the following resistors are connected in parallel.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **R1** | **R2** | **R3** | **RT** |
| **a** | 12Ω | 6Ω | 4Ω | 2Ω |
| **b** | 30Ω | 90Ω | 45Ω | 15Ω |
| **c** | 120Ω | 80Ω | 48Ω | 24Ω |
| **d** | 6Ω | 20Ω | 30Ω | 4Ω |
| **e** | 1.5Ω | 4Ω | 12Ω | 1Ω |

1. Complete the following table assuming that the resistors are connected in parallel.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **R1** | **R2** | **R3** | **RT** |
| **a** | 120Ω | 80Ω | - | 48Ω |
| **b** | 16Ω | 48Ω | - | 12Ω |
| **c** | 200Ω | 50Ω | - | 40Ω |
| **d** | 40Ω | 40Ω | 20Ω | 10Ω |
| **e** | 60Ω | 30Ω | 20Ω | 10Ω |

1. Two resistors of 48Ω and 80Ω are connected together in parallel. What would the value of a third resistor have to be, when connected in parallel with the first two, in order to give a combined resistance total of 15Ω?

30Ω

1. A parallel circuit containing three resistors of 1.5Ω, 4Ω and 12Ω is connected across a 10 volt supply. Calculate the current flowing in each resistor and prove Kirchhoff's current law.

6.67A, 2.5A, 0.83A

IT = 10A

1. A parallel circuit containing three resistors of 18Ω, 20Ω and 30Ω is connected across a 144 volt supply. Calculate the current flowing in each resistor and prove Kirchhoff's current law.

8A, 7.2A, 4.8A

IT = 20A

1. A parallel circuit containing three resistors of 30Ω, 90Ω and 45Ω is connected across a 30 volt supply. Calculate the current flowing in each resistor and prove Kirchhoff's current law.

1A, 0.33A, 0.67A

IT = 2A

1. Three resistors of 0.012Ω, 0.015Ω and 0.008Ω, respectively, are connected in parallel across a 2.4 volt d.c. supply. Calculate:
   1. the current flowing in each resistor
   2. the current in each section of the circuit
   3. the total current drawn from the supply.

200A

160A

300A

IT = 660A

1. Three resistors are connected in parallel across a d.c. supply. The values of two of the resistors are 12Ω and 18Ω, respectively. If the 18Ω resistor has a current of 18 amperes flowing through it and the total current drawn from the supply is 81 amperes, calculate:
   1. the supply voltage
   2. the value of current flowing through each resistor
   3. the value, in ohms, of the third resistor.

324V

27A

18A

36A

9Ω