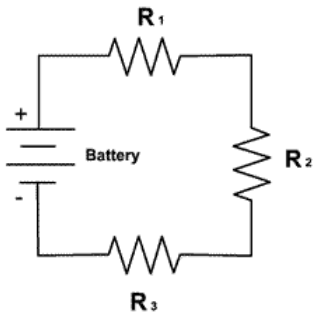
Three resistors are in series with a 12V battery. The resistors have values of R_1=100 Ω, R_2=60Ω, and R_3=75Ω. Find



a. The total resistance in the circuit.
b. The current through each resistor.
c. The voltage drop across each resistor.

$R_{total} = R_1 + R_2 + R_3 = 100 + 60 + 75 = 235\,\Omega$

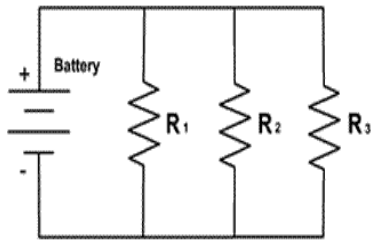
$I_{total} = I_1 = I_2 = I_3 = \frac{V_{total}}{R_{total}} = \frac{12}{235} = 0.051\,A$

$V_1 = I_1 R_1 = 0.051(100) = 5.1V$

$V_2 = I_2 R_2 = 0.051(60) = 3.1V$

$V_3 = I_3 R_3 = 0.051(75) = 3.8V$

Three resistors are in parallel with a 12V battery. The resistors have values of R_1=100 Ω, R_2=60Ω, and R_3=75Ω. Find



a. The total resistance in the circuit.
b. The current through each resistor.
c. The voltage drop across each resistor.

$$R_{total} = \left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)^{-1} = \left(\frac{1}{100} + \frac{1}{60} + \frac{1}{75}\right)^{-1} = 25\,\Omega$$

$$I_{total} = \frac{V_{total}}{R_{total}} = \frac{12}{25} = 0.48\,A$$

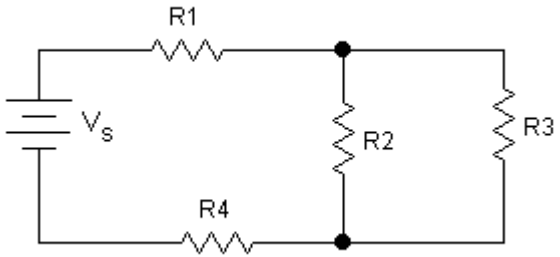
$$V_1 = V_2 = V_3 = V_{total}$$

$$I_1 = \frac{V_1}{R_1} = \frac{12}{100} = 0.12\,A$$

$$I_2 = \frac{V_2}{R_2} = \frac{12}{60} = 0.20\,A$$

$$I_3 = \frac{V_3}{R_3} = \frac{12}{75} = 0.16$$

Four resistors are arranged in a circuit as shown in the diagram to the right. The resistors have values of R_1=100 Ω, R_2=60Ω, R_3=75Ω, and R_4=125Ω. The battery has a voltage of 60V. Find



a. the total resistance
b. the total current
c. the voltage drop across each resistor
d. the current through each resistor.

- R_2 and R_3 are in parallel

$$R_{23} = \left(\frac{1}{R_2} + \frac{1}{R_3}\right)^{-1} = 33.3\,\Omega$$

R_1 and R_{23} and R_4 are in series

$$R_{total} = R_1 + R_{23} + R_4 = 258.3\,\Omega$$

- $$I_{total} = \frac{V_{total}}{R_{total}} = \frac{60}{258.3} = 0.232\ A$$

$$I_1 = I_{total} = 0.23\ A$$

$$I_4 = I_{total} = 0.23\ A$$

$$V_1 = I_1 R_1 = 23\ V$$

$$V_4 = I_4 R_4 = 29\ V$$

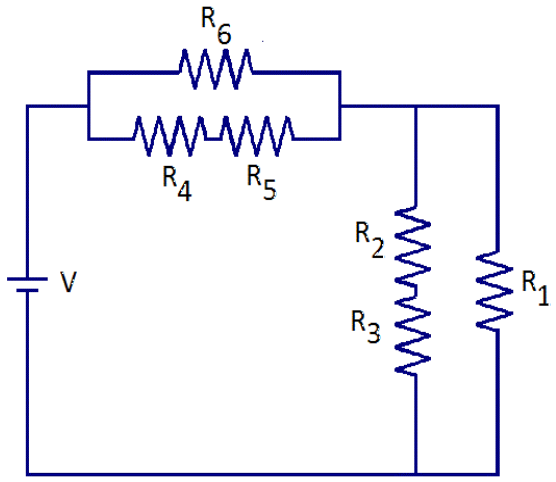
$$V_2 = V_3 = V_{total} - V_1 - V_4 = 7.8\ V$$

$$I_2 = \frac{V_2}{R_2} = \frac{7.8}{60} = 0.13\ A$$

$$I_3 = \frac{V_3}{R_3} = \frac{7.8}{75} = 0.10\ A$$

Six resistors are arranged in a circuit as shown in the diagram to the right. The resistors have values of R_1=100 Ω, R_2=60Ω, R_3=75Ω, R_4=125Ω, R_5=80Ω, and R_6=25Ω. The battery has a voltage of 120V. Find

a. the total resistance
b. the total current
c. the voltage drop across each resistor
d. the current through each resistor.



$R_{45} = R_4 + R_5 = 205\Omega$

$R_{456} = \left(\frac{1}{R_6} + \frac{1}{R_{45}}\right)^{-1} = 22.28\Omega$

$R_{23} = R_2 + R_3 = 135\Omega$

$R_{123} = \left(\frac{1}{R_1} + \frac{1}{R_{23}}\right)^{-1} = 57.45\Omega$

$R_{total} = R_{456} + R_{123} = 79.73\Omega$

$I_{total} = \frac{V_{total}}{R_{total}} = \frac{120}{79.73} = 1.505A$

$V_{456} = I_{total} R_{456} = 33.54V$

$V_6 = V_{456} = 33.54V$

$I_6 = \frac{V_6}{R_6} = 1.341A$

$I_4 = I_5 = I_{total} - I_6 = 0.164A$

$V_4 = I_4 R_4 = 20.45V$

$V_5 = V_{456} - V_4 = 13.09V$

$V_{123} = V_{total} - V_{456} = 86.45V$

$V_1 = V_{123} = 86.45V$

$I_1 = \frac{V_1}{R_1} = 0.865A$

$I_2 = I_3 = I_{total} - I_1 = 0.640A$

$V_2 = I_2 R_2 = 38.43V$

$V_3 = V_{123} - V_2 = 48.03V$