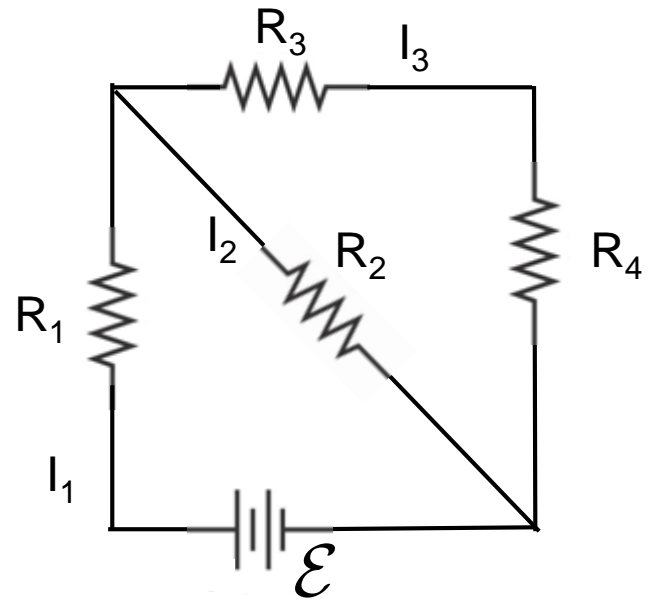


Electric circuits

Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

What is the main plan of attack?



Electric circuits

Find the currents in this circuit:

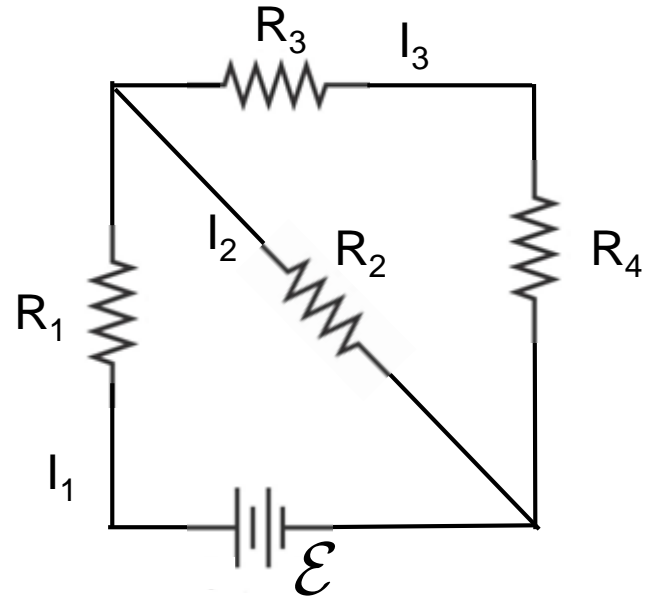
$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

First find the equivalent resistance to find the current thru the battery

Second, find the voltage drop over R_1 to find the voltage drops across the I_2 and I_3 branches

Then use the resistances on those branches to determine I_2 and I_3

Check, using $I_1 = I_2 + I_3$



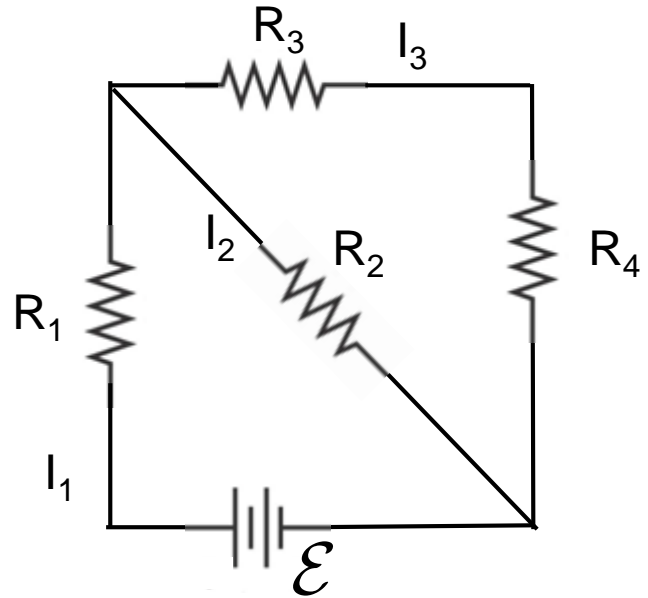
Electric circuits

Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

First find the equivalent resistance to find the current thru the battery

$$R_{34} = R_3 + R_4 = 6\Omega$$



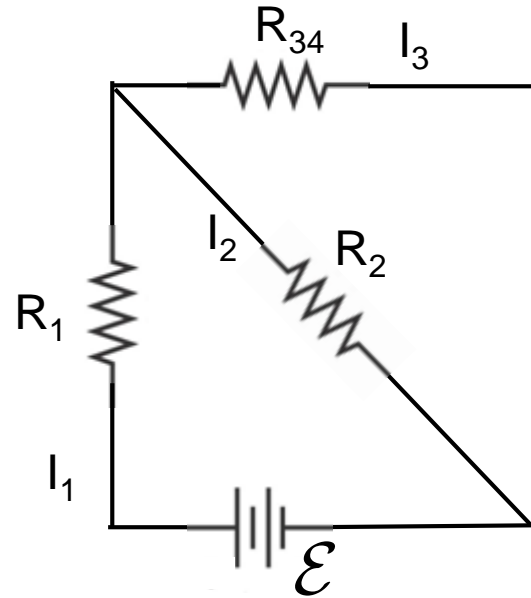
Electric circuits

Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

First find the equivalent resistance to find the current thru the battery

$$R_{34} = R_3 + R_4 = 6\Omega$$



Electric circuits

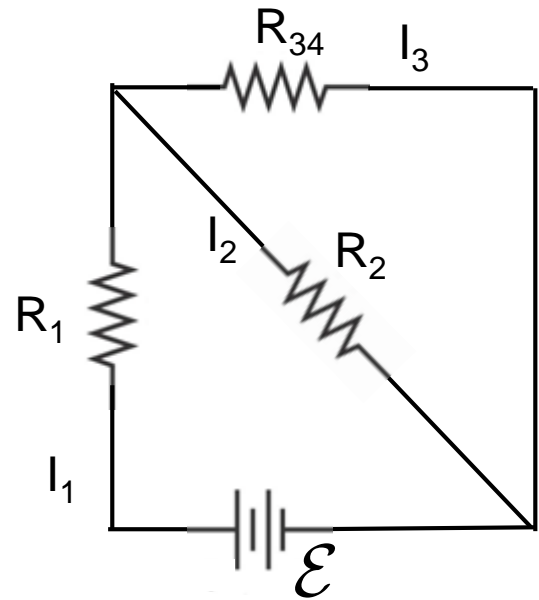
Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

First find the equivalent resistance to find the current thru the battery

$$R_{34} = R_3 + R_4 = 6\Omega$$

$$R_{234} = \frac{R_2 R_{34}}{R_2 + R_{34}} = \frac{3 \times 6}{3 + 6} \Omega = 2\Omega$$



Electric circuits

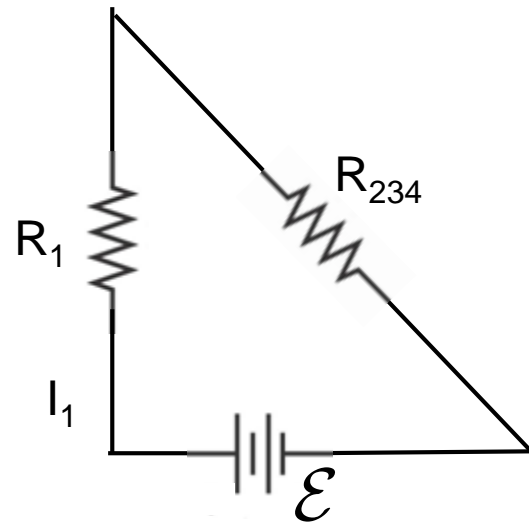
Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

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Electric circuits

Find the currents in this circuit:

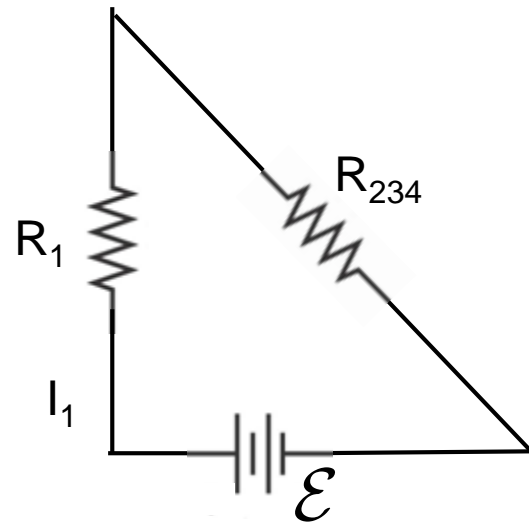
$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

First find the equivalent resistance to find the current thru the battery

$$R_{34} = R_3 + R_4 = 6\Omega$$

$$R_{234} = \frac{R_2 R_{34}}{R_2 + R_{34}} = \frac{3 \times 6}{3 + 6} \Omega = 2\Omega$$

$$R_{1234} = 2\Omega + 2\Omega = 4\Omega$$



Electric circuits

Find the currents in this circuit:

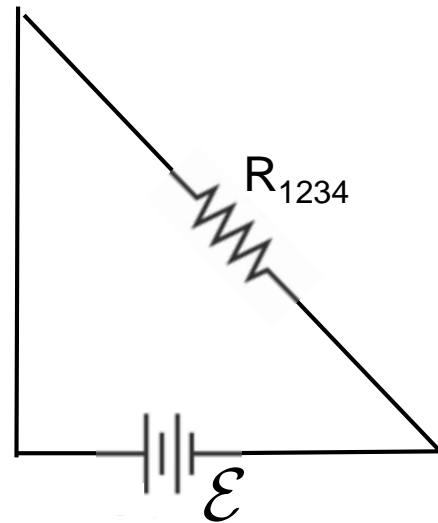
$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

First find the equivalent resistance to find the current thru the battery

$$R_{34} = R_3 + R_4 = 6\Omega$$

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Electric circuits

Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega$$

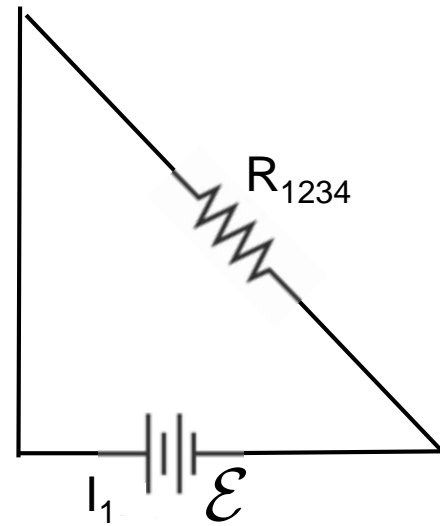
First find the equivalent resistance to find the current thru the battery

$$R_{34} = R_3 + R_4 = 6\Omega$$

$$R_{234} = \frac{R_2 R_{34}}{R_2 + R_{34}} = \frac{3 \times 6}{3 + 6} \Omega = 2\Omega$$

$$R_{1234} = 2\Omega + 2\Omega = 4\Omega$$

$$I_1 = \frac{12\text{V}}{4\Omega} = 3\text{A}$$

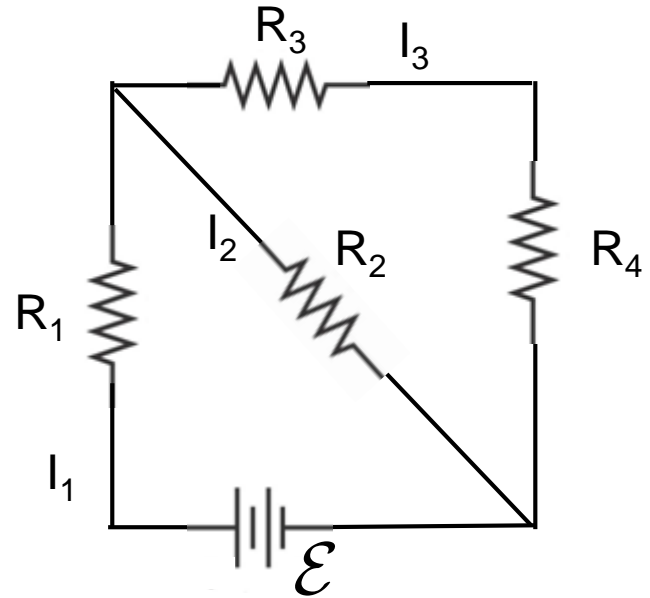


Electric circuits

Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega \quad I_1 = 3\text{A}$$

Now, what is the voltage drop
across R_1 ?



Electric circuits

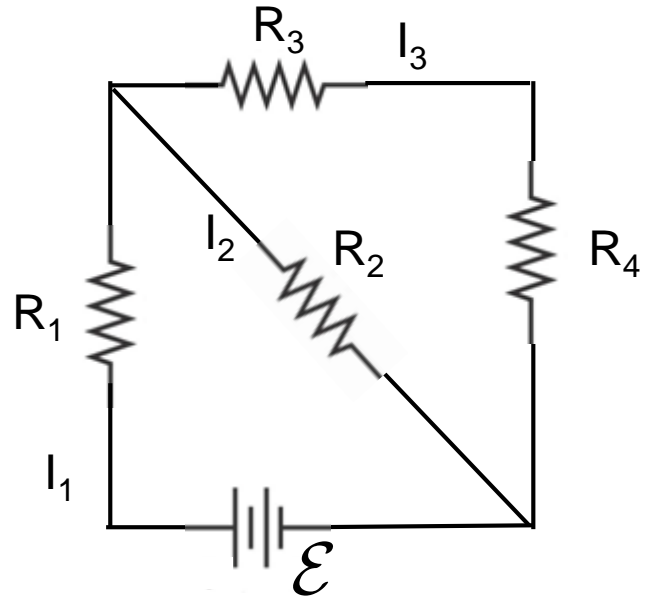
Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega \quad I_1 = 3\text{A}$$

Now, what is the voltage drop
across R_1 ?

$$\Delta V_1 = I_1 R_1 = 3\text{A} \times 2\Omega = 6\text{V}$$

So what is the voltage drop
across the parallel branches?



Electric circuits

Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega \quad I_1 = 3\text{A}$$

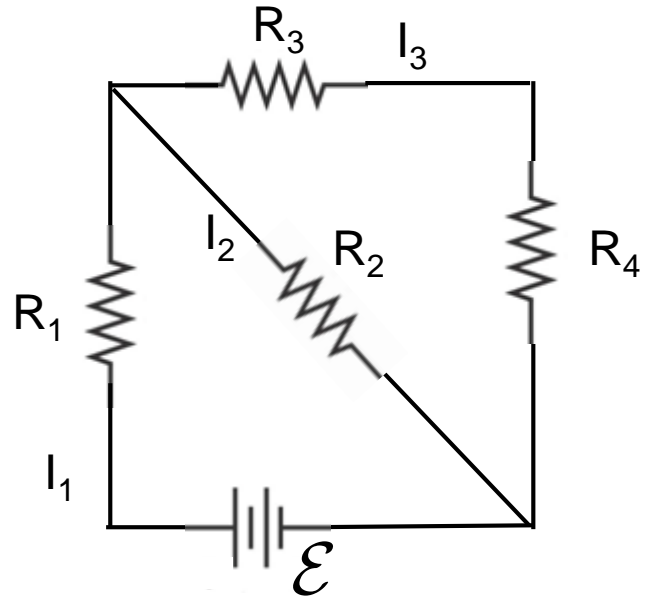
Now, what is the voltage drop
across R_1 ?

$$\Delta V_1 = I_1 R_1 = 3\text{A} \times 2\Omega = 6\text{V}$$

So what is the voltage drop
across the parallel branches?

$$\Delta V_2 = \Delta V_{34} = 12\text{V} - 6\text{V} = 6\text{V}$$

Now find the other currents



Electric circuits

Find the currents in this circuit:

$$\mathcal{E} = 12 \text{ V}, R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 2\Omega, R_4 = 4\Omega \quad I_1 = 3\text{A}$$

Now, what is the voltage drop
across R_1 ?

$$\Delta V_1 = I_1 R_1 = 3\text{A} \times 2\Omega = 6\text{V}$$

So what is the voltage drop
across the parallel branches?

$$\Delta V_2 = \Delta V_{34} = 12\text{V} - 6\text{V} = 6\text{V}$$

Now find the other currents

$$I_2 = \frac{6\text{V}}{3\Omega} = 2\text{A} \quad I_3 = \frac{6\text{V}}{6\Omega} = 1\text{A} \quad I_1 = I_2 + I_3 \quad \text{checks!}$$

