

Real Circuit

September 15, 2024

1

When the switch is open, there is no current flowing in the circuit. This means the voltage drop across all the resistors that separate the + and - labels is zero.

2

To calculate the current through the battery, the simplest way is taking the battery voltage (9V) and dividing it by the equivalent resistance of all the resistors will be the current through the battery.

First we have to determine the resistances of the resistors based on their color codes:

$$\text{Red-Red-Brown: } 22 \times 10^1 = 220 \, \Omega$$

$$\text{Brown-Blue-Brown: } 16 \times 10^1 = 160 \, \Omega$$

$$\text{Brown-Red-Red: } 12 \times 10^2 = 1200 \, \Omega$$

$$\text{Orange-Blue-Red: } 36 \times 10^2 = 3600 \, \Omega$$

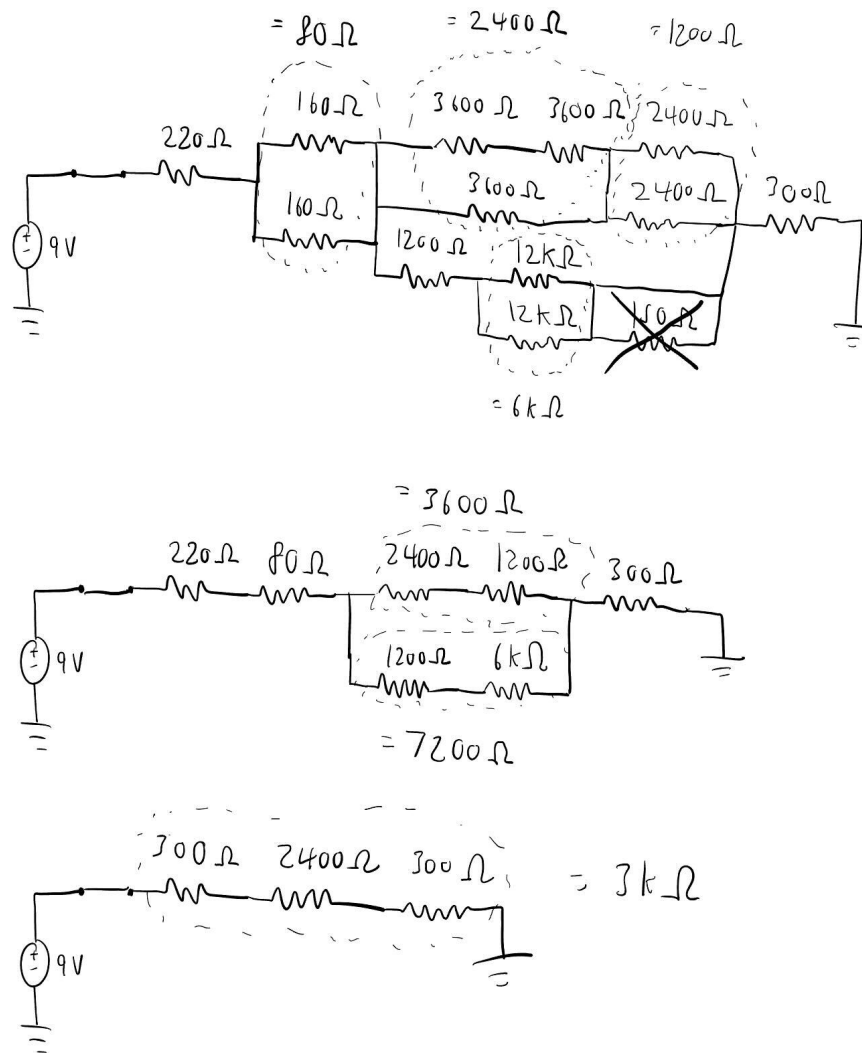
$$\text{Brown-Red-Orange: } 12 \times 10^3 = 12,000 \, \Omega (12 \, \text{k}\Omega)$$

$$\text{Brown-Green-Brown: } 15 \times 10^1 = 150 \, \Omega$$

$$\text{Red-Yellow-Red: } 24 \times 10^2 = 2400 \, \Omega$$

$$\text{Orange-Black-Brown: } 30 \times 10^1 = 300 \, \Omega$$

Then simplifying the circuit:



The equivalent series resistance is 3000Ω. This means the current flowing through the battery is $9V/3000\Omega = 3mA$.