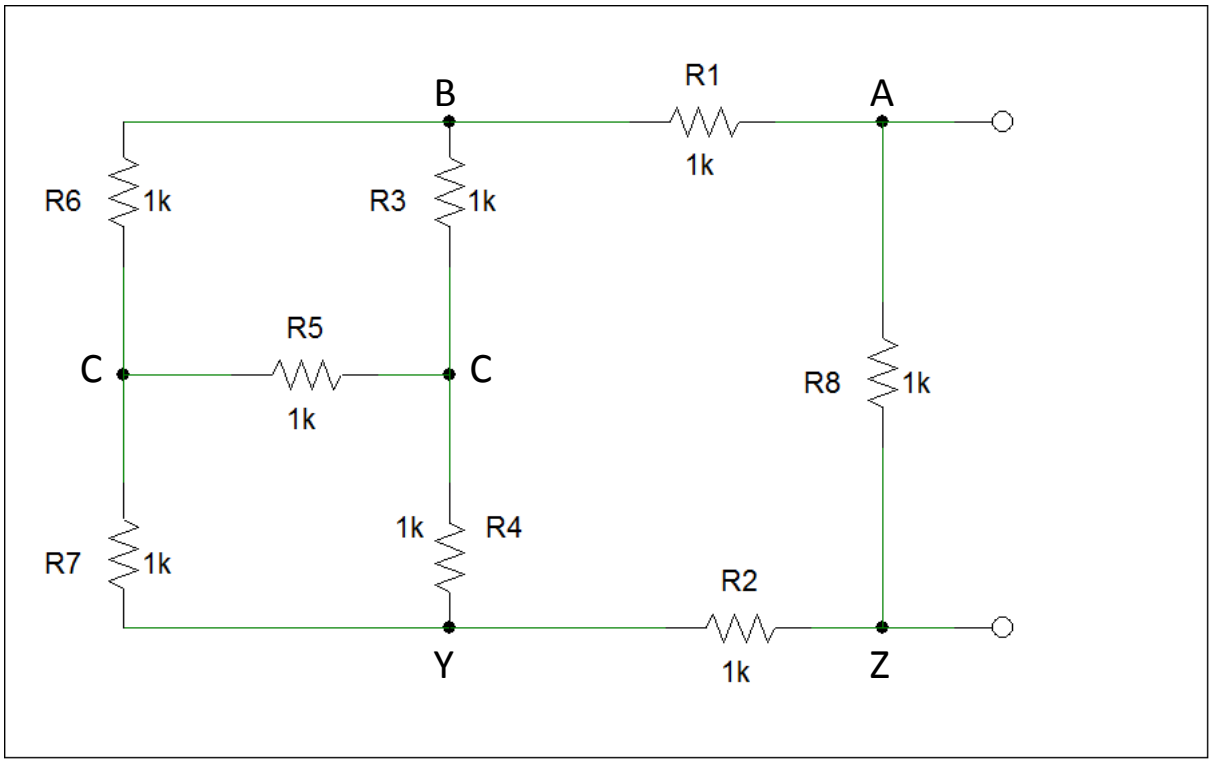
Total resistance of electric DC circuit.

At first look on circuit below looks complicated to calculate its total resistance R_t from A and Z terminals. Note that all resistors in circuit has the same value. As we know to let the current flow it must be electric potential difference between two point of conductor. Electric potentials will be marked using letters. This case of circuit is specific because of equal resistors values. We assume that connection wires between resistors has very small resistance and we can omit it. All elements in circuit we consider as elements with focused parameters.



Picture 1. Example specific electric circuit.

As was said electric potentials are marked. Reader noted that resistor $R5$ is connected to wires which have the same electric potential. It means that no current will flow through resistor $R5$. Total resistance seen from terminal A and Z doesn't see resistor $R5$ and we can omit that resistor in our calculations.

Resistors $R6$ and $R7$ are connected in series

$$R_{R6R7} = R6 + R7$$

Resistors $R3$ and $R4$ are connected in series

$$R_{R3R4} = R6 + R7$$

Resistances R_{R6R7} and R_{R3R4} are connected in parallel. Relation between resistance and conductance will we used.

$$G = \frac{1}{R}$$

$$G_{R6R7} = \frac{1}{R_{R6R7}}$$

$$G_{R3R4} = \frac{1}{R_{R3R4}}$$

$$G_{R3R4R6R7} = G_{R3R4} + G_{R6R7}$$

$$R_{R3R4R6R7} = \frac{1}{G_{R3R4R6R7}}$$

Resistance $R_{R3R4R6R7}$ and resistor $R1$, $R2$ are connected in series

$$R_{R1R2R3R4R6R7} = R_{R3R4R6R7} + R1 + R2$$

Resistance $R_{R1R2R3R4R6R7}$ is connected in parallel with resistor $R8$

$$G_{R1R2R3R4R6R7} = \frac{1}{R_{R1R2R3R4R6R7}}$$

$$G8 = \frac{1}{R8}$$

$$G_{R1R2R3R4R6R7R8} = G_{R1R2R3R4R6R7} + G8$$

$$R_{R1R2R3R4R6R7R8} = \frac{1}{G_{R1R2R3R4R6R7R8}}$$

$$R_{AZ} = R_{R1R2R3R4R6R7R8}$$