# Answer on Question #79954 - Physics - Electric Circuits

A battery of two cells in series each of emf of 1.5v and internal resistance of 1 ohms is connected to a 5 ohms resistor <mark>in series with a parallel combination of two 2 resistance.</mark>a,draw the circuit diagram for this set up.b,calculate the effective external resistance ?ii,calculate the current in the circuit ?iii,calculate the loss voltage in the battery?

Solution

a) The circuit diagram:
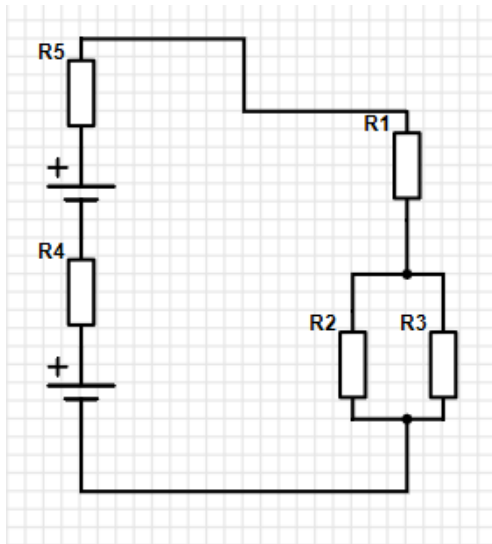
b) 1. If the 5 ohms resistor is connected in series to the parallel combination of two 2 Ohm resistances, the external effective resistance is

$$R_e = R_4 + R_5 + R_1 + \frac{R_2 R_3}{R_2 + R_3} = 1 + 1 + 5 + \frac{2 \cdot 2}{2 + 2} = 8 \, \Omega$$

2. If the 5 ohms resistor is connected in series to the parallel combination of two 5 Ohm resistances, the external effective resistance is

$$R_e = R_4 + R_5 + R_1 + \frac{R_2 R_3}{R_2 + R_3} = 1 + 1 + 5 + \frac{5 \cdot 5}{5 + 5} = 7.5 \, \Omega$$

c) 1. If the 2 Ohm resistors are connected in parallel, the current is:

$$I = \frac{E + E}{R_e} = \frac{1.5 + 1.5}{8} = 0.375 \text{ A.}$$

2. If the 5 Ohm resistors are connected in parallel, the current is:

$$I = \frac{E + E}{R_e} = \frac{1.5 + 1.5}{7,5} = 0.4 \text{ A.}$$

d) Calculate the loss voltage in the battery if the current is 0.375 A:

$$V = I \cdot (R_4 + R_5) = 0.375(1 + 1) = 0.75 \text{ V}$$

Or if the current is 0.4 A:

$$V = I \cdot (R_4 + R_5) = 0.4(1 + 1) = 0.8 \text{ V}$$

Answer

If the 2 Ohm resistors are connected in parallel:

b) 8 Ohm, c) 0.375 A, d) 0.75 V

If the 5 Ohm resistors are connected in parallel:

b) 7.5 Ohm, c) 0.4 A, d) 0.8 V

Answer provided by