Q8 March 2018

A 4 Ohm resistor is connected in parallel with a 6 Ohm resistor, and this combination is connected in series with an 8 Ohm resistor. The current flowing through the 8 Ohm resistor is 7.5 Amps. Calculate EACH of the following:

(a) The applied voltage; (4)

(b) The current in EACH of the parallel resistors. (4)

Q9 December 2019

A battery has an e.m.f. of 38 volts and an internal resistance of 4 ohms. It feeds a circuit consisting of three resistors connected in parallel. The resistors have values of 10 ohm, 20 ohm and 30 ohm.

Calculate EACH of the following:

(a) the battery terminal voltage; (4)

(b) the current in EACH resistor.

Q9 March 2017

A battery consists of 10 cells connected in series, each cell having an e.m.f. of 2V and an internal resistance of 0.05Ω. The battery supplies a current of 5A to an electric motor.

Calculate each of the following:

(a) the potential difference of the battery; (5)

(b) the resistance of the electric motor. (3)

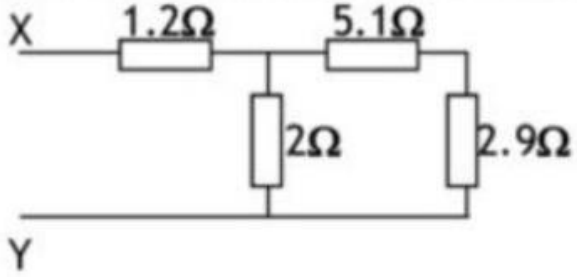
Q8 December 2016

A battery of EMF 12V and internal resistance 0.2Ω is connected across the terminals XY of the circuit shown. Calculate EACH of the following:

(a) Total resistance of the circuit. (4)

(b) The current flowing in the 2.9Ω resistor. (4)

(c) The potential difference across the 5.1Ω resistor. (2)

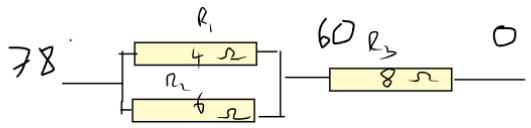


Q8 March 2018

A 4 Ohm resistor is connected in parallel with a 6 Ohm resistor, and this combination is connected in series with an 8 Ohm resistor. The current flowing through the 8 Ohm resistor is 7.5 Amps. Calculate EACH of the following:

(a) The applied voltage; (4)

(b) The current in EACH of the parallel resistors. (4)



Circuit Current = 7.5 Amp

a) Resistance over Parallel section

$\frac{1}{R_T} = \frac{1}{4} + \frac{1}{6}$

$\frac{1}{R_T} = \frac{5}{12}$

$R_T = 2.4\ \Omega$

Resistance over Series Section

$R_T = R_4 + R_3$

$R_T \quad 2.4 + 8 = 10.4$

Voltage

$V = I \times R = 78$ volts

b) R_3 $V = 60$, $I = 7.5$, $R = 8$

Voltage over Parallel section $= 18$

R_1 $V = 18$, $I = 4.5$ A, $R = 4$

R_2 $V = 18$, $I = 3$ Amp, $R = 6$

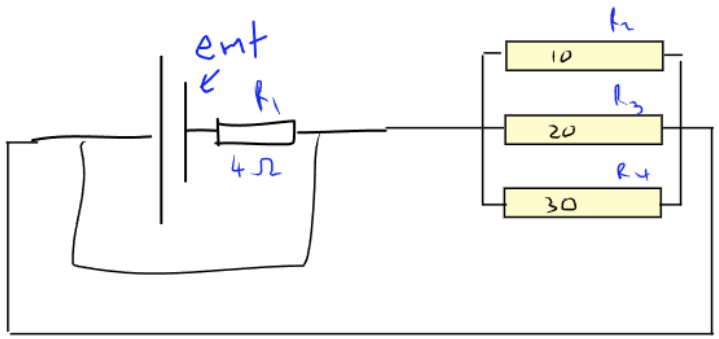
Q9 December 2019

A battery has an e.m.f. of 38 volts and an internal resistance of 4 ohms. It feeds a circuit consisting of three resistors connected in parallel. The resistors have values of 10 ohm, 20 ohm and 30 ohm.

Calculate EACH of the following:

(a) the battery terminal voltage; (4)

(b) the current in EACH resistor.



V
I R

Resistors over Parallel section

$$\frac{1}{R_T} = \frac{1}{10} + \frac{1}{20} + \frac{1}{30} = \frac{11}{60}$$

$$R_T = \frac{60}{11} = 5.4545\ \Omega$$

Circuit Resistance (Series)

$$R_T = 4 + 5.4545 = 9.45$$

Circuit Current

$$I = \frac{V}{R} = \frac{38}{9.4545} = 4.019\ \text{Amp}$$

Voltage drop over R_1

$V = IR$ $\quad V = 4.019 \times 4$

$V = 16.0769$

Terminal voltage

$38 - 16.0769 = 21.923$ Volts

$$I_2 = \frac{V}{R_2} = \frac{21.9}{10} = 2.19\ A$$

$$I_3 = \frac{V}{R_3} = \frac{21.9}{20} = 1.095\ A$$

$$I_4 = \frac{V}{R_4} = \frac{21.9}{30} = 0.73\ A$$

$$I_1 = \frac{16.0769}{4} = 4.019225\ A$$

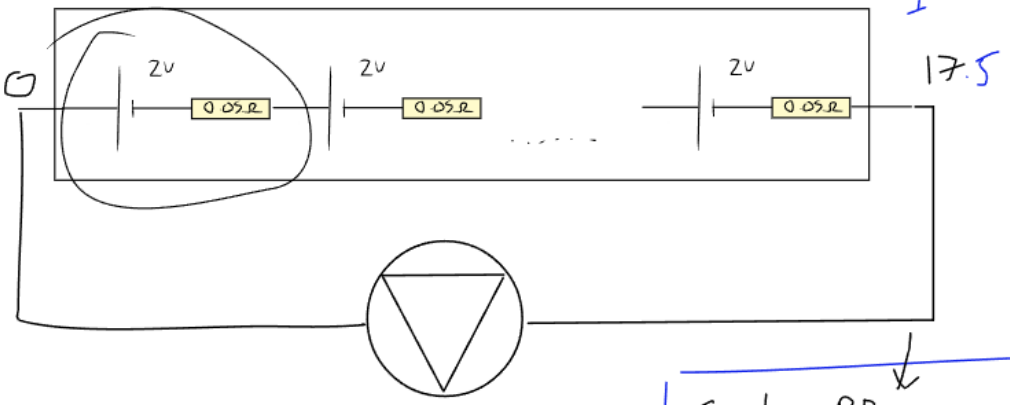
Q9 March 2017

A battery consists of 10 cells connected in series, each cell having an e.m.f. of 2V and an internal resistance of 0.05Ω. The battery supplies a current of 5A to an electric motor.

Calculate each of the following:

(a) the potential difference of the battery; (5)

(b) the resistance of the electric motor. (3)



Motor

$V = 17.5$ v

$I = 5$

$R = 3.5\ \Omega$

Circuit current = 5 A

Resistance in battery $= 0.05 \times 10 = 0.5$

$Emf = PD \text{ on battery} + IR$

$PD = Emf - IR$

$PD = Emf - I \times R$

$17.5 = 20 -$ Voltage used by internal resistance

5×0.5

2.5

$17.5 = 20 - 2.5$

17.5v

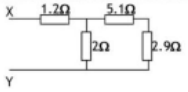
Q8 December 2016

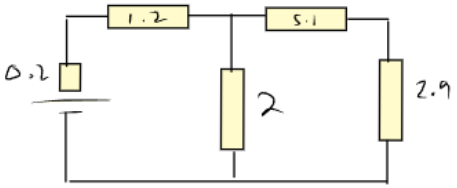
A battery of EMF 12V and internal resistance 0.2Ω is connected across the terminals XY of the circuit shown. Calculate EACH of the following:

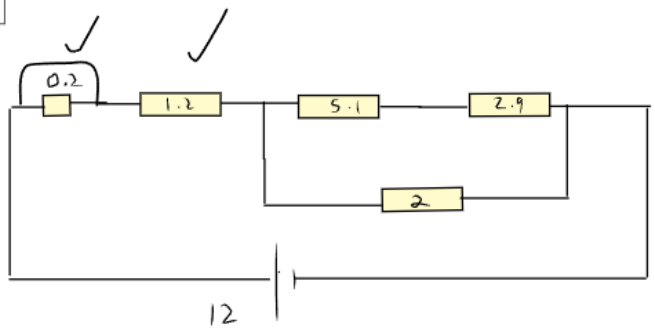
(a) Total resistance of the circuit. = 3Ω (4)

(b) The current flowing in the 2.9Ω resistor. (4)

(c) The potential difference across the 5.1Ω resistor. (2)

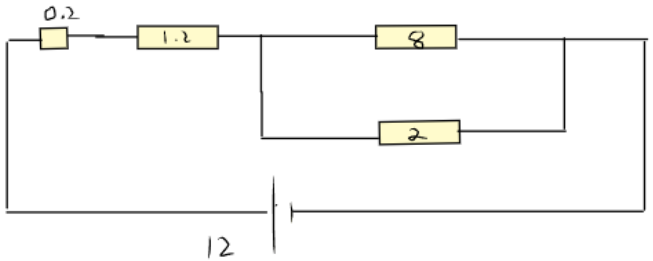






Resistor in Series

$R_T = 5.1 + 2.9 = 8\,\Omega$

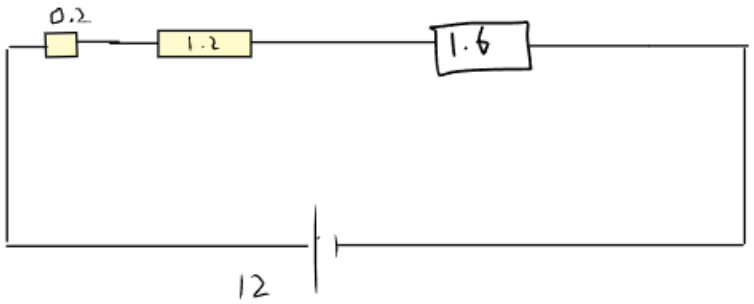


Resistor in Parallel

$\frac{1}{R_T} = \frac{1}{8} + \frac{1}{2} = \frac{5}{8}$

$R_T = \frac{8}{5} = 1.6$

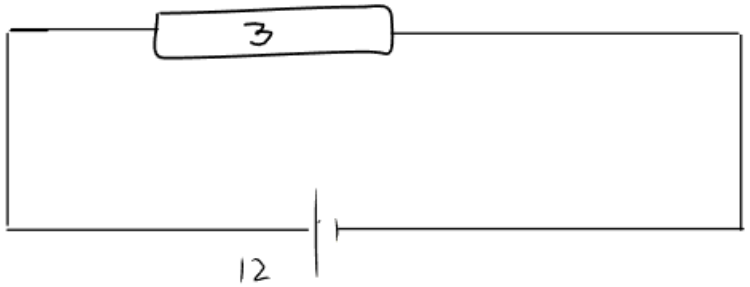
DavidJamesGallimore42@gmail.com



Resistors in Series

$R_T = 0.2 + 1.2 + 1.6$

$R_T = 3$



$R = 3$

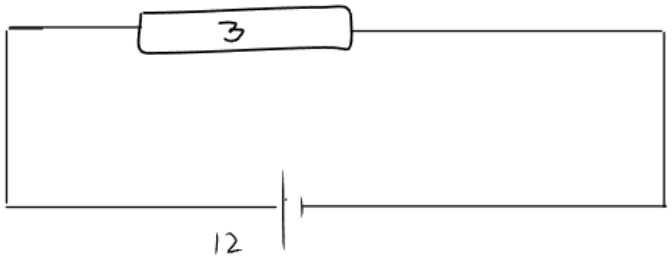
$V = 12$

$I = \frac{12}{3} = 4$ Amps

V

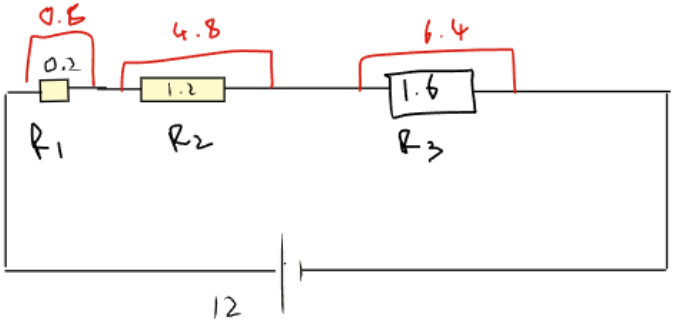
I R

DavidJamesGallimore42@gmail.com



Circuit

V = 12
I = 4
R = 3



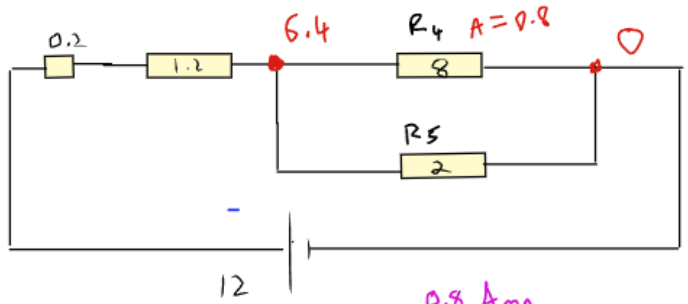
Series = Voltage drops across components

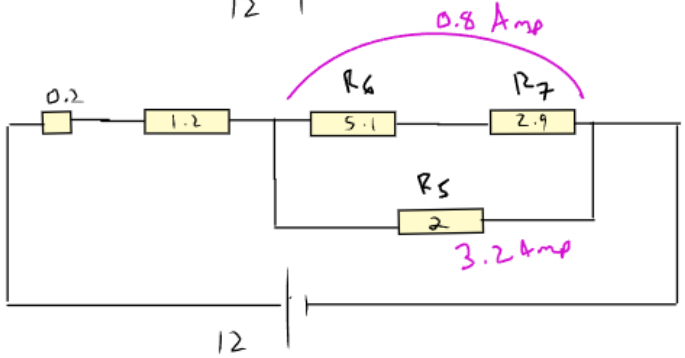
R_1 = V = 0.8, I = 4, R = 0.2

R_2 = V = 4.8, I = 4, R = 1.2

R_3 = V = 6.4, I = 4, R = 1.6

DavidJamesGallimore42@gmail.com





Current over parrallel section

R_4 $V = 6.4$, $I = 0.8$, $R = 8$

R_5 $V = 6.4$, $I = 3.2$, $R = 2$

Series section (Voltage drops)

R_6 $V = 4.08$, $I = 0.8$, $R = 5.1$

$V = I \cdot R$

R_7 V, $I = 0.8$, $R = 2.9$