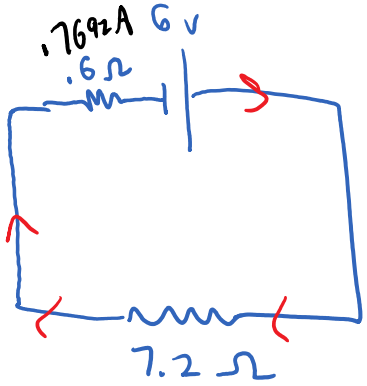
Lesson 6 Homework Solutions

Tuesday, June 2, 2020 9:03 AM

Lesson 6 Homework

1. Find the terminal voltage of a 6.0 volt cell with 0.60 Ω internal resistance that is connected to a 7.2 Ω load
(5.53 V)

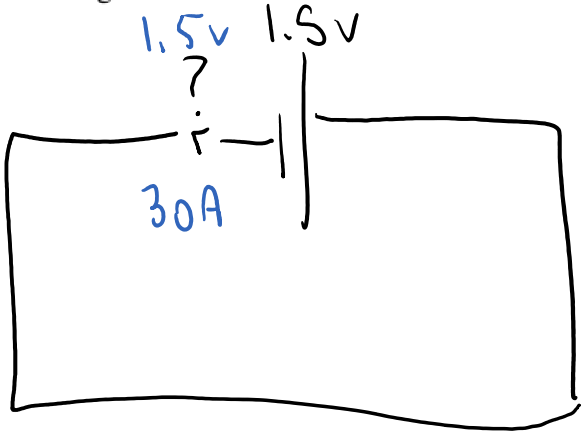


$R_T = 7.8\,\Omega$

$I_T = \frac{6}{7.8} = .7692\ A$

$V_{term} = 6 - Ir = 6 - .7692(.6) = 5.54\ V$

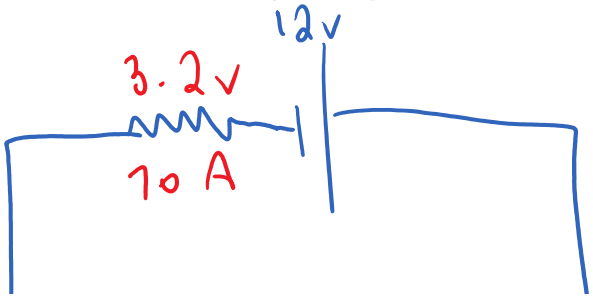
3. A 1.5 V dry cell is short circuited and produces a maximum current of 30. A. At this current, the terminal voltage is zero. What is the internal resistance of the cell? (0.050 Ω)



$r = \frac{V}{I} = \frac{1.5}{30}$

$r = 0.050\,\Omega$

4. A 12.0 volt cell has 8.8 V terminal voltage when it is providing 70.A of current. What is the internal resistance of the cell? (0.045Ω)



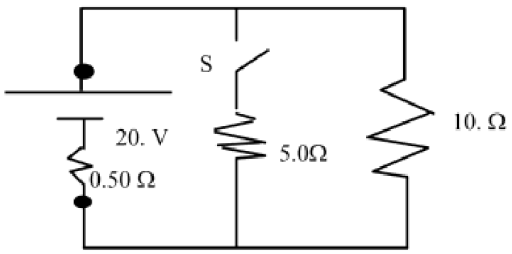
$12 - 8.8 = 3.2\ V$

$r = \frac{V}{I} = \frac{3.2}{70} = 0.046\,\Omega$

$r = \frac{V}{I} = \frac{3.2}{70} = 0.046\,\Omega$

7. find the total current in this circuit when the switch(S) is

a) open b) closed (1.9 A; 5.2 A)



a) $R_T = 10 + .5 = 10.5\,\Omega$

$I_T = \frac{20}{10.5} = 1.9\ A$

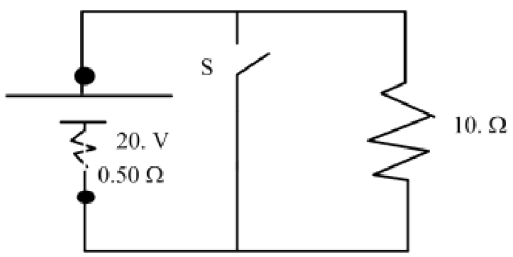
b) $\frac{1}{R_{//}} = \frac{1}{5} + \frac{1}{10} \rightarrow R_{//} = 3.33\,\Omega$

$R_T = 3.3 + .5 = 3.83\,\Omega$

$I_T = \frac{20}{3.83} = 5.2\ A$

8. find the total current in this circuit when the switch(S) is

a) open b) closed (1.9 A; 40. A)



a) $R_T = 10 + .5 = 10.5$

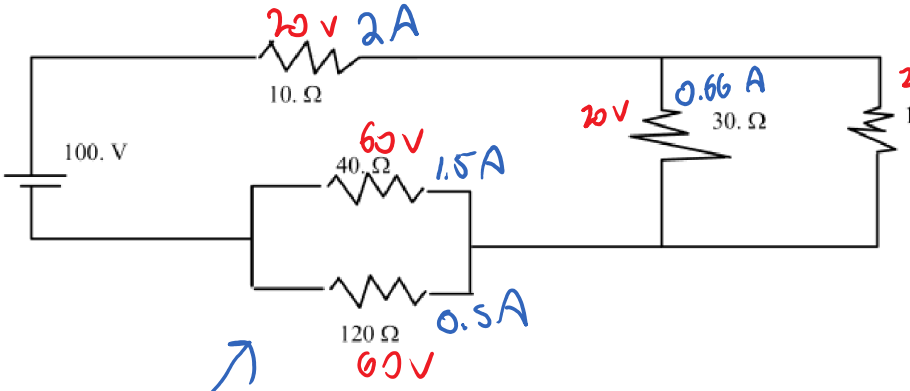
$I_T = \frac{20}{10.5} = 1.9\ A$

b) $R_T = .5\,\Omega$

$I_T = \frac{20}{15} = 4.0\ A$

9) Find R_t and I_t then all voltages and currents

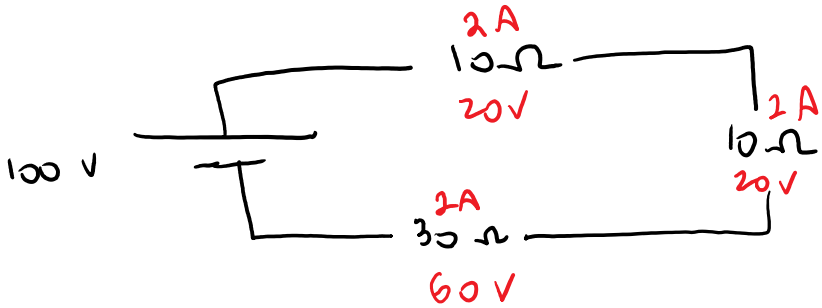
(50Ω,2.0A; 20.V,2.0A; 20V,0.67A; 20.V,1.3A; 60.V,1.5A; 60.V,0.50 A)



$\frac{1}{R_{//}} = \frac{1}{30} + \frac{1}{15}$

$R_{//} = 10\ \Omega$

$\frac{1}{R_{//}} = \frac{1}{40} + \frac{1}{120} \rightarrow R_{//} = 30\ \Omega$



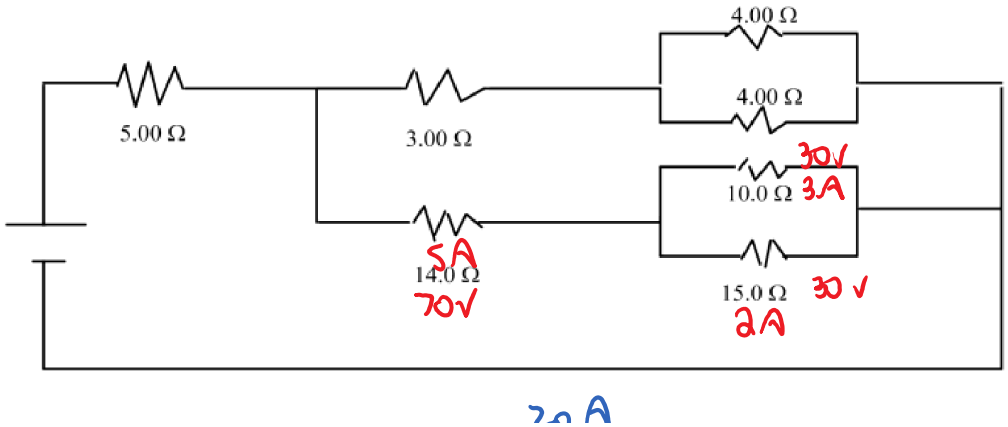
$R_T = 10 + 10 + 30 = 50\ \Omega$

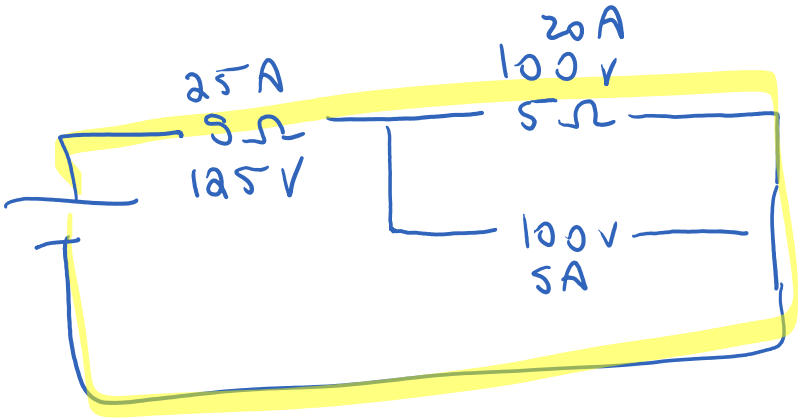
$I_T = \frac{100}{50} = 2\ A$

10) Find the cell voltage given that 2.00A flows through the 15.0Ω. (225V)

$\frac{1}{R_{//}} = \frac{1}{4} + \frac{1}{4}$

$R_{//} = 2\ \Omega$

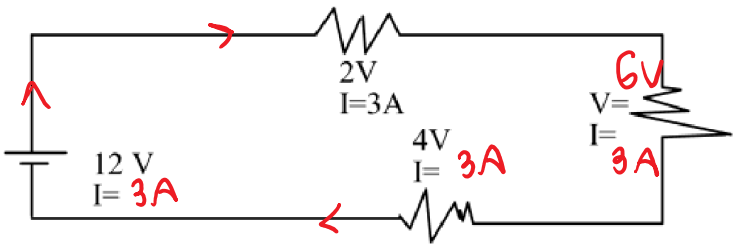




$V_T = 125 + 100$

$= 225\ V$

11. Find the unknown voltage drops and currents



(3A; 6V 3A; 3A)

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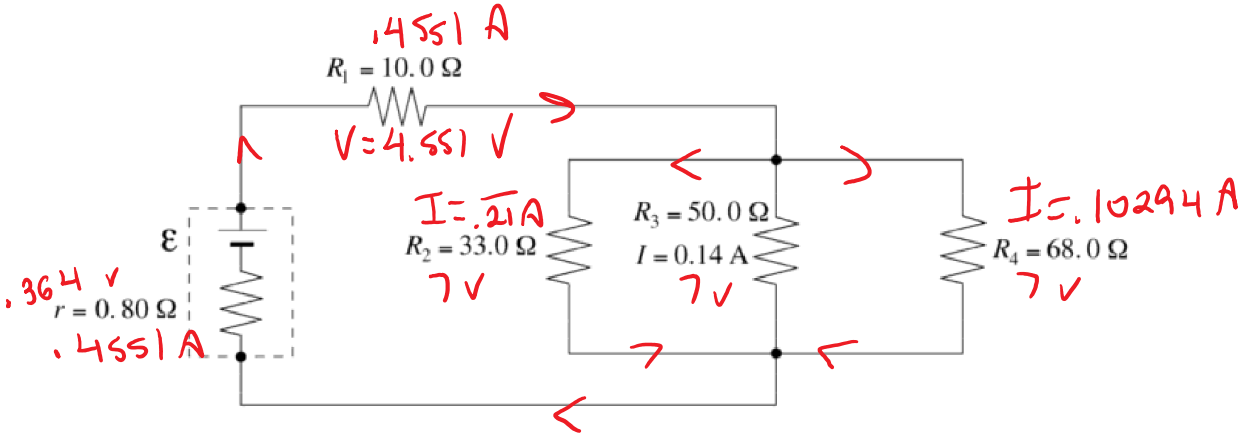
The current through the 50.0 Ω resistor in the circuit below is 0.14 A.



a) Determine the emf of the battery. **(5 marks)**

b) Determine the power dissipated in the battery's internal resistance. **(2 marks)**

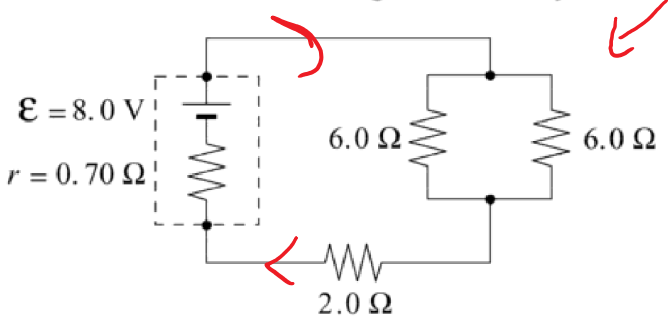
$I_T = .4551$ A

a) $\mathcal{E} = 4.551 + 7 + .364 = 11.9$ V

b) $P = VI = (.364)(.4551) = 0.166$ W

14.

In the following circuit, what is the terminal voltage of the battery?



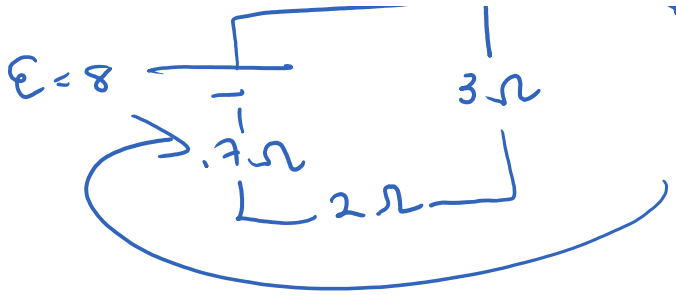
$\frac{1}{R_{//}} = \frac{1}{6} + \frac{1}{6}$

$R_{//} = 3\ \Omega$

A. 6.9 V
B. 7.0 V
C. 8.0 V
D. 9.0 V

$R_T = 3 + 2 + .7$
$= 5.7\ \Omega$

C. 8.0 V
D. 9.0 V



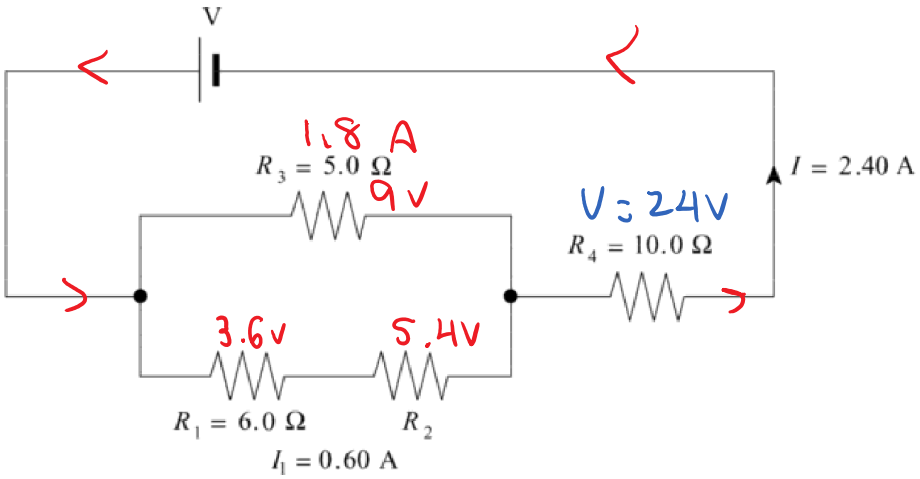
$R_T = 5.7\ \Omega$

$I_T = \frac{8}{5.7} = 1.403\ A$

$V_T = 8 - Ir = 8 - 1.403(.7) = 7.02\ V$

15.

a) Find the value of resistor R_2. **(5 marks)**



b) Find the potential difference of the power supply, V. **(2 marks)**

a) $R_T = \frac{5.4}{.6} = 9\Omega$

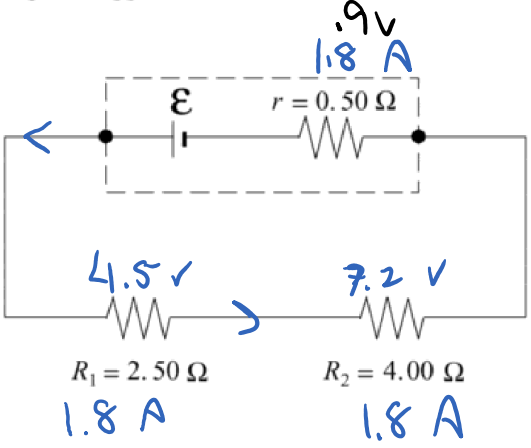
b) $V = 9 + 24 = 33\ V$

16.

The cell shown in the diagram supplies a 1.80 A current to the resistors R_1 and R_2.

9V

The cell shown in the diagram supplies a 1.80 A current to the resistors R_1 and R_2.



a) What is the terminal voltage of the cell? **(3 marks)**

b) What is the emf of the cell? **(4 marks)**

a) $V_T = 4.5 + 7.2 = 11.6$ V

b) $\mathcal{E} = 11.6 + .9 = 12.5$ V

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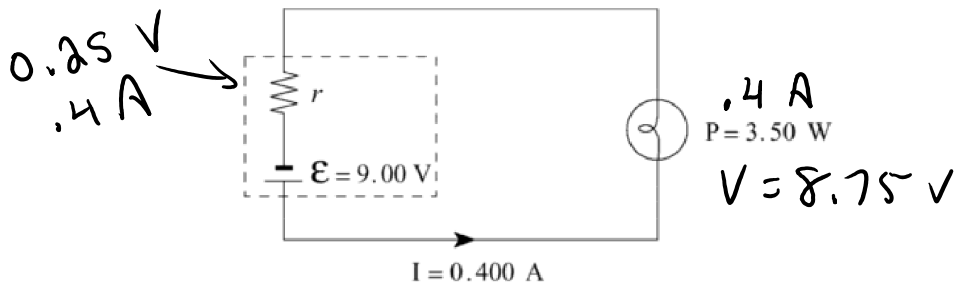
The circuit shown in the diagram below consists of a 9.00 V battery and a 3.50 W light bulb.

$P = VI$



a) If a current of 0.400 A leaves the battery, what is the internal resistance, r, of the battery? **(5 marks)**

$r = \frac{V}{I} = \frac{.25}{.4} = 0.625\ \Omega$