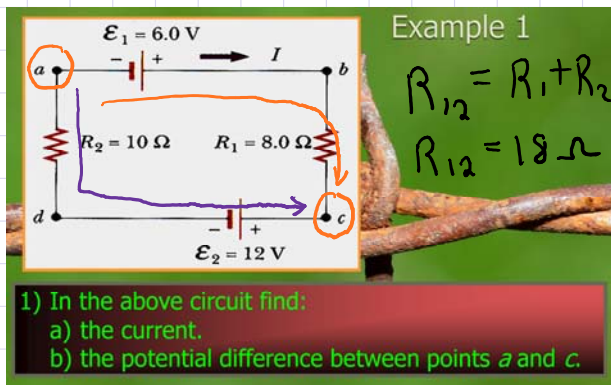


Example 1

Sunday, March 30, 2014

4:03 PM



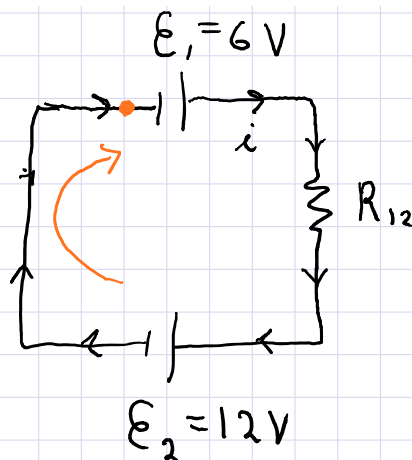
b) a to c

$$V_a + E_1 - i R_1 = V_c$$

$$V_c - V_a = E_1 - i R_1$$

$$V_{ca} = 6V - (-.33A)(8\Omega)$$

$$V_{ca} = 8.64V$$



$$E_1 - i R_{12} - E_2 = 0$$

$$i = \frac{E_1 - E_2}{R_{12}}$$

$$i = \frac{6V - 12V}{18\Omega}$$

$$i = \frac{-6V}{18\Omega}$$

$$i = -.33A$$

a to c

$$V_a + i R_2 + E_2 = V_c$$

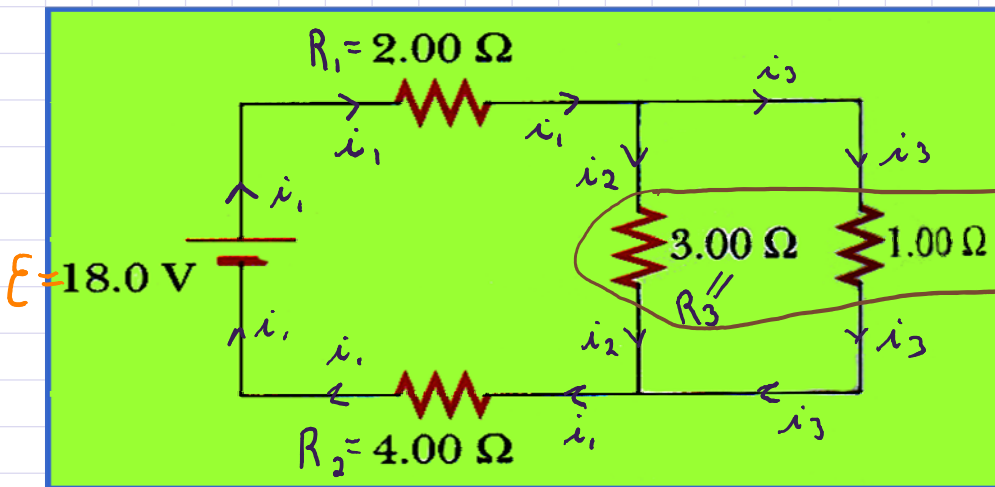
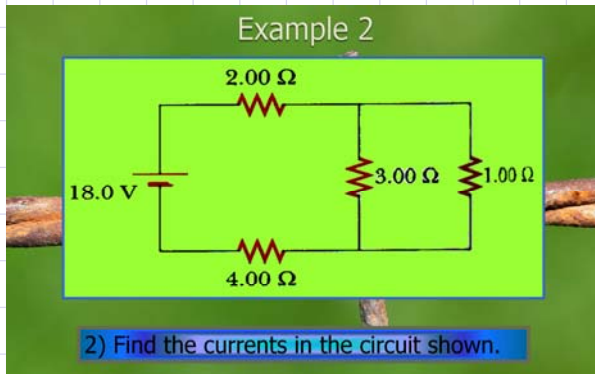
$$V_c - V_a = i R_2 + E_2$$

$$V_{ca} = (-.33A)(10\Omega) + 12V$$

$$V_{ca} = 8.64V$$

Example 2

Monday, March 31, 2014 7:57 AM



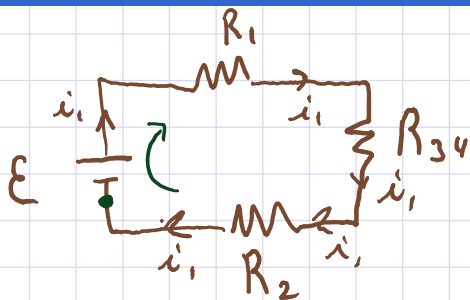
$$\frac{1}{R_{34}} = \frac{1}{R_3} + \frac{1}{R_4}$$

$$\frac{1}{R_{34}} = \frac{1}{3\Omega} + \frac{1}{1\Omega}$$

$$\frac{1}{R_{34}} = \frac{1}{3\Omega} + \frac{3}{3\Omega}$$

$$\frac{1}{R_{34}} = \frac{4}{3\Omega}$$

$$R_{34} = \frac{3}{4}\Omega$$



$$E - i_1 R_1 - i_1 R_{34} - i_1 R_2 = 0$$

$$E - i_1 (R_1 + R_{34} + R_2) = 0$$

$$i_1 = \frac{E}{R_1 + R_{34} + R_2}$$

$$i_1 = \frac{18V}{2\Omega + \frac{3}{4}\Omega + 4\Omega}$$

$$i_1 = 2.67 A$$

$$V_{34} = i_1 R_{34}$$

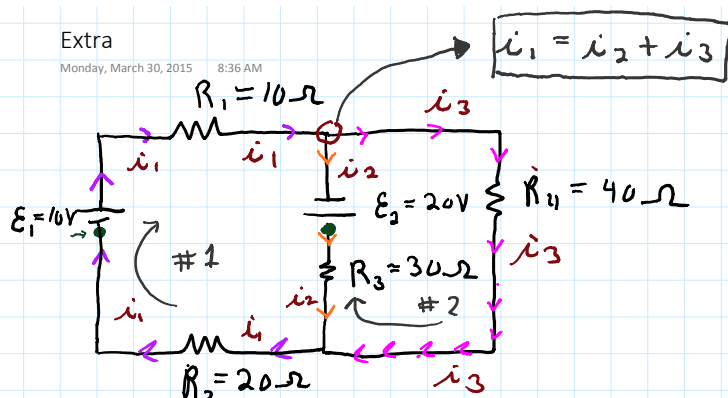
$$V_{34} = (2.67 A) \left(\frac{3}{4}\Omega\right)$$

$$V_{34} = 2 V$$

$$V_3 = V_4 = 2 V$$

$$i_3 = \frac{V_4}{R_4} = \frac{2V}{1\Omega} = 2 A$$

$$i_2 = \frac{V_3}{R_3} = \frac{2V}{3\Omega} = .667 A$$



Loop #1

$$E_1 - i_1 R_1 + E_2 - i_2 R_3 - i_1 R_2 = 0$$

$$E_2 + E_1 - i_1 (R_1 + R_2) - i_2 R_3 = 0$$

$$E_2 + E_1 - (i_2 + i_3) (R_1 + R_2) - i_2 R_3 = 0$$

$$E_2 + E_1 - i_2 (R_1 + R_2 + R_3) - i_3 (R_1 + R_2) = 0$$

$$E_2 + E_1 - i_2 (R_1 + R_2 + R_3) - \left[-\frac{E_2}{R_4} + i_2 \frac{R_3}{R_4} \right] (R_1 + R_2) = 0$$

$$-i_2 \left[R_1 + R_2 + R_3 + \frac{R_3}{R_4} (R_1 + R_2) \right] + E_2 + E_1 + \frac{E_2}{R_4} (R_1 + R_2) = 0$$

$$i_2 = \frac{E_2 + E_1 + \frac{E_2}{R_4} (R_1 + R_2)}{R_1 + R_2 + R_3 + \frac{R_3}{R_4} (R_1 + R_2)}$$

$$i_2 = \frac{20V + 10V + \frac{20V}{40\Omega} (30\Omega)}{10\Omega + 20\Omega + 30\Omega + \frac{30\Omega}{40\Omega} (30\Omega)} = \frac{30V + \frac{1}{2}\Omega (30\Omega)}{60\Omega + \frac{3\Omega}{4}\Omega (30\Omega)}$$

$$i_2 = .545 A$$

Loop #2

$$-E_2 - i_3 R_4 + i_2 R_3 = 0$$

$$i_3 = -\frac{E_2}{R_4} + i_2 \frac{R_3}{R_4}$$

$$i_3 = -\frac{20V}{40\Omega} + (.545A) \frac{(30\Omega)}{(40\Omega)}$$

$$i_3 = -.09125 A$$

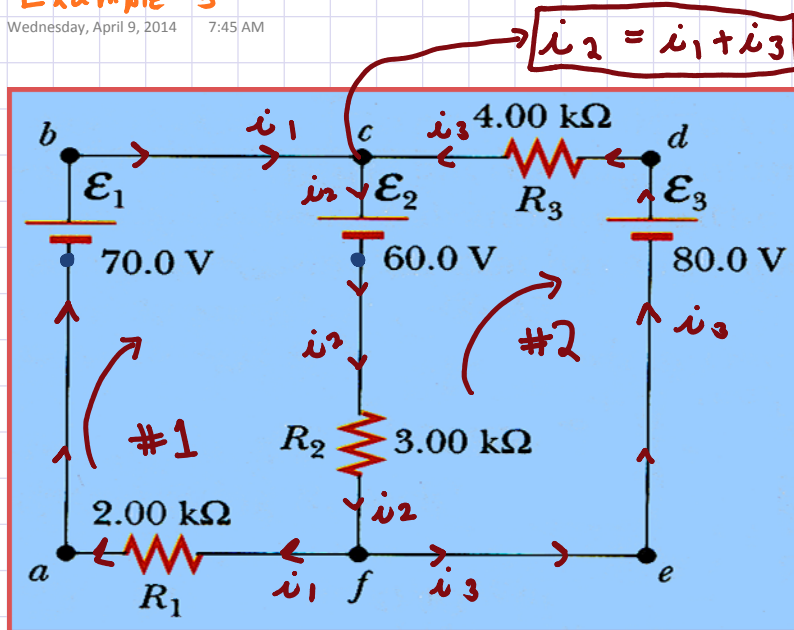
$$i_1 = i_2 + i_3$$

$$i_1 = .545 A - .09125 A$$

$$i_1 = .453 A$$

Example 3

Wednesday, April 9, 2014 7:45 AM



$$i_1 = i_2 - i_3$$

Loop #1

$$E_1 - E_2 - i_2 R_2 - i_1 R_1 = 0$$

$$E_1 - E_2 - i_2 R_2 - (i_2 - i_3) R_1 = 0$$

$$E_1 - E_2 + i_3 R_1 - i_2 (R_2 + R_1) = 0$$

Loop #2

$$E_2 + i_3 R_3 - E_3 + i_2 R_2 = 0$$

$$E_2 - E_3 + i_3 R_3 + i_2 R_2 = 0$$

$$i_3 = \frac{E_3 - E_2 - i_2 R_2}{R_3}$$

$$i_3 = \frac{E_3 - E_2}{R_3} - i_2 \frac{R_2}{R_3}$$

$$E_1 - E_2 + \left[\frac{E_3 - E_2}{R_3} - i_2 \frac{R_2}{R_3} \right] R_1 - i_2 (R_2 + R_1) = 0$$

$$-i_2 \left[\frac{R_2 R_1}{R_3} + R_2 + R_1 \right] + E_1 - E_2 + \frac{E_3 - E_2}{R_3} R_1 = 0$$

$$i_2 \left[\frac{R_2 R_1}{R_3} + R_2 + R_1 \right] = E_1 - E_2 + \frac{E_3 - E_2}{R_3} R_1$$

$$i_2 = \frac{E_1 - E_2 + \frac{E_3 - E_2}{R_3} R_1}{\frac{R_2 R_1}{R_3} + R_2 + R_1} = \frac{70V - 60V + \frac{80V - 60V}{4000\Omega} (2000\Omega)}{\frac{(3000\Omega)(2000\Omega)}{4000\Omega} + 3000\Omega + 2000\Omega}$$

$$i_2 = .003 A$$

$$i_3 = \frac{E_3 - E_2}{R_3} - i_2 \frac{R_2}{R_3}$$

$$i_3 = \frac{80V - 60V}{4000\Omega} - (.003A) \frac{3000\Omega}{4000\Omega}$$

$$i_3 = .0027 A$$

$$i_1 = i_2 - i_3$$

$$i_1 = .003A - .0027A$$

$$i_1 = .0003 A$$