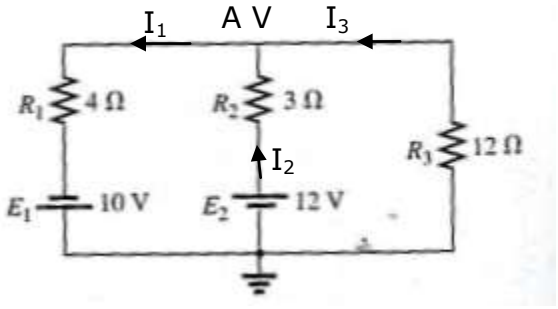
Q- Find current through all resistances in the given network.



Let the current in the loops are I_1 and I_2 as in the figure and the potential at node A be V.

Using Ohms law we can write the equations for the current in the three resistors we get (the potential of the grounded portion is zero)

$V - (-E_1) = I_1R_1$ (E1 is connected with opposite polarity)

Or $V + 10 = I_1*4$

Or $I_1 = (V + 10)/4$ ---------- (1)

$E_2 - V = I_2R_2$

Or $12 - V = I_2*3$

Or $I_2 = (12 - V)/3$ ---------- (2)

And

$0 - V = I_3R_3$

Or $I_3 = -V/12$ ---------- (3)

And as at node A

$I_2 + I_3 - I_1 = 0$

Substituting the values of currents from equations 1, 2 and 3 in above equation we get

$\frac{12-V}{3} - \frac{V}{12} - \frac{V+10}{4} = 0$

Gives 48 – 4V –V - 3V - 30 = 0

Or V = 9/4 = 2.25 volt

Substituting in equation 1 we get

$I_1 = 12.25/4 = 3.0625$ A

And from equation 2 we get

$I_2 = (12 - 2.25)/3 = 3.25$ A

And $I_3 = - 2.25/12 = - 0.1875$ A

Hence current through R_1 is I_1 = **3.0625 A**

Current through R_2 is I_2 = **3.25 A**

And current through R_3 is I_3 = **- 0.1875 A**

(Negative means opposite to the direction indicated in the figure)