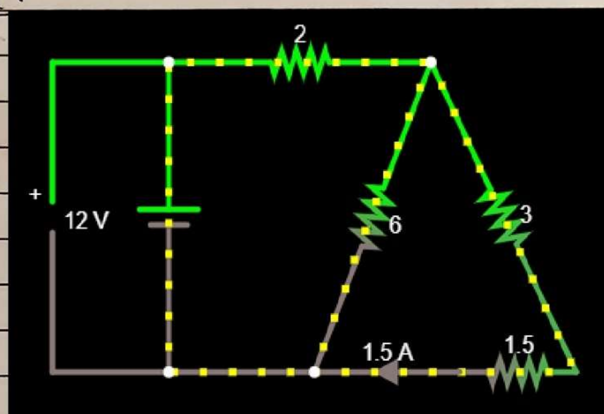
EXPERIMENT : No. 6 Verification of Nortons Theorem.

Page No. Date

Q.) Find the Nortons Equivalent for the below circuit. about 1.5 Ω resistor

Circuit:-



- Now removing 1.5 Ω resistor and finding Norton's current ~~at~~ as shown.

First finding R_{net}

$$R_{net} = 2 + \frac{3 \times 6}{9} = 4\,\Omega$$

$$V = IR$$

$$12 = (I) \times 4$$

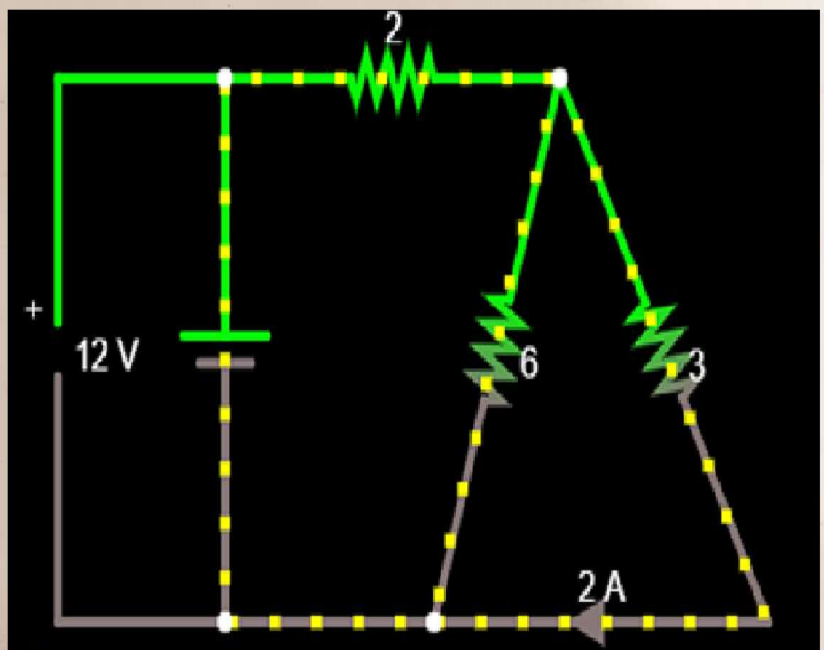
$$I = 3A$$

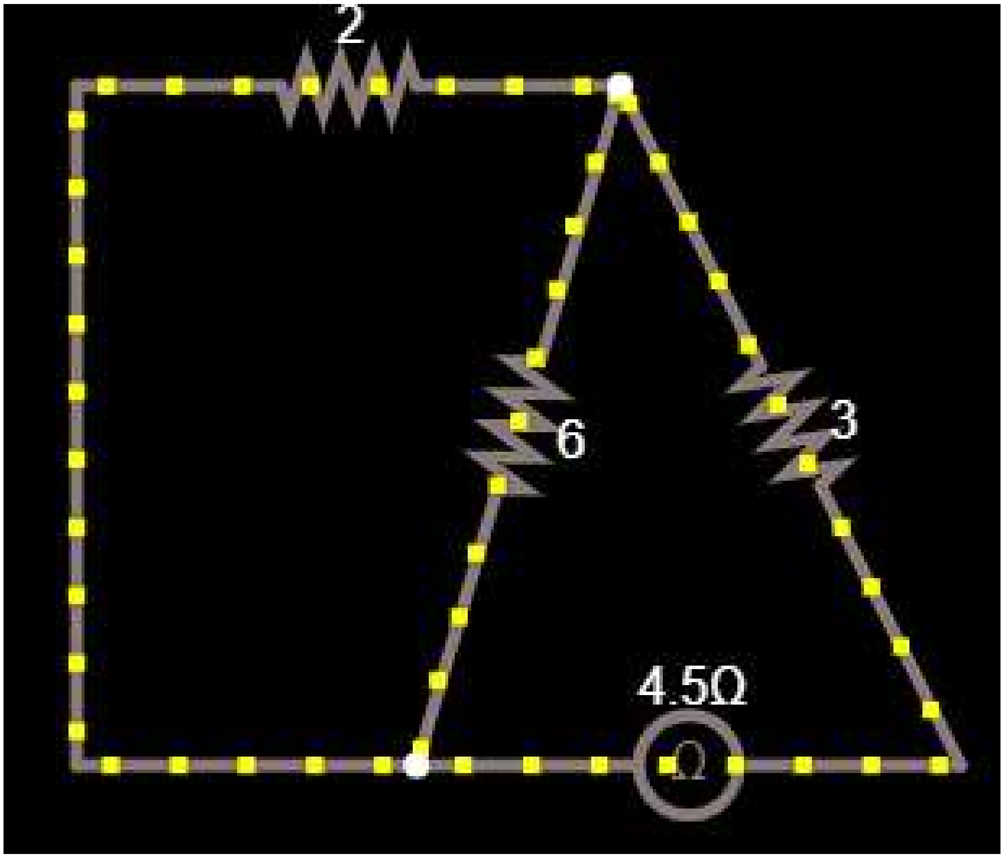
Applying current division,

$$I_3 = \frac{6 \times 3}{6+3} = 2A$$

$$I_3 = I_{N_0} = 2A$$

Which is quite evident as seen in the simulation




2
6
3
4.5Ω
Ω

EXPERIMENT : No. Page No. Date

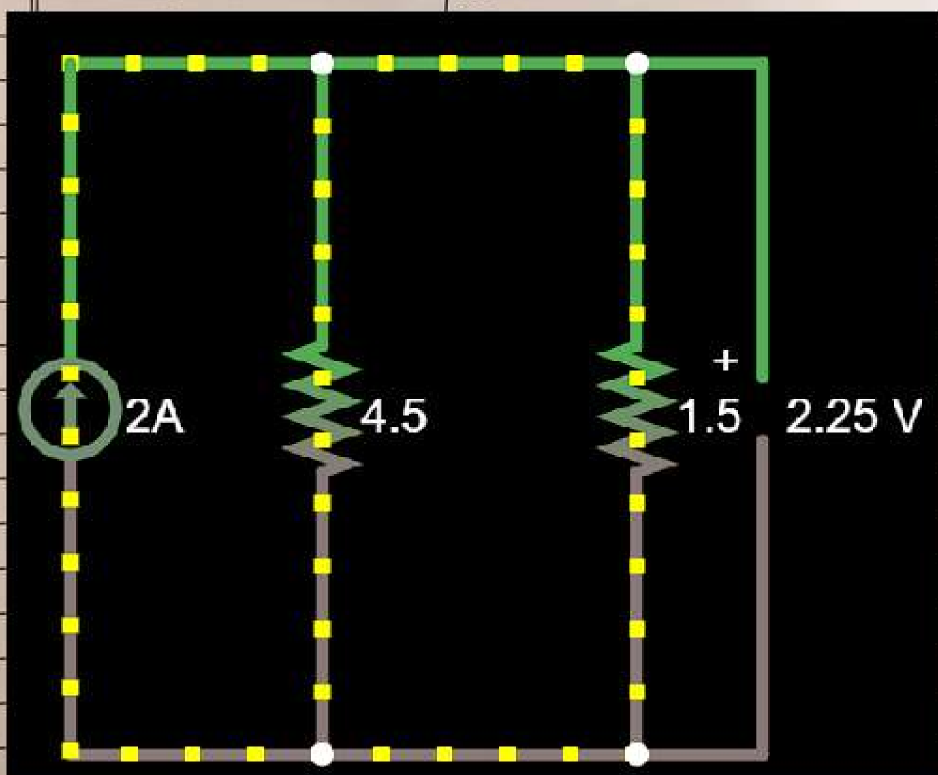
Computing R_{No} :-

Short the voltage source.

$$R_{No} = 3 + \frac{2 \times 6}{8} = 3 + 1.5 = 4.5\,\Omega$$

Thus $R_{No} = 4.5\,\Omega$.

Thus Nortons equivalent circuit is:-



Teacher's Sign. :

EXPERIMENT : No. 6 Verification of Norton's Theorem using (Dependent sources)

Page No.

Date

Using Nortons theorem find Norton's equivalent circuit about 'a-b'.

→ To find Voc (V_{AB})

Applying KCL at node Z

$$2i_x + i_x = i_1 - 8$$

$$3i_x - i_1 = -8 \quad \text{—} ①$$

KVL in loop AZBCA

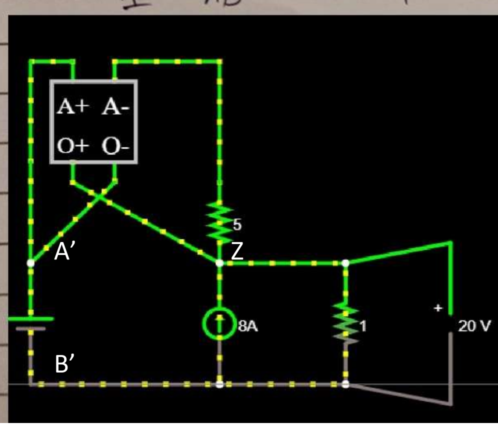
$$5i_x + 1i_1 = 40$$

$$5i_x + i_1 = 40 \quad \text{—} ②$$

On solving both equations, we get

$$i_x = 4A \quad \& \quad i_1 = 20A.$$

$$V_1 = V_{AB} = 1 \times i_1 = 1 \times 20 = 20V$$



EXPERIMENT : No. Page No. Date

Finding 'i_{Th}' short the open terminal.

Applying KVL

$$-40 + 5i_x = 0$$

$$i_x = 8$$

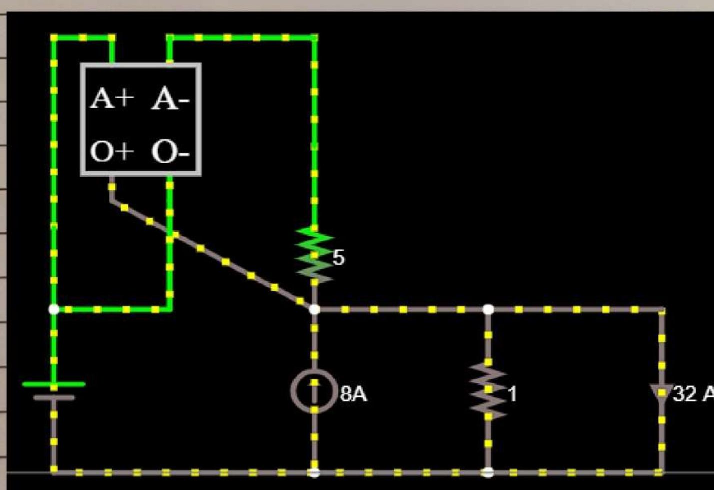
We can remove 1Ω resistance as it is shorted.

KCL at Z

$$3i_x = -8 + i_{Th}$$

$$i_{Th} = 32A$$

$$R_{Th} = \frac{V_{oc}}{I_{Th}} = \frac{20}{32} = 0.625\Omega$$



NORTON’S EQUIVALENT CIRCUIT