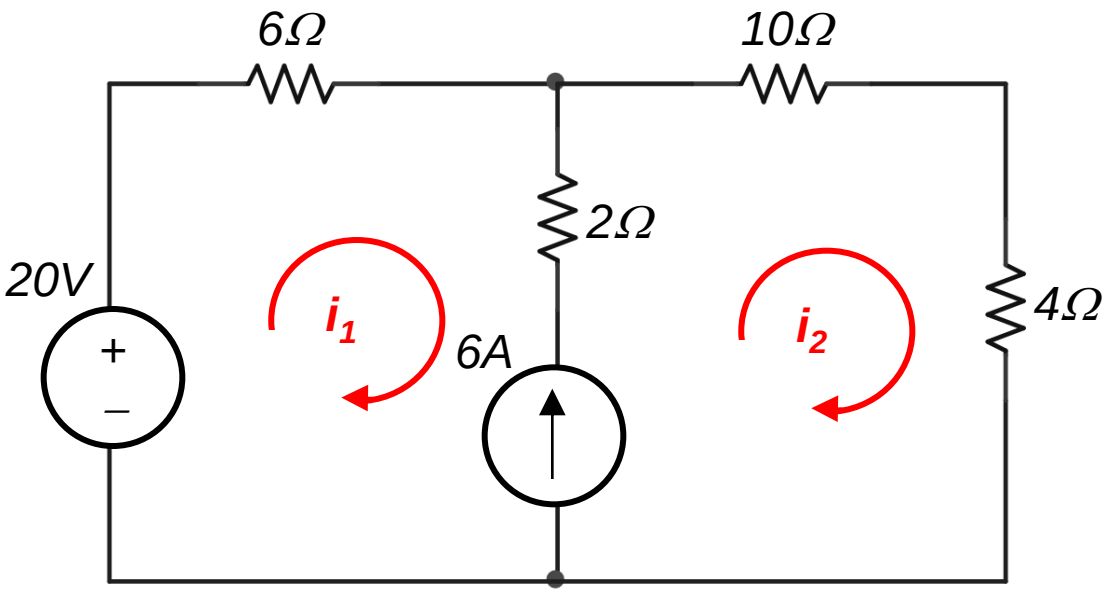
METHODS OF ANALYSIS

- Nodal analysis
- Mesh Analysis

Mesh Analysis 2

Supermesh



Solve the mesh currents

Step 1

Assign mesh currents to the meshes

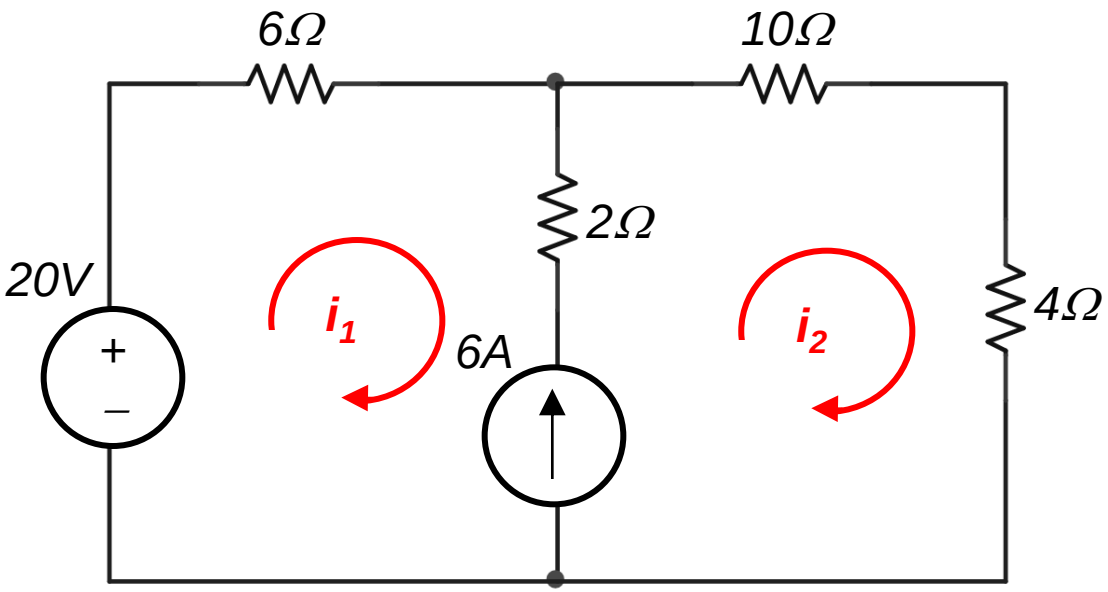
Step 2

For every mesh, apply KVL – Using Ohm's law, write down the equations in terms of mesh currents

We cannot write equation for the meshes since we cannot write the voltage drop across the 6A source in terms of mesh currents!

Mesh Analysis 2

Supermesh



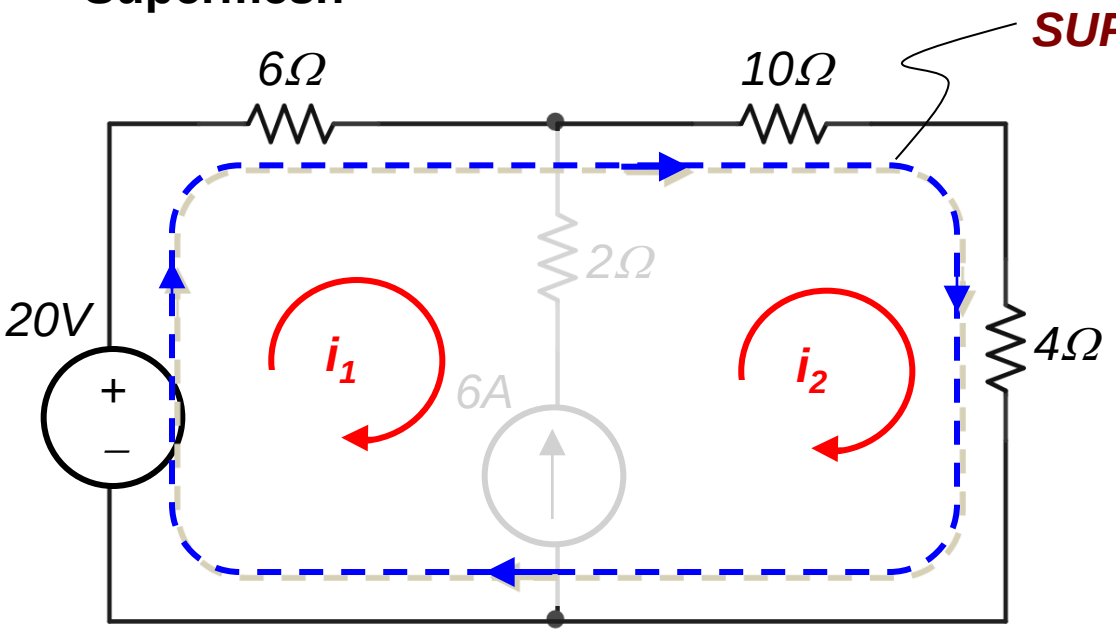
Solve the mesh currents

*We form a **supermesh** by EXCLUDING the branch containing the current source and elements connected in series with it*

We cannot write equation for the meshes since we cannot write the voltage drop across the 6A source in terms of mesh currents!

Mesh Analysis 2

Supermesh



Solve the mesh currents

We cannot write equation for the meshes since we cannot write the voltage drop across the 6A source in terms of mesh currents!

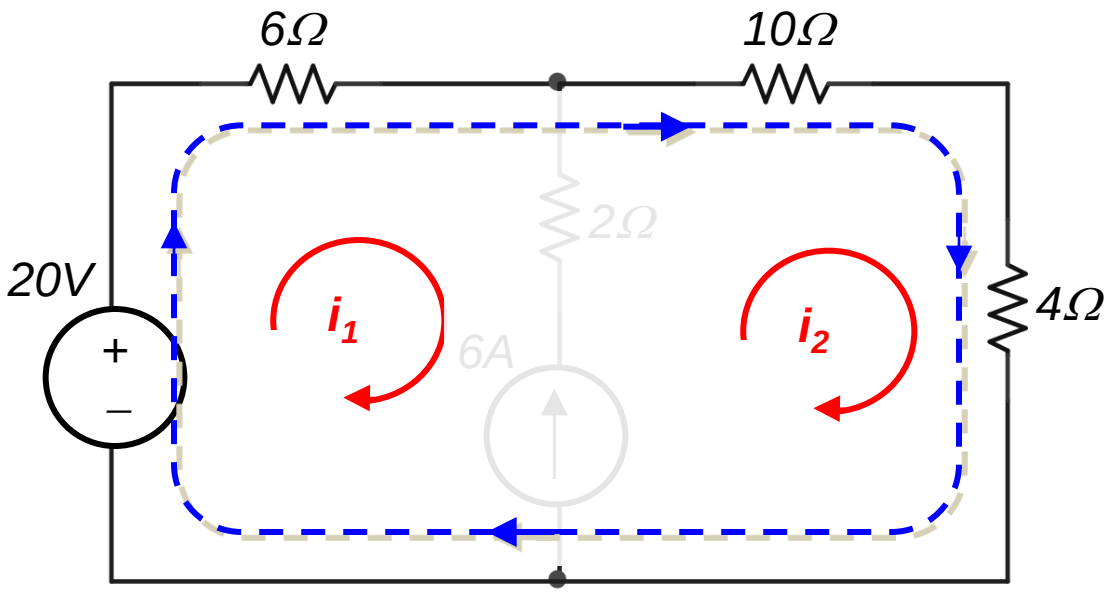
*We form a **supermesh** by EXCLUDING the branch containing the current source and elements connected in series with it*

*KVL for the **supermesh :***

$$-20 + 6i_1 + 10i_2 + 4i_2 = 0$$

Mesh Analysis 2

Supermesh



Solve the mesh currents

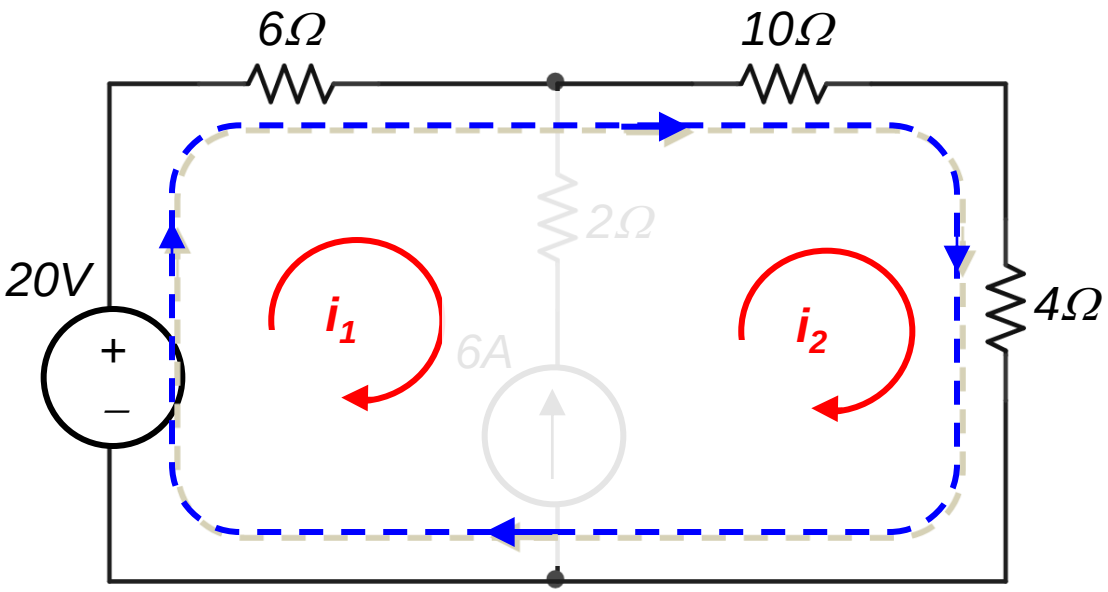
Since we have combined meshes 1 and 2, we lost one equation. We need one more equation to solve the mesh current

We obtain the extra equation by using KCL on the branch current that we have removed.

$$-20 + 6i_2 + 10i_2 + 4i_2 = 0$$

Mesh Analysis 2

Supermesh



Solve the mesh currents

Step 3

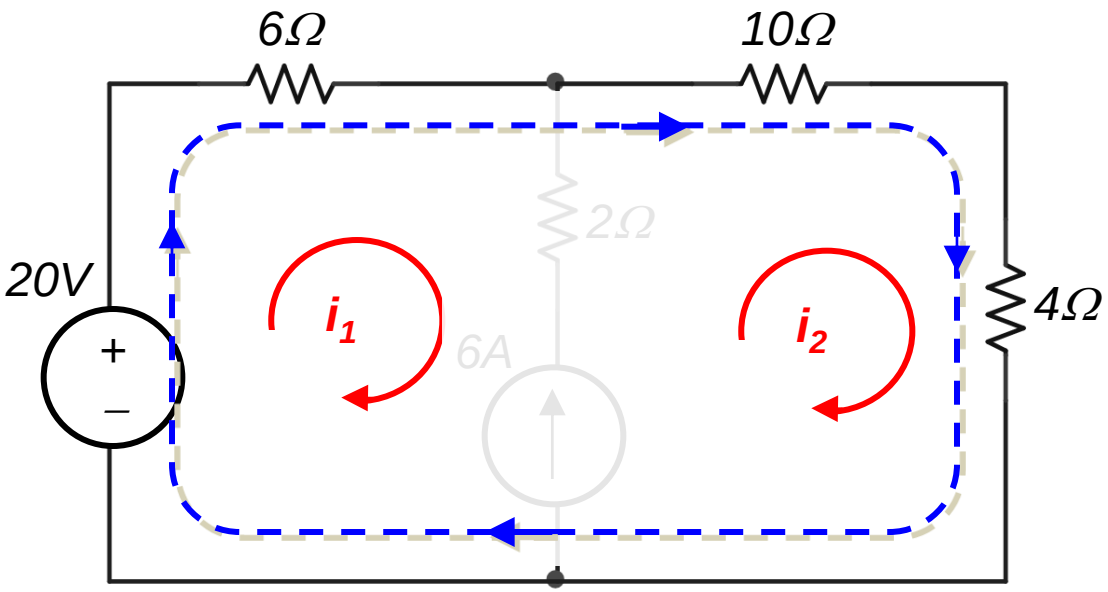
Solve mesh currents in equations obtained in step 2, simultaneously

$$-20 + 6i_1 + 10i_2 + 4i_2 = 0$$

$$i_2 - i_1 = 6$$

Mesh Analysis 2

Supermesh



Solve the mesh currents

Step 3

Solve mesh currents in equations obtained in step 2, simultaneously

$$-20 + 6i_1 + 10i_2 + 4i_2 = 0$$

$$i_2 - i_1 = 6$$

$$i_1 = -3.2 \text{ A}, \quad i_2 = 2.8 \text{ A}$$

Mesh Analysis 2

Supermesh

To summarize ….

*We form a **supermesh** when there is a current source in a branch sharing 2 mesh currents*

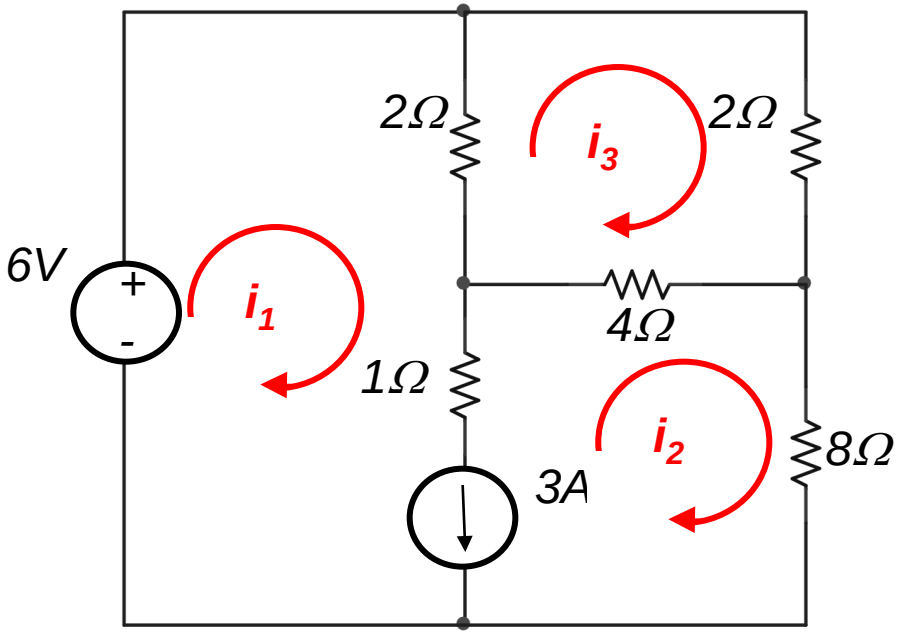
Supermesh has no current of its own.

To solve the mesh currents, we need extra equation which can be obtained by applying KCL in the branch containing the current source.

Mesh Analysis 2

Supermesh

Example 2



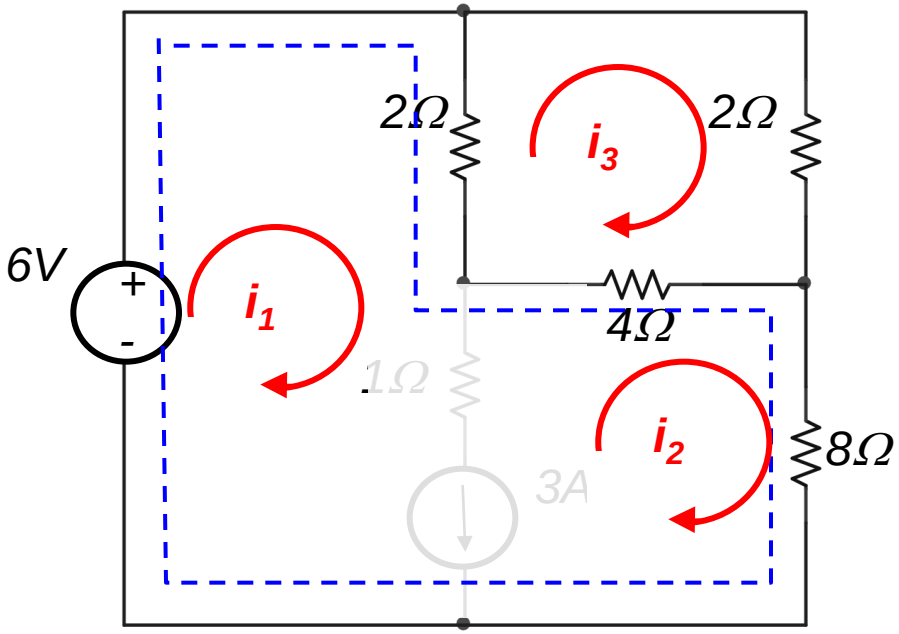
Step 1

Assign mesh currents to the meshes

Mesh Analysis 2

Supermesh

Example 2



Step 2

For every mesh, apply KVL – Using Ohm's law, write down the equations in terms of mesh currents

Step 3

Solve mesh currents in equations obtained in step 2, simultaneously