Last Class…

Finish super-mesh example.

THE OHIO STATE UNIVERSITY

COLLEGE OF ENGINEERING

Node Voltage and Mesh Current Analysis Examples

This Lecture…

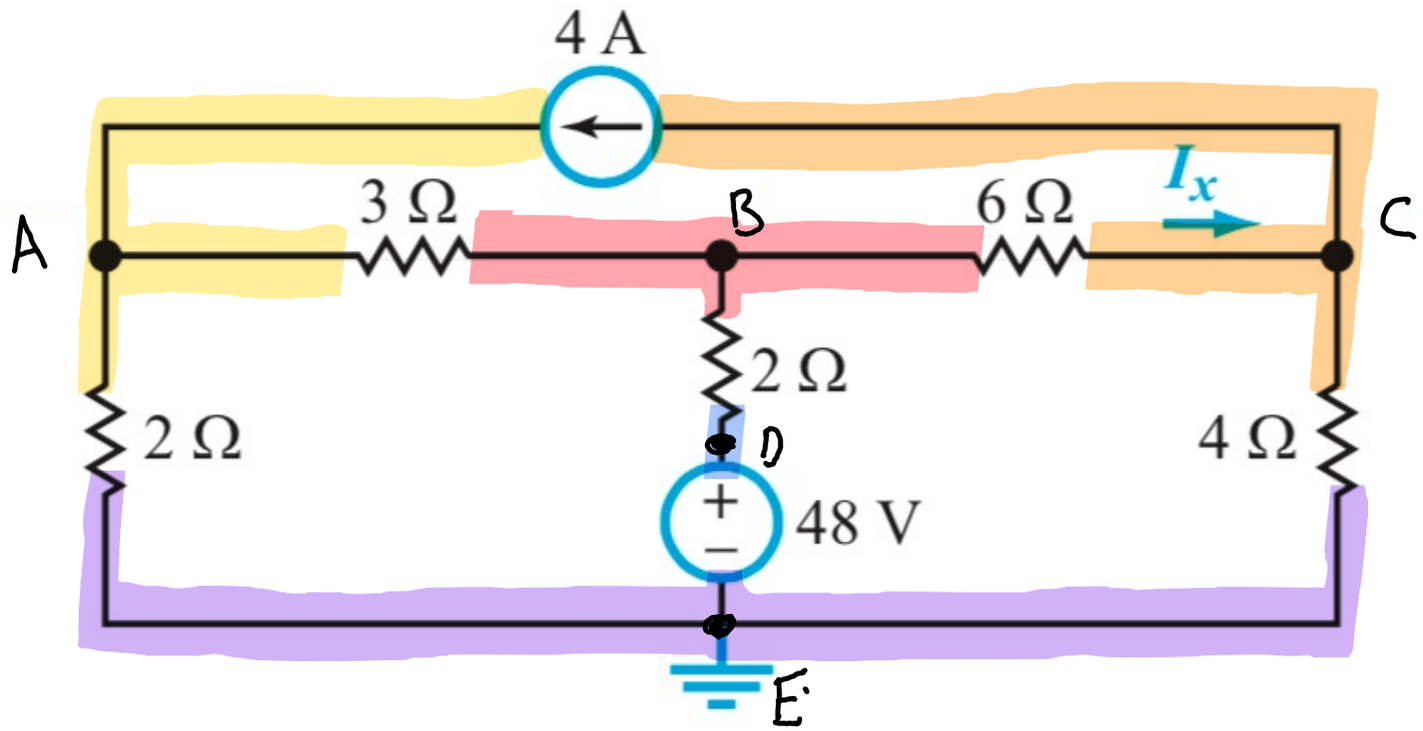
- Learning Objectives:
  - Apply the node-voltage and mesh current analysis technique to linear electric circuits.

Example 1

Apply nodal analysis to find node voltages in the circuit below and then determine I_X.

Step1 -> 5 nodes

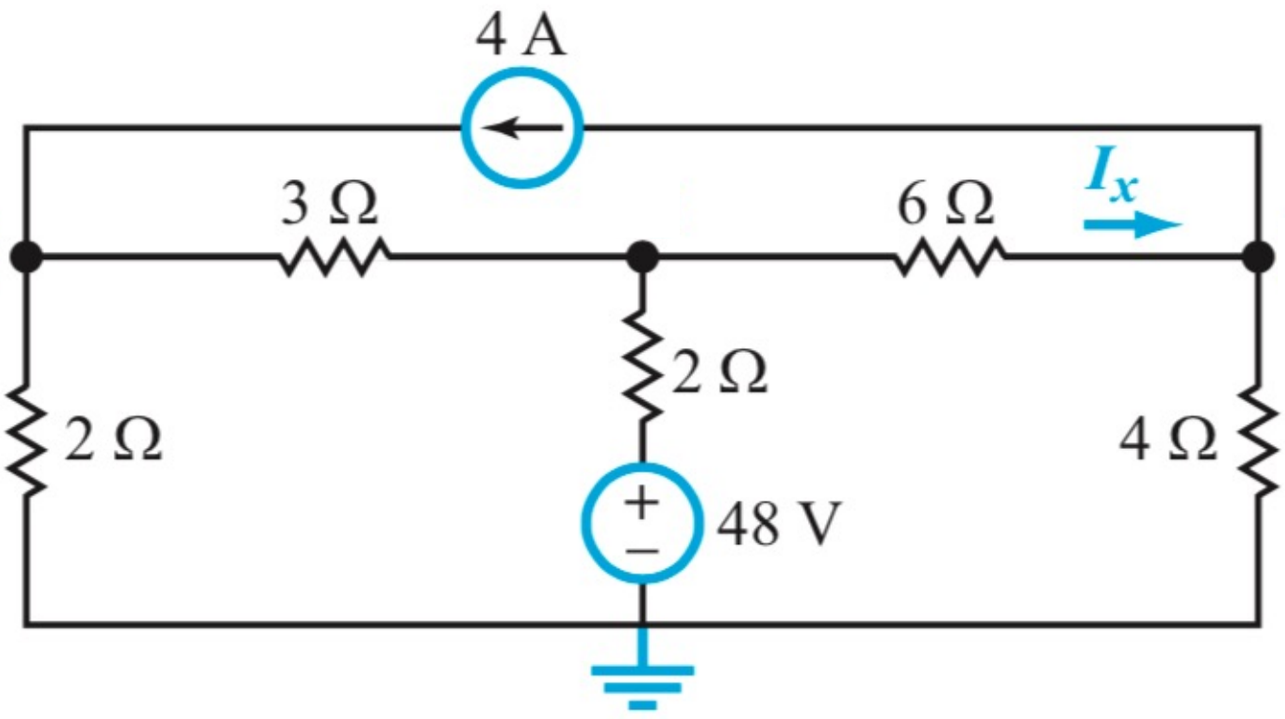
Step2 -> Choose ground



Example 1

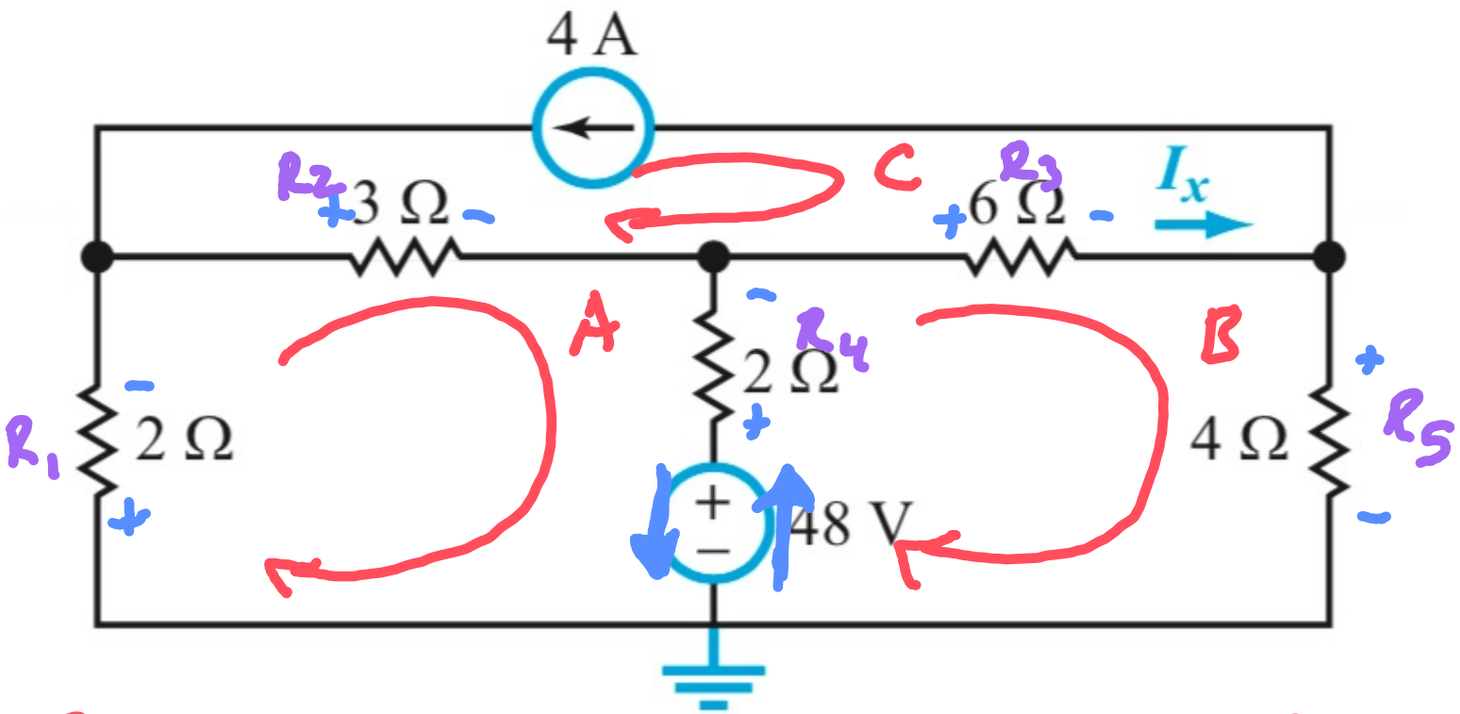
Example 1

Apply nodal analysis to find node voltages in the circuit below and then determine I_X.



Example 2

Apply mesh analysis to find mesh currents in the circuit below and then determine I_X.



Step 1 → 3 meshes

Step 2 → 1 mesh / 2 meshes

2 eqns

2 unknowns

KCL @ C:

$4 = i_3 + i_2$

Auxiliar Eqn:

$48 = V_A - V_B$

KCL @ Super-Mesh:

$i_1 + i_2 + i_3 + i_5 = 0$

$V_1 = V_A$

$V_2 = V_A - V_C$

$V_3 = V_B - V_C$

$V_4 = V_A - V_B$

$V_5 = V_B$

Ohm's Law

$$\frac{V_1}{2} + \frac{V_2}{3} + \frac{V_3}{6} + \frac{V_5}{4} = 0$$

KVL @ C:

$$4 = V_B - V_C + V_A - V_C$$

$$4 = V_A + V_B - 2V_C$$

KVL @ Super Mesh:

$$\frac{V_A}{2} + \frac{V_A - V_C}{3} + \frac{V_B - V_C}{6} + \frac{V_B}{4} = 0$$

$$\frac{5}{6}V_A - \frac{1}{2}V_C + \frac{5}{12}V_B = 0$$

$i_x = i_3$??? I'm lost

Example 2

Example 2

Apply mesh analysis to find mesh currents in the circuit below and then determine I_X.