Linear Circuits

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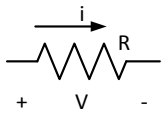
Module 2
Lesson 2: Kirchhoff's Current Law

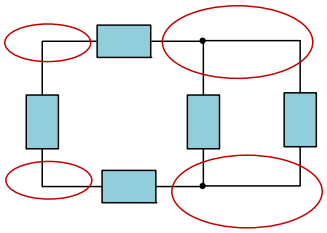
Kirchhoff's Current Law

Builds Upon:

- Ohm's Law (V=iR)



- Nodes

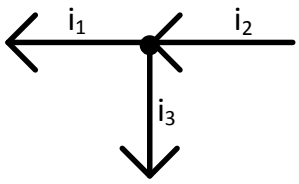


Kirchhoff's Current Law (KCL)

Sum of the currents leaving a node = sum of current entering the node

$$\sum i_{leaving} = \sum i_{entering}$$

$i_1 + i_3 = i_2$



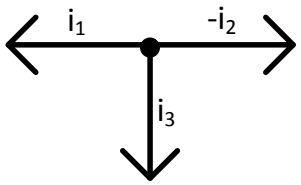
Kirchhoff's Current Law (KCL)

Sum of the currents leaving a node = sum of current entering the node

$$\sum i_{leaving} = \sum i_{entering}$$

$$i_1 + i_3 = i_2$$

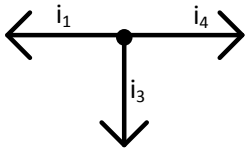
$$i_1 + i_3 - i_2 = 0$$



Kirchhoff's Current Law (KCL)

Sum of the currents leaving a node = zero

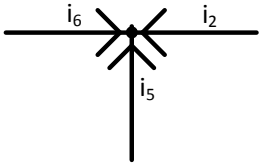
$$\sum i_{leaving} = 0$$



$$i_1 + i_2 + i_4 = 0$$

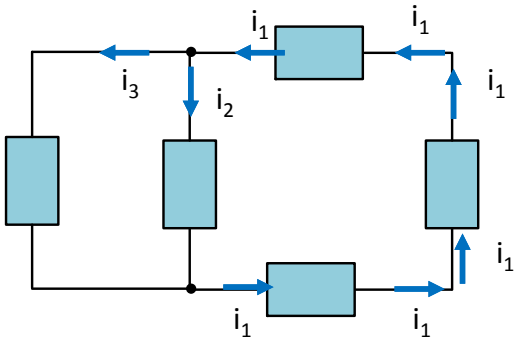
Sum of the currents entering a node = zero

$$\sum i_{entering} = 0$$



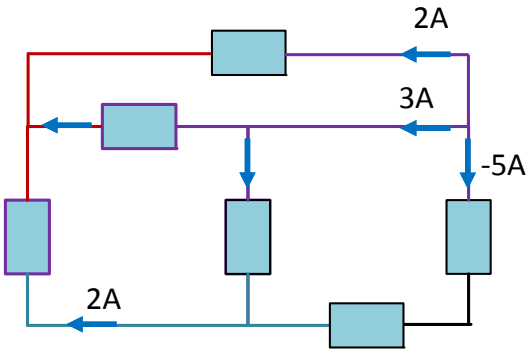
$$i_2 + i_5 + i_6 = 0$$

KCL For Series Elements



The current is the same through series elements.

KCL Example and Quiz

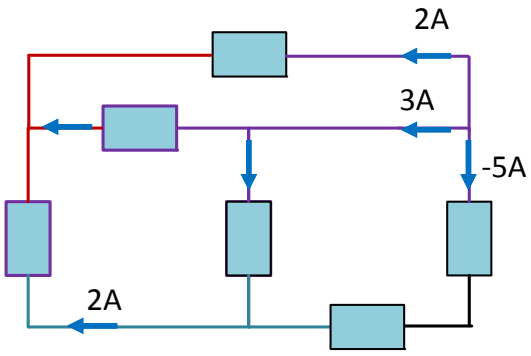


$$\sum i_{leaving} = 0$$

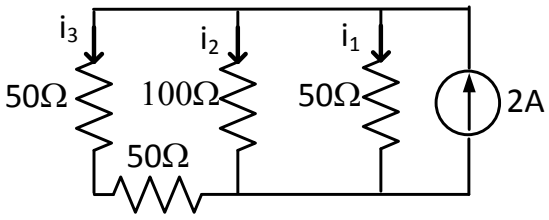
$$\sum i_{entering} = 0$$

$$\sum i_{leaving} = \sum i_{entering}$$

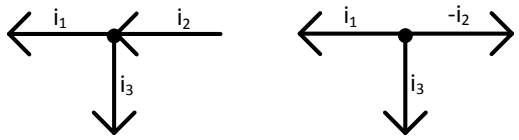
KCL Example and Quiz



KCL and KVL Example



Key Concepts

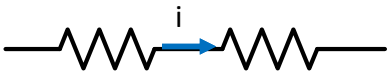
- 

- KCL:

$$\sum i_{leaving} = \sum i_{entering}$$

$$\sum i_{leaving} = 0 \qquad \sum i_{entering} = 0$$

- Series components have the same current



- Solve problems by combining KVL and KCL