

# Loop law

## Student Group

First Name	Surname	Matrikel Nr.

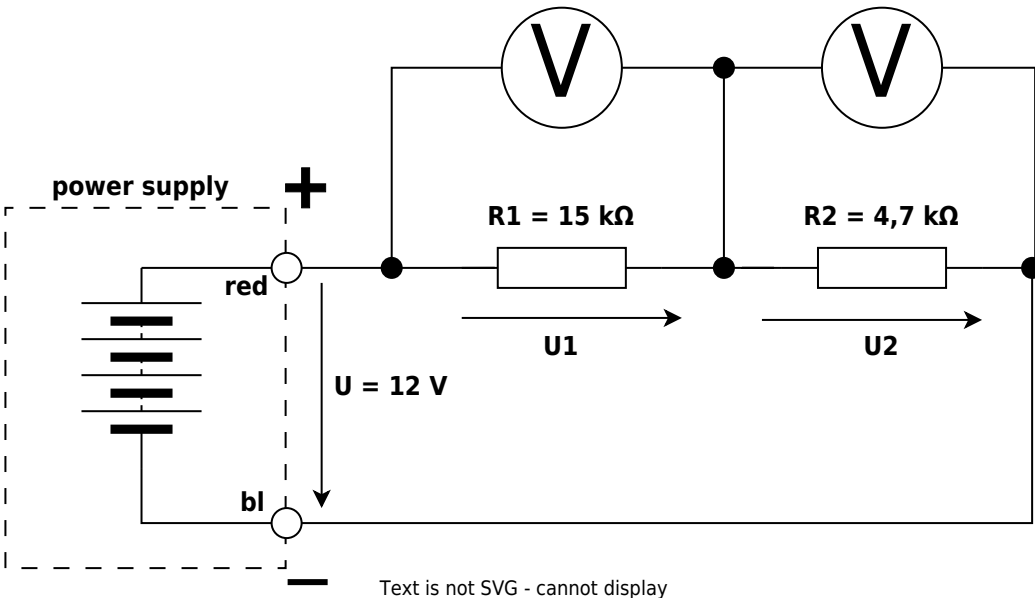
## Table of Contents

<b>Loop law</b> .....	2
<b>Node law</b> .....	3

# Loop law

**Kirchhoff's voltage law:** In every closed loop of an electrical network, the sum of all voltages is zero.

Set the voltage on the power supply to  $12 \text{ V}$  and measure this voltage accurately using a multimeter. Build the measurement circuit shown in [figure 1](#).



Text is not SVG - cannot display

Fig. 1: Verification of

Kirchhoff's voltage law

Add the voltage arrows and measure  $U$ ,  $U_{\text{1}}$  and  $U_{\text{2}}$ .

U	$U_{\text{1}}$	$U_{\text{2}}$

Tab. 1: Voltage measurement for Kirchhoff's voltage law

What is the loop equation here?

Verify the equation using the measured values.

The resistors  $R_{\text{1}}$  and  $R_{\text{2}}$  connected in series form a voltage divider. In what ratio are the voltages  $U_{\text{1}}$  and  $U_{\text{2}}$ ?

$$\frac{U_{\text{1}}}{U_{\text{2}}} =$$

## Node law

**Kirchhoff's current law:** At every node, the sum of all currents flowing into and out of the node is zero.

Set the voltage on the power supply to  $12 \text{ V}$  and measure the voltage accurately using a multimeter. As a first step, build the measurement circuit shown in [figure 2](#).

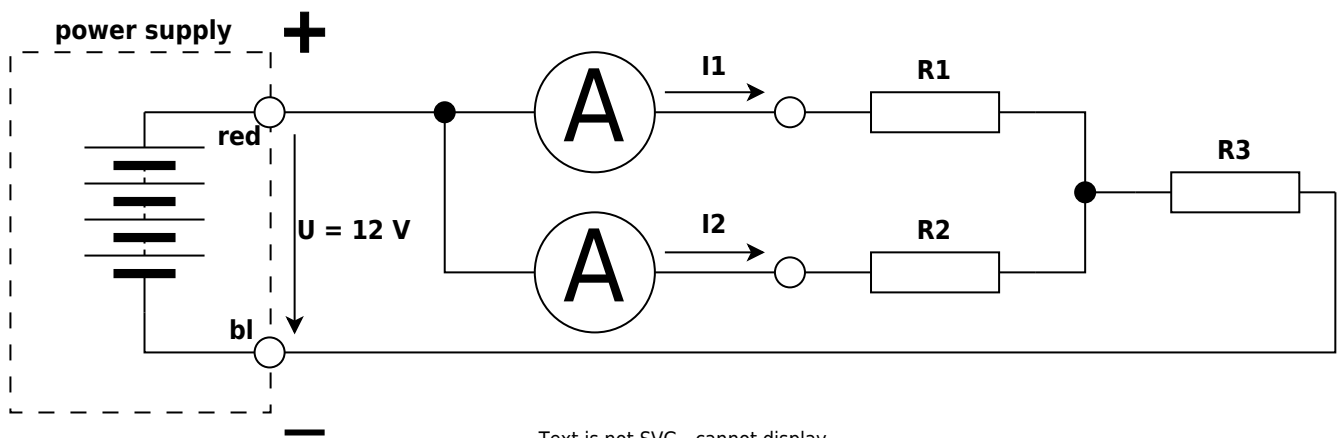
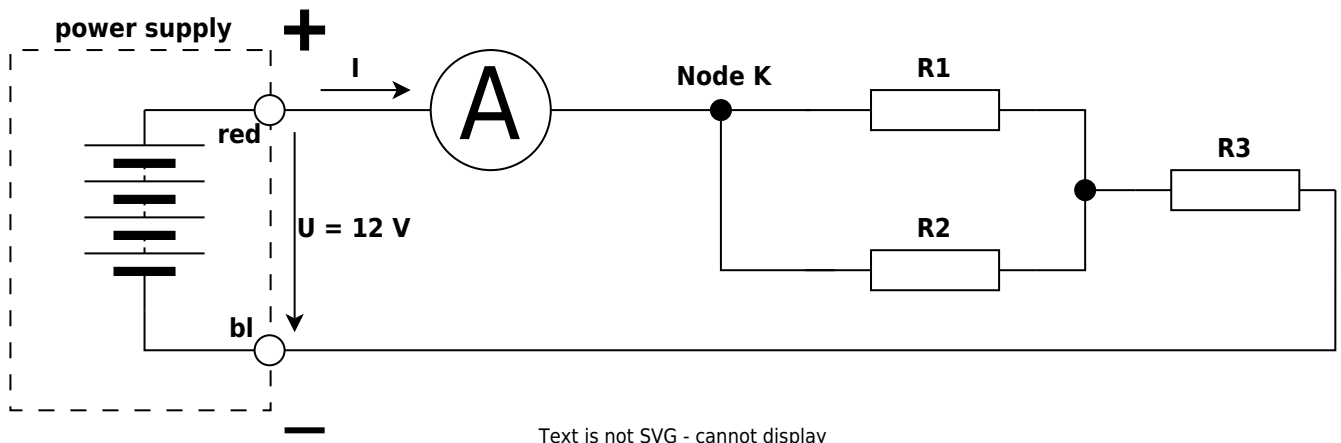


Fig. 2: Branch currents for verification of Kirchhoff's current law

Add the arrows indicating the directions of currents  $I_{\text{1}}$  and  $I_{\text{2}}$ . On both multimeters, set the DC current range and the polarity before switching on. Then measure currents  $I_{\text{1}}$  and  $I_{\text{2}}$  and enter the measured values in the table.



Text is not SVG - cannot display

Fig. 3: Total current and node \$K\$

In what ratio are currents  $I_{\text{R1}}$  and  $I_{\text{R2}}$ ?

$$\frac{I_{\text{R1}}}{I_{\text{R2}}} =$$

Switch the power supply on again and measure the current  $I$ . Enter its value in the table.


Tab. 2: Current measurement for Kirchhoff's current law

Determine the node equation for node \$K\$ and verify its validity.

Using the measured values of resistors  $R_{\text{1}}$ ,  $R_{\text{2}}$  and  $R_{\text{3}}$ , calculate the total resistance  $R_{\text{KP}}$ .

Using the calculated value of  $R_{\text{KP}}$ , verify the measured value of the total current:

$$I = \frac{U}{R_{\text{KP}}} =$$

From:

<https://wiki.mexle.org/> - **MEXLE Wiki**

Permanent link:

[https://wiki.mexle.org/lab\\_electrical\\_engineering/1\\_resistors/mesh-set?rev=1773619858](https://wiki.mexle.org/lab_electrical_engineering/1_resistors/mesh-set?rev=1773619858)

Last update: **2026/03/16 01:10**

