Loop law

Student Group

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Mesh set

In every closed circuit and every mesh of the network, the sum of all voltages is zero!
Set the voltage on the power supply to $12~\rm V$ and measure this voltage precisely using a multimeter. Set up the measuring circuit shown in figure ##.
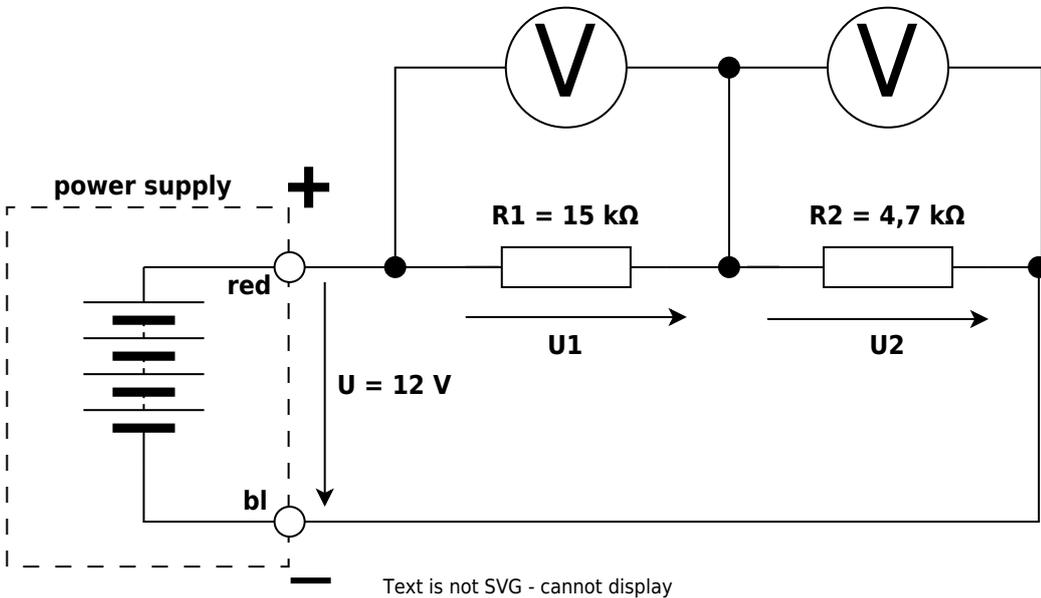

Fig. ##: Mesh-set

Add the voltage arrows and measure U, $U_{\rm 1}$ und $U_{\rm 2}$:

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

Tab. ##: Mesh set voltage measurement

What is the mesh set here?

Check the formula with the measured values:

The resistors $R_{\rm 1}$ and $R_{\rm 2}$ connected in series form a voltage divider. What is the ratio between the voltages $U_{\rm 1}$ and $R_{\rm 2}$?

$$ \frac{U_1}{U_2} = $$

Set of nodes

At each junction point, the sum of all incoming and outgoing currents is equal to zero!
Set the voltage on the power supply to $12~\rm V$ and measure the voltage accurately with a multimeter. In the first step, set up the measuring circuit shown in figure ##:
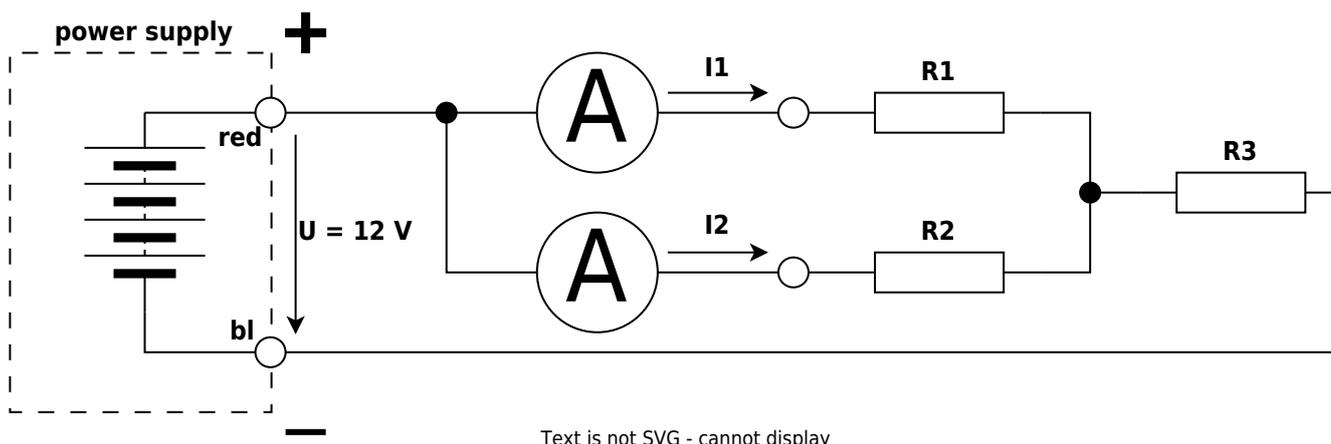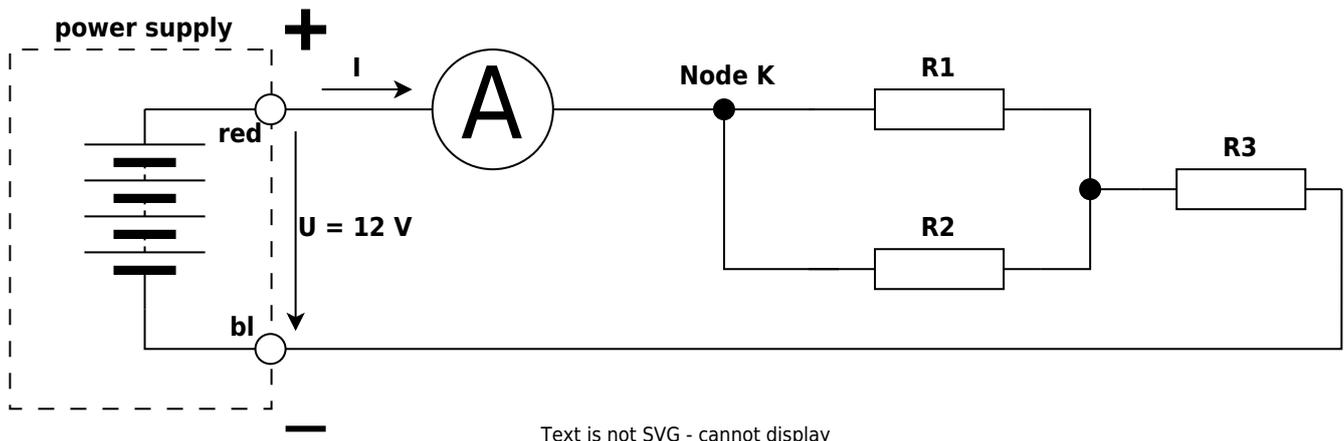

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Fig. ##: Node-set circuit 1

Draw the arrows for the directions of currents $I_{\rm 1}$ and $I_{\rm 2}$ in figure ##. The DC current measurement range must be set on both multimeter using the rotary switch. Then measure currents $I_{\rm 1}$ and $I_{\rm 2}$ and enter the measured values in table ##.

power supply

+

red

I

Node K

R1

R3

$U = 12\ V$

R2

bl

−

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Fig. ##: Node-set circuit 2

What is the relationship between currents $I_{\rm 1}$ and $I_{\rm 2}$?

$$ \frac{I_1}{I_2} = $$

Switch the power supply back on and measure the current I. Enter its value in table ##.

$$I$$	$$I_{~\rm.}$$	$$I_{~\rm..}$$

Tab. ##: Node set current mesurement

Determine the node set for node K and check its validity.

Using the measured values for resistors $R_{\rm 1}$, $R_{\rm 2}$, and $R_{\rm 3}$, calculate the total resistance $R_{\rm KP}$:

Using the calculated value $R_{\rm KP}$, check the measured value of the total current:
$$ I=\frac{U}{R_{KP}} = $$