

# task\_erlctd760zmvox0t\_with\_calculation

## Student Group

First Name	Surname	Matrikel Nr.

## Table of Contents

Exercise E1 Pure Resistor Network Simplification I (written test, approx. 14 % of a 60-minute written test, SS2023) .....	2
---	---

network simplification, exam ee1 SS2023

**Exercise E1 Pure Resistor Network Simplification I**  
**(written test, approx. 14 % of a 60-minute written test, SS2023)**

The circuit below should be given as  $U_{\text{AB}} = 60 \text{ V}$ . What is the value for  $R_{\text{eq}}$  the circuit?

Solution

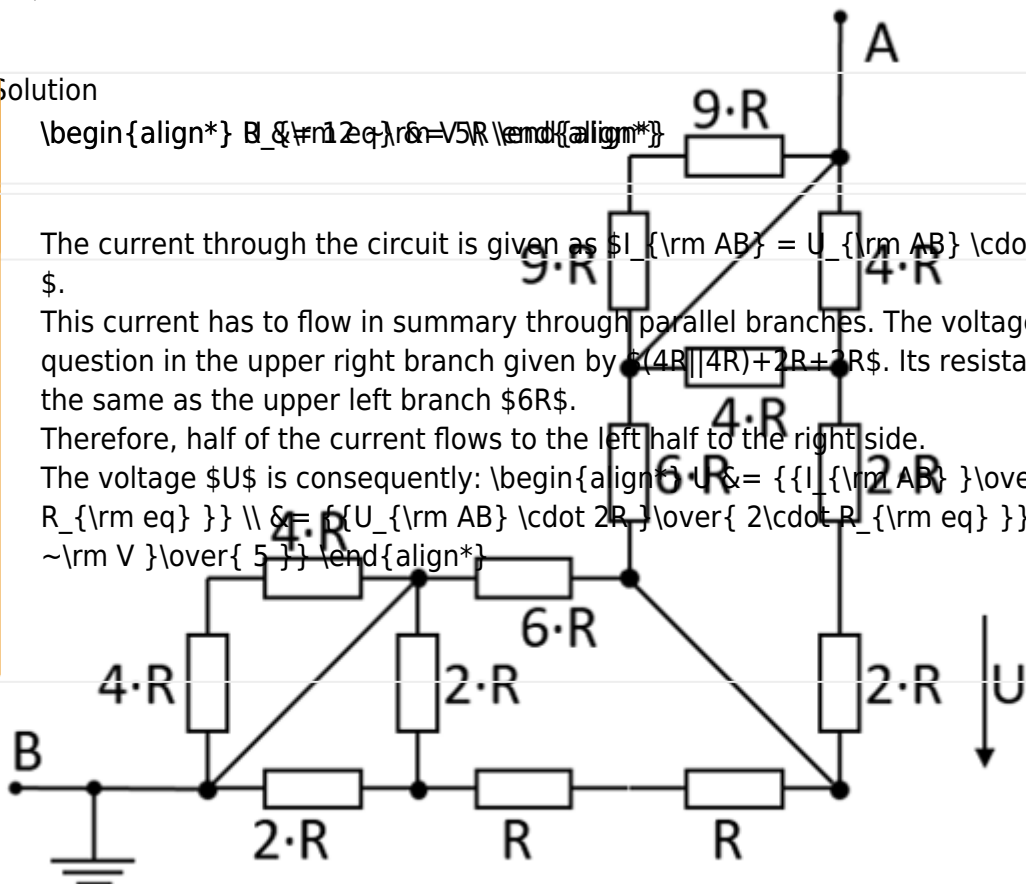
$$I_{\text{AB}} = \frac{U_{\text{AB}}}{R_{\text{eq}}} = 5 \text{ A}$$

The current through the circuit is given as  $I_{\text{AB}} = \frac{U_{\text{AB}}}{R_{\text{eq}}}$ .

This current has to flow in summary through parallel branches. The voltage  $U$  in question in the upper right branch given by  $(4R \parallel 4R) + 2R + 2R$ . Its resistance is just the same as the upper left branch  $6R$ .

Therefore, half of the current flows to the left half to the right side.

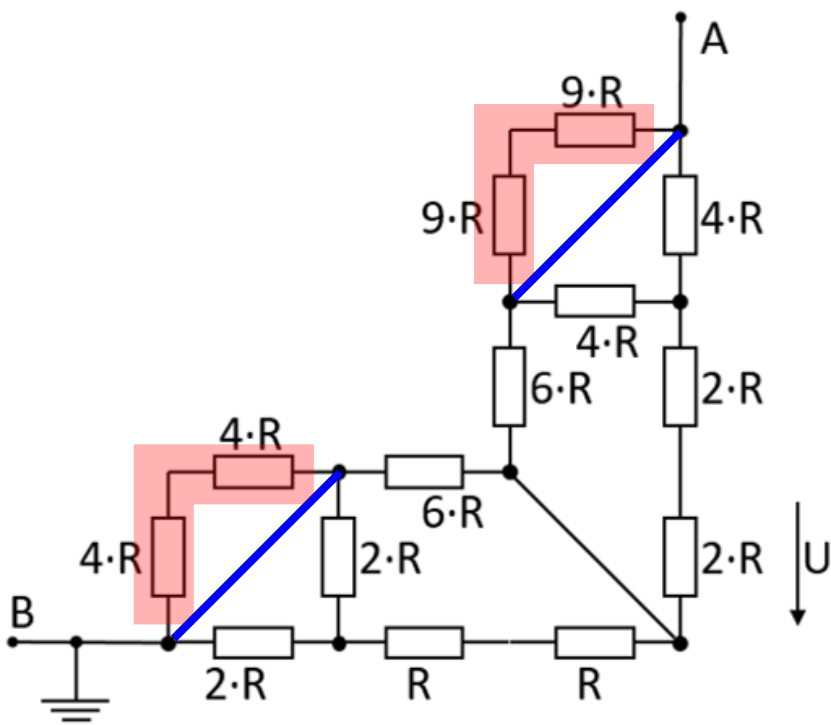
$$U = \frac{I_{\text{AB}} \cdot R_{\text{eq}}}{2} = \frac{5 \text{ A} \cdot R_{\text{eq}}}{2}$$



1. What is the equivalent resistance  $R_{\text{eq}}$ ?

Solution

Part of the circuit is shorted. Here the resistors (marked in red) are shorted by the connections marked in blue:



The circuit can then be rearranged for better interpretation:

Therefore,  $R_{\text{eq}}$  is given as: 
$$R_{\text{eq}} = (2R || 2R + R +$$

$$R \parallel 6R \text{ \&\&+ } 6R \parallel (2R + 2R + 4R \parallel 4R) \text{ \&\&= } (R + R + R) \parallel 6R \text{ \&\&+ } 6R \parallel (2R + 2R + 2R) \text{ \&\&= } 3R \parallel 6R \text{ \&\&+ } 6R \parallel 6R \text{ \&\&= } \left\{ \frac{3R \cdot 6R}{3R+6R} \right\} \text{ \&\&+ } 3R \text{ \&\& \end{align*}}$$

From:

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

Permanent link:

[https://wiki.mexle.org/electrical\\_engineering\\_and\\_electronics/task\\_erlctd760zmvox0t\\_with\\_calculation](https://wiki.mexle.org/electrical_engineering_and_electronics/task_erlctd760zmvox0t_with_calculation)

Last update: **2023/07/24 19:33**

