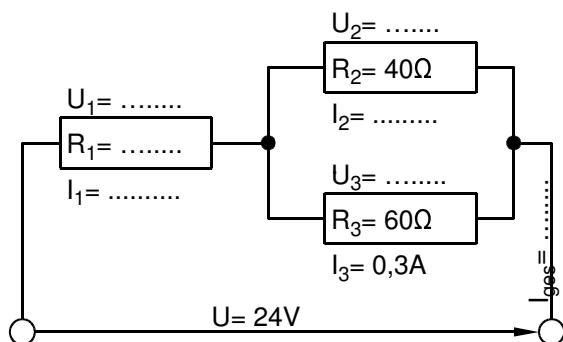




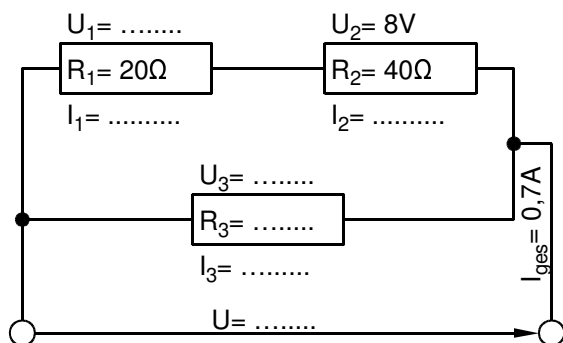
Einfache gemischte Schaltungen

Ermitteln Sie die fehlenden Größen

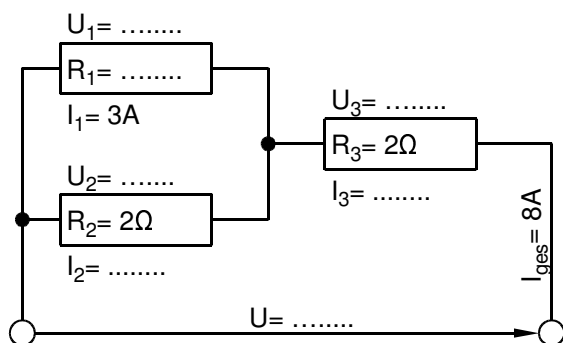
1)



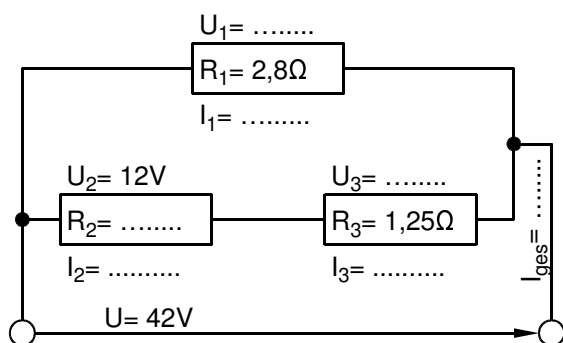
2)



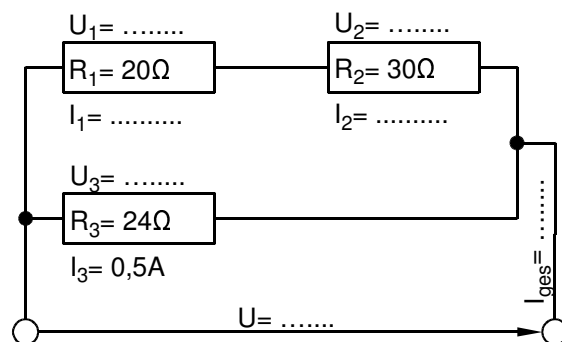
3)



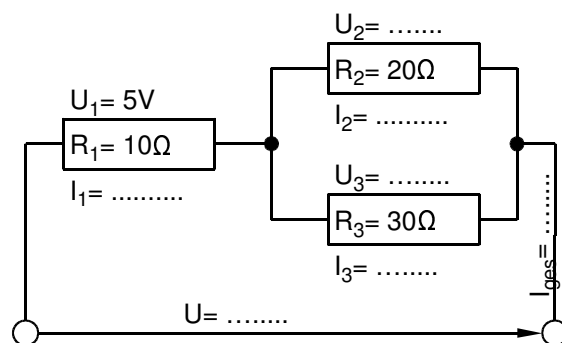
4)



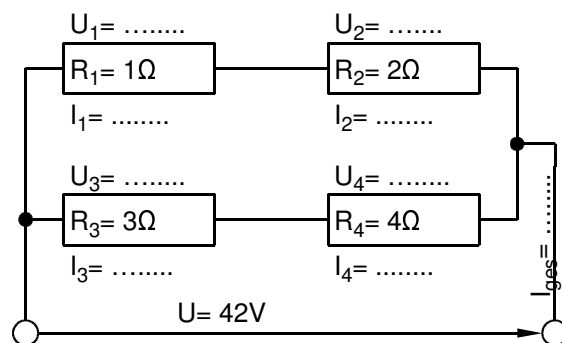
5)



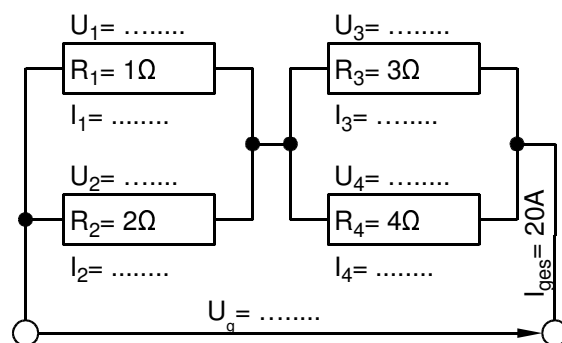
6)

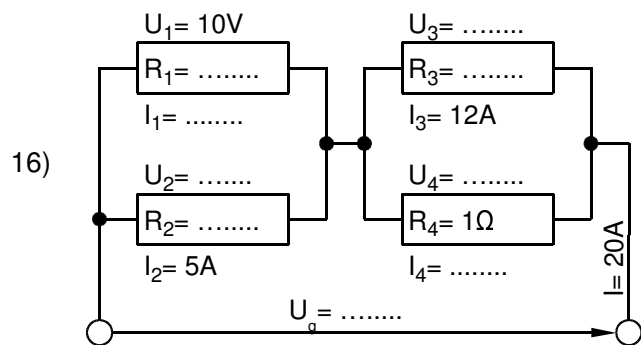
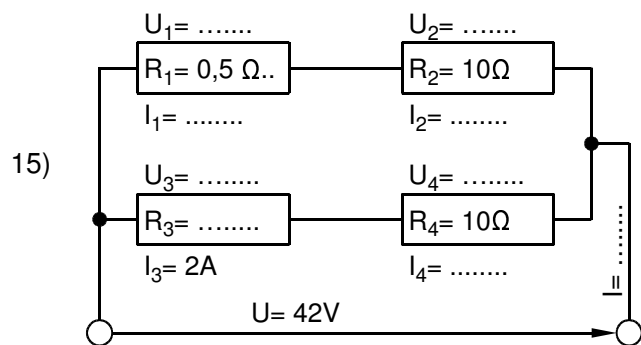
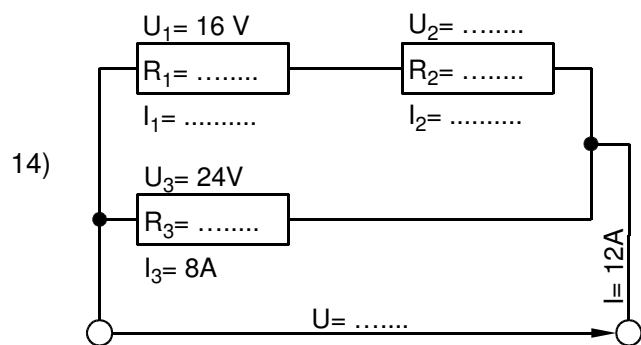
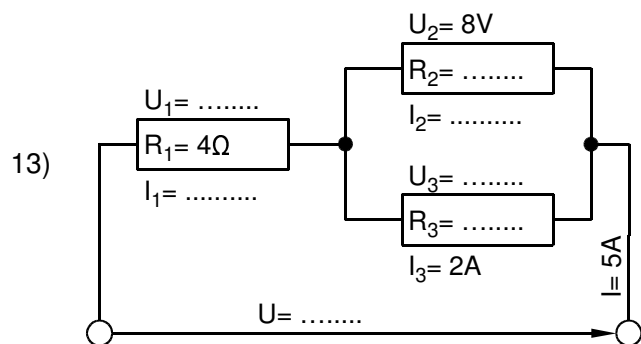
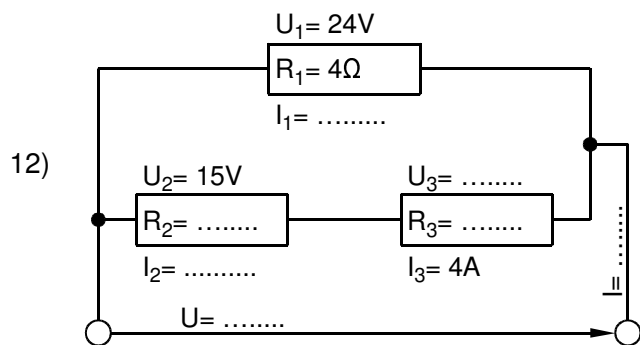
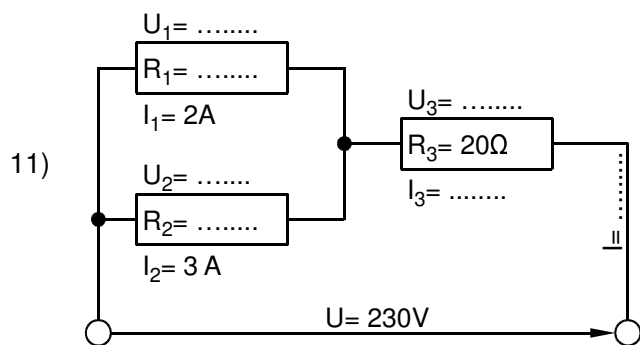
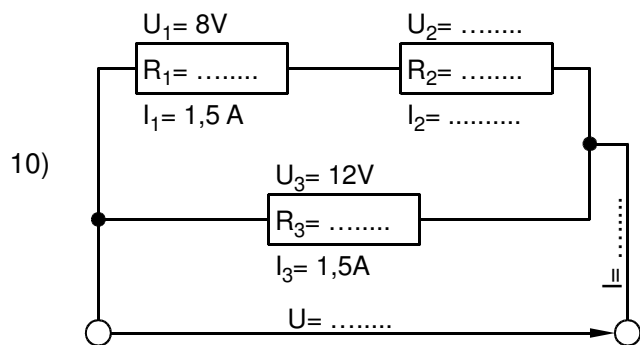
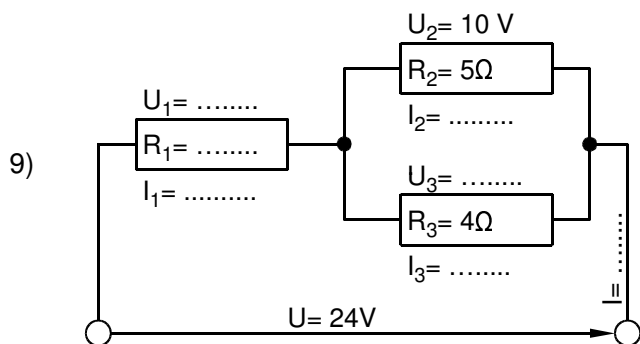


7)



8)

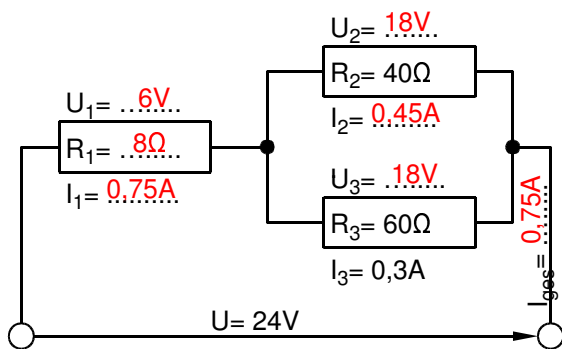






Lösungsvorschläge

1)



$$U_3 = R_3 \cdot I_3 = 60\Omega \cdot 0,3\text{ A} = 18\text{ V}$$

$$U_2 = U_3 = 18\text{ V}$$

$$I_2 = \frac{U_2}{R_2} = \frac{18\text{ V}}{40\Omega} = 0,45\text{ A}$$

$$U_1 = U - U_{2/3} = 24\text{ V} - 18\text{ V} = 6\text{ V}$$

$$I_1 = I_2 + I_3 = 0,45\text{ A} + 0,3\text{ A} = 0,75\text{ A}$$

$$R_1 = \frac{U_1}{I_1} = \frac{6\text{ V}}{0,75\text{ A}} = 8\Omega$$

Gesamtwiderstand

$$\frac{1}{R_{2/3}} = \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{40\Omega} + \frac{1}{60\Omega}$$

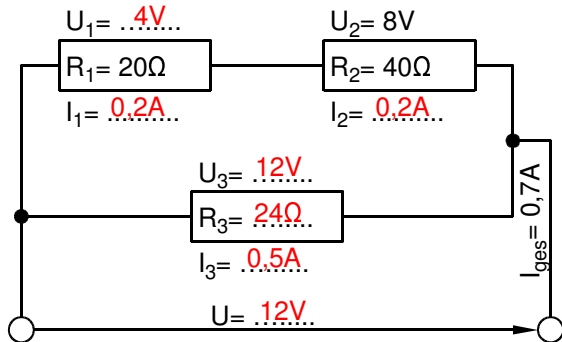
$$\rightarrow R_{2/3} = 24\Omega$$

$$R = R_1 + R_{2/3} = 8\Omega + 24\Omega = 32\Omega$$

Kontrolle

$$R = \frac{U}{I} = \frac{24\text{ V}}{0,75\text{ A}} = 32\Omega$$

2)



$$I_2 = \frac{U_2}{R_2} = \frac{8\text{ V}}{40\Omega} = 0,2\text{ A}$$

$$I_1 = I_2 = 0,2\text{ A}$$

$$U_1 = R_1 \cdot I_1 = 20\Omega \cdot 0,2\text{ A} = 4\text{ V}$$

$$U = U_1 + U_2 = 4\text{ V} + 8\text{ V} = 12\text{ V}$$

$$U_3 = U = 12\text{ V}$$

$$I_3 = I - I_{2/3} = 0,7\text{ A} - 0,2\text{ A} = 0,5\text{ A}$$

$$R_3 = \frac{U_3}{I_3} = \frac{12\text{ V}}{0,5\text{ A}} = 24\Omega$$

Gesamtwiderstand

$$R_{1+2} = R_1 + R_2 = 20\Omega + 40\Omega = 60\Omega$$

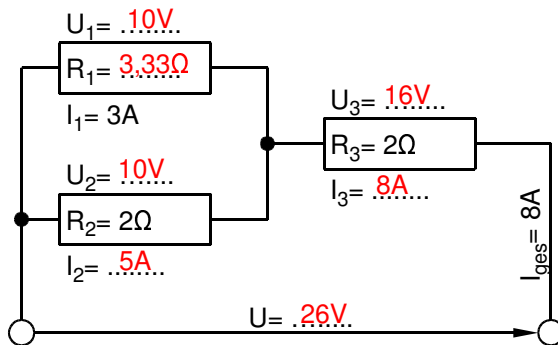
$$\frac{1}{R} = \frac{1}{R_{1+2}} + \frac{1}{R_3} = \frac{1}{60\Omega} + \frac{1}{24\Omega}$$

$$\rightarrow R = 17,2\Omega$$

Kontrolle

$$R = \frac{U}{I} = \frac{12\text{ V}}{0,7\text{ A}} = 17,2\Omega$$

3)



$$I_2 = I - I_1 = 8\text{ A} - 3\text{ A} = 5\text{ A}$$

$$U_2 = R_2 \cdot I_2 = 2\Omega \cdot 5\text{ A} = 10\text{ V}$$

$$U_1 = U_2 = 10\text{ V}$$

$$R_1 = \frac{U_1}{I_1} = \frac{10\text{ V}}{3\text{ A}} = 3,33\Omega$$

$$I_3 = I = 8\text{ A}$$

$$U_3 = R_3 \cdot I_3 = 2\Omega \cdot 8\text{ A} = 16\text{ V}$$

$$U = U_{1/2} + U_3 = 10\text{ V} + 16\text{ V} = 26\text{ V}$$

Gesamtwiderstand

$$\frac{1}{R_{1+2}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{3,33\Omega} + \frac{1}{2\Omega}$$

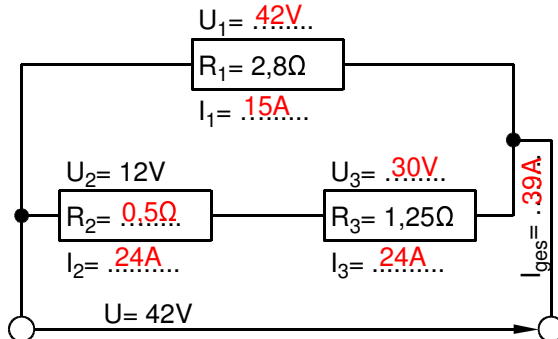
$$\rightarrow R_{1+2} = 1,25\Omega$$

$$R = R_{1+2} + R_3 = 1,25\Omega + 2\Omega = 3,25\Omega$$

Kontrolle

$$R = \frac{U}{I} = \frac{26\text{ V}}{8\text{ A}} = 3,25\Omega$$

4)





$$U_1 = U = 42 \text{ V}$$

$$U_3 = U - U_2 = 42 \text{ V} - 12 \text{ V} = 30 \text{ V}$$

$$I_1 = \frac{U_1}{R_1} = \frac{42 \text{ V}}{2,8 \Omega} = 15 \text{ A}$$

$$I_3 = \frac{U_3}{R_3} = \frac{30 \text{ V}}{1,25 \Omega} = 24 \text{ A}$$

$$I_2 = I_3 = 24 \text{ A}$$

$$R_2 = \frac{U_2}{I_2} = \frac{12 \text{ V}}{24 \text{ A}} = 0,5 \Omega$$

$$I = I_1 + I_{2+3} = 15 \text{ A} + 24 \text{ A} = 39 \text{ A}$$

Gesamtwiderstand

$$R_{2+3} = R_2 + R_3 = 0,5 \Omega + 1,25 \Omega = 1,75 \Omega$$

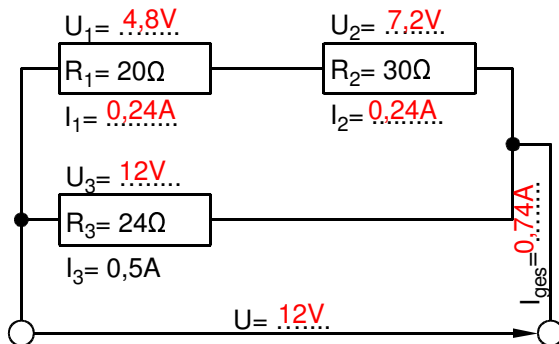
$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_{2+3}} = \frac{1}{2,8 \Omega} + \frac{1}{1,75 \Omega}$$

$$\rightarrow R = 1,08 \Omega$$

Kontrolle

$$R = \frac{U}{I} = \frac{42 \text{ V}}{39 \text{ A}} = 1,08 \Omega$$

5)



$$U_3 = R_3 \cdot I_3 = 24 \Omega \cdot 0,5 \text{ A} = 12 \text{ V}$$

$$U = U_3 = 12 \text{ V}$$

$$R_{1+2} = R_1 + R_2 = 20 \Omega + 30 \Omega = 50 \Omega$$

$$I_{1/2} = \frac{U}{R_{1+2}} = \frac{12 \text{ V}}{50 \Omega} = 0,24 \text{ A}$$

$$U_1 = R_1 \cdot I_1 = 20 \Omega \cdot 0,24 \text{ A} = 4,8 \text{ V}$$

$$U_2 = R_2 \cdot I_2 = 30 \Omega \cdot 0,24 \text{ A} = 7,2 \text{ V}$$

$$I = I_{1/2} + I_3 = 0,24 \text{ A} + 0,5 \text{ A} = 0,74 \text{ A}$$

Gesamtwiderstand

$$R_{1+2} = R_1 + R_2 = 20 \Omega + 30 \Omega = 50 \Omega$$

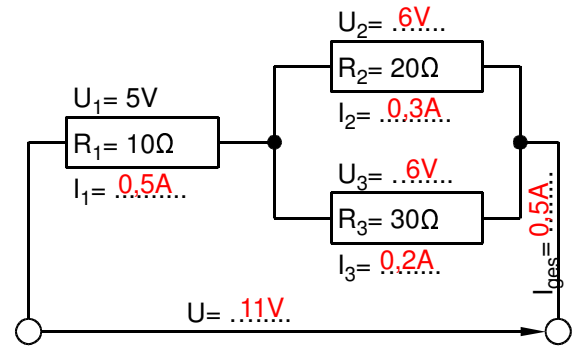
$$\frac{1}{R} = \frac{1}{R_{1+2}} + \frac{1}{R_3} = \frac{1}{50 \Omega} + \frac{1}{24 \Omega}$$

$$\rightarrow R = 16,2 \Omega$$

Kontrolle

$$R = \frac{U}{I} = \frac{12 \text{ V}}{0,74 \text{ A}} = 16,2 \Omega$$

6)



$$I_1 = \frac{U_1}{R_1} = \frac{5 \text{ V}}{10 \Omega} = 0,5 \text{ A}$$

$$\frac{1}{R_{2+3}} = \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{20 \Omega} + \frac{1}{30 \Omega}$$

$$\rightarrow R_{2+3} = 12 \Omega$$

$$I_{2+3} = I = I_1 = 0,5 \text{ A}$$

$$U_{2/3} = R_{2+3} \cdot I_{2+3} = 12 \Omega \cdot 0,5 \text{ A} = 6 \text{ V}$$

$$I_2 = \frac{U_2}{R_2} = \frac{6 \text{ V}}{20 \Omega} = 0,3 \text{ A}$$

$$I_3 = \frac{U_3}{R_3} = \frac{6 \text{ V}}{30 \Omega} = 0,2 \text{ A}$$

$$U = U_1 + U_{2/3} = 5 \text{ V} + 6 \text{ V} = 11 \text{ V}$$

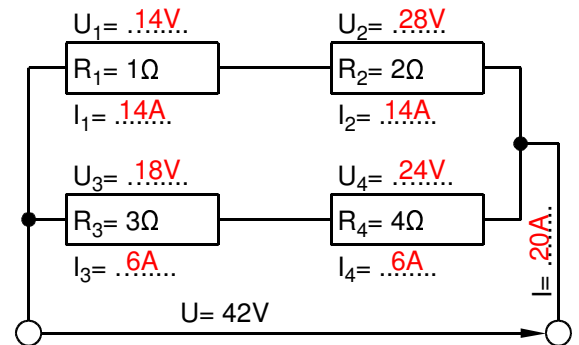
Gesamtwiderstand

$$R = R_1 + R_{2+3} = 10 \Omega + 12 \Omega = 22 \Omega$$

Kontrolle

$$R = \frac{U}{I} = \frac{11 \text{ V}}{0,5 \text{ A}} = 22 \Omega$$

7)



$$R_{1+2} = R_1 + R_2 = 1 \Omega + 2 \Omega = 3 \Omega$$

$$R_{3+4} = R_3 + R_4 = 3 \Omega + 4 \Omega = 7 \Omega$$

$$I_{1/2} = \frac{U_{1/2}}{R_{1+2}} = \frac{42 \text{ V}}{3 \Omega} = 14 \text{ A}$$

$$I_{3/4} = \frac{U_{3/4}}{R_{3+4}} = \frac{42 \text{ V}}{7 \Omega} = 6 \text{ A}$$

$$U_1 = R_1 \cdot I_1 = 1 \Omega \cdot 14 \text{ A} = 14 \text{ V}$$

$$U_2 = R_2 \cdot I_2 = 2 \Omega \cdot 14 \text{ A} = 28 \text{ V}$$

$$U_3 = R_3 \cdot I_3 = 3 \Omega \cdot 6 \text{ A} = 18 \text{ V}$$

$$U_4 = R_4 \cdot I_4 = 4 \Omega \cdot 6 \text{ A} = 24 \text{ V}$$

$$I = I_{1/2} + I_{3/4} = 14 \text{ A} + 6 \text{ A} = 20 \text{ A}$$



Gesamtwiderstand

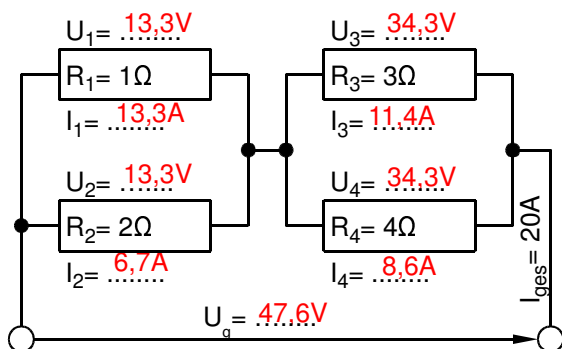
$$\frac{1}{R} = \frac{1}{R_{1+2}} + \frac{1}{R_{3+4}} = \frac{1}{3\Omega} + \frac{1}{7\Omega}$$

$$\rightarrow R = 2,1\Omega$$

Kontrolle

$$R = \frac{U}{I} = \frac{42V}{20A} = 2,1\Omega$$

8)



$$\frac{1}{R_{1+2}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{1\Omega} + \frac{1}{2\Omega}$$

$$\rightarrow R_{1+2} = 0,67\Omega$$

$$\frac{1}{R_{3+4}} = \frac{1}{R_3} + \frac{1}{R_4} = \frac{1}{3\Omega} + \frac{1}{4\Omega}$$

$$\rightarrow R_{3+4} = 1,71\Omega$$

$$U_{1/2} = R_{1+2} \cdot I = 0,67\Omega \cdot 20A = 13,3V$$

$$U_{3/4} = R_{3+4} \cdot I = 1,71\Omega \cdot 20A = 34,3V$$

$$I_1 = \frac{U_1}{R_1} = \frac{13,3V}{1\Omega} = 13,3A$$

$$I_2 = \frac{U_2}{R_2} = \frac{13,3V}{2\Omega} = 6,7A$$

$$I_3 = \frac{U_3}{R_3} = \frac{34,3V}{3\Omega} = 11,4A$$

$$I_4 = \frac{U_4}{R_4} = \frac{34,3V}{4\Omega} = 8,6A$$

$$U = U_{1/2} + U_{3/4} = 13,3V + 34,3V = 47,6V$$

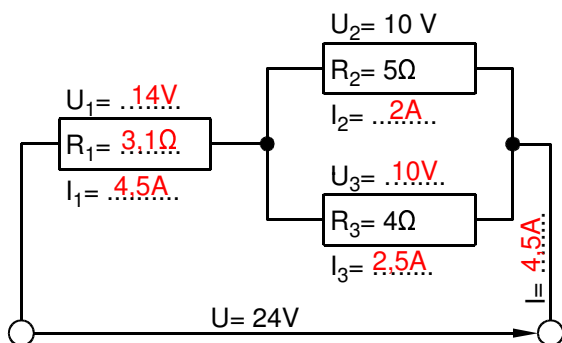
Gesamtwiderstand

$$R = R_{1+2} + R_{3+4} = 0,67\Omega + 1,71\Omega = 2,38\Omega$$

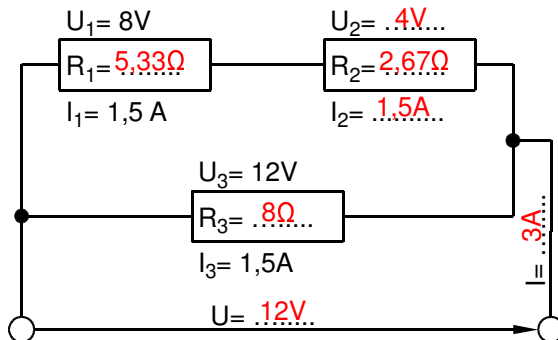
Kontrolle

$$R = \frac{U}{I} = \frac{47,6V}{20A} = 2,38\Omega$$

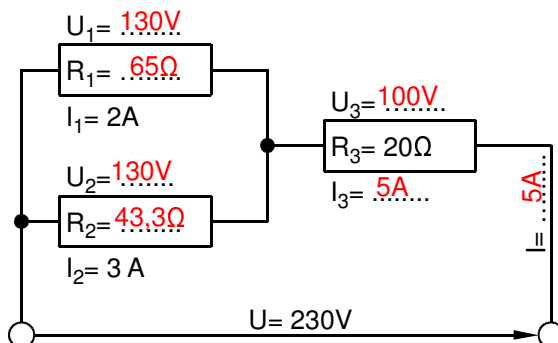
9)



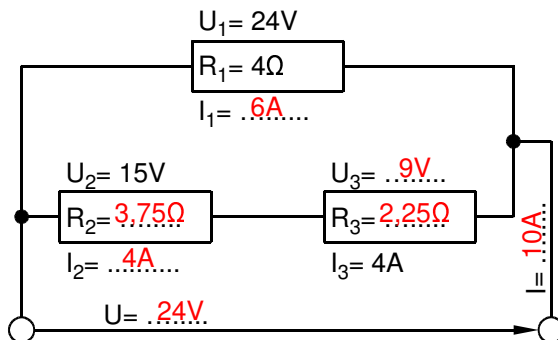
10)



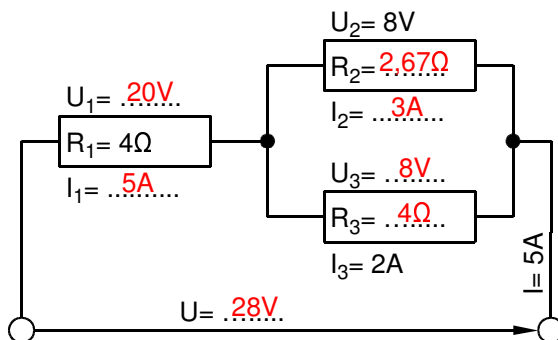
11)



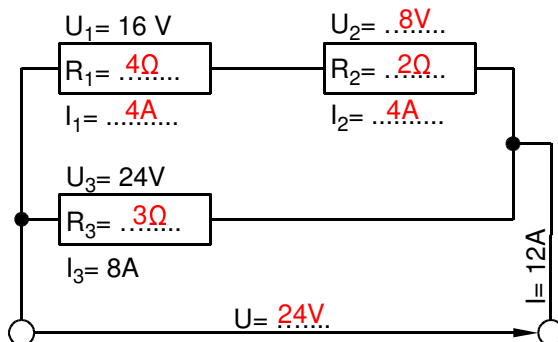
12)



13)

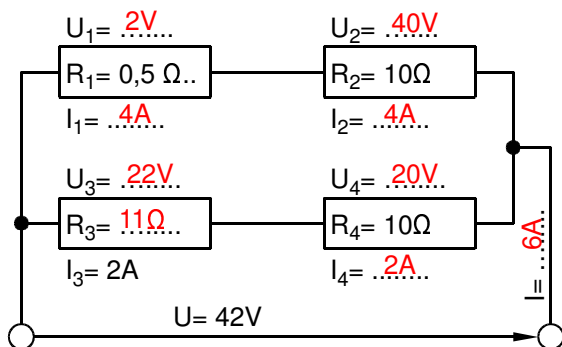


14)

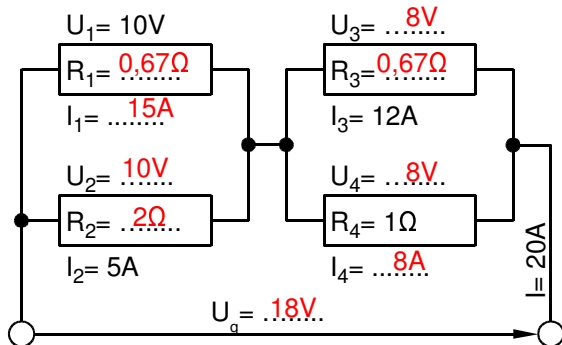




15)



16)



17) Formelvorlagen

$$R_2 = \frac{U_2}{I_2} = \frac{10V}{3A} = 3,33 \Omega$$

$$I = I_1 + I_{2/3} = 15A + 24A = 39A$$

$$I_1 = \frac{U_1}{R_1} = \frac{42V}{2,8 \Omega} = 15A$$

$$I_3 = I_2 = 8A$$

$$R_1 = \frac{U_1}{I_1} = \frac{10V}{3A} = 3,33 \Omega$$

$$R_{1+2} = R_1 + R_2 = 20 \Omega + 30 \Omega = 50 \Omega$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_{2+3}} = \frac{1}{2,8 \Omega} + \frac{1}{1,75 \Omega}$$

$$\rightarrow R = 1,08 \Omega$$

$$U = U_{1/2} + U_3 = 10V + 16V = 26V$$

$$U_1 = U - U_{2/3} = 24V - 18V = 6V$$

$$U_1 = U_2 = 10V$$

$$U_2 = R_2 \cdot I_2 = 2 \Omega \cdot 5A = 10V$$