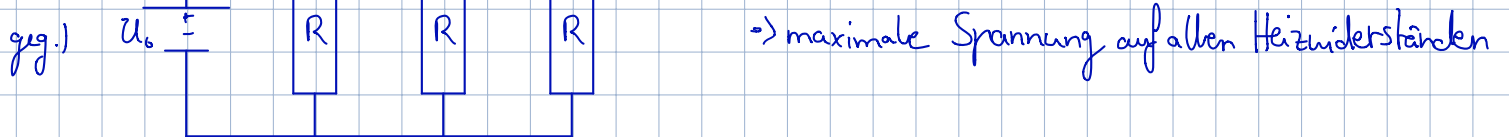


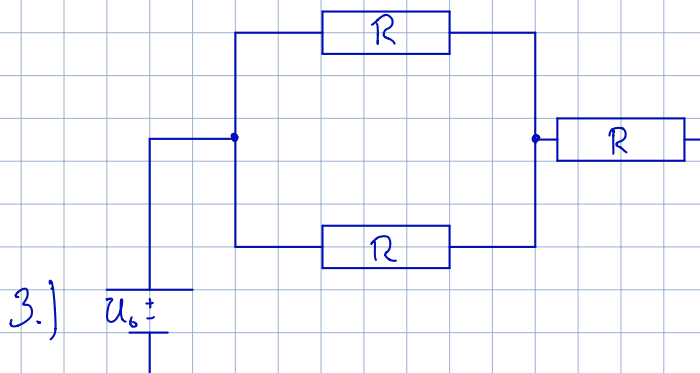
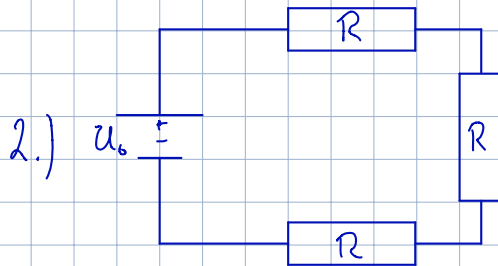
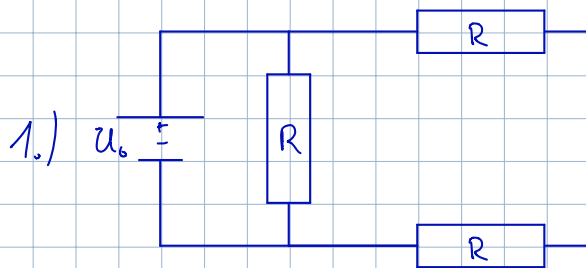
Aufgabe 1

a)

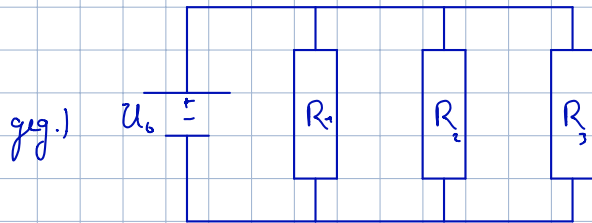
(i)



$\Rightarrow$ 3 weitere Heizstufen realisieren



(ii)

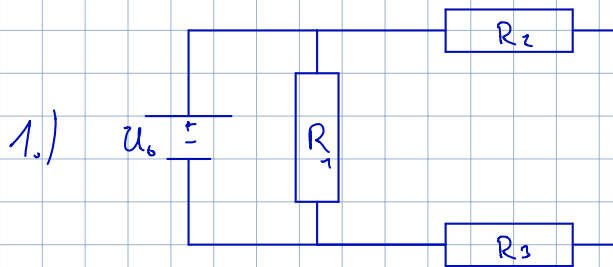


$\rightarrow$ Wasser V siedet nach $t_0 = 0,1h$

$$R_{1,2} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{R^2}{2R} = \frac{1}{2}R \quad R_{ges} = R_{1,2} \parallel R_3 = \frac{R_{1,2} \cdot R_3}{R_{1,2} + R_3} = \frac{1}{3}R$$

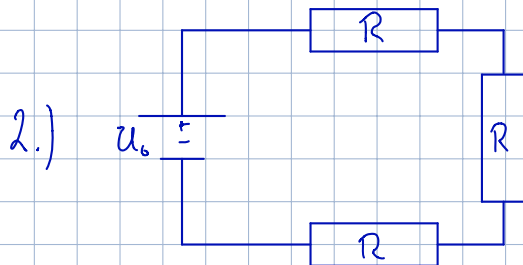
$$\frac{1}{3}R \rightarrow t = 0,1h$$

$\Rightarrow 1R$ Widerstand $\rightarrow t_0 = 0,3h$



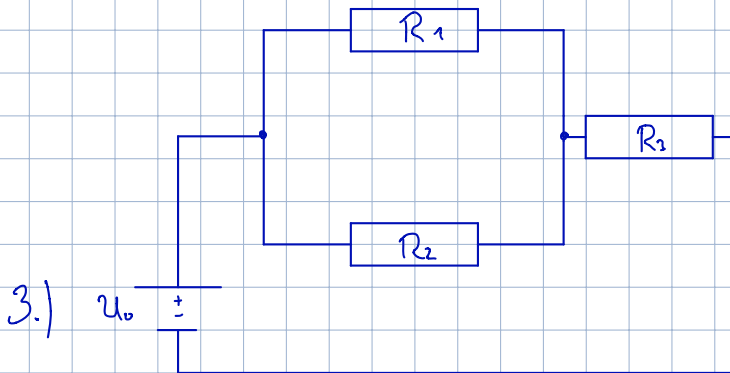
$$R_{2,3} = 2R \quad R_{ges} = R_1 \parallel R_{2,3} = \frac{R \cdot 2R}{R + 2R} = \frac{2R^2}{3R} = \frac{2}{3}R$$

$$\frac{2}{3}R \rightarrow t_0 = 0,3h \cdot \frac{2}{3} = 0,2h$$



$$R_{ges} = 3R$$

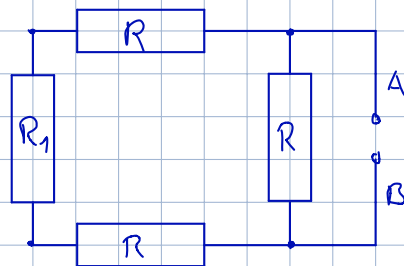
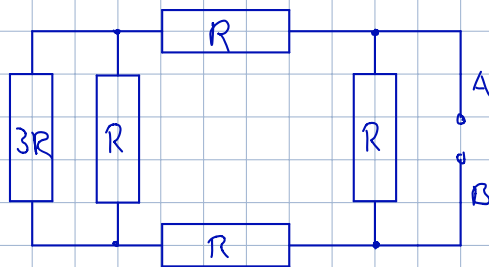
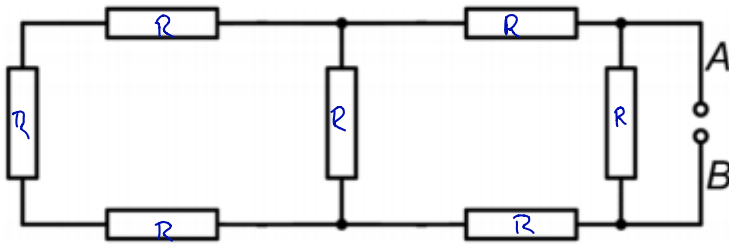
$$3R \rightarrow t_0 = 0,3h \cdot 3 = 0,9h$$



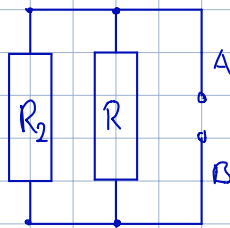
$$R_{1,2} = \frac{R^2}{2R} = \frac{1}{2}R \quad R_{ges} = \frac{1}{2}R + R = 1,5R$$

$$1,5R \rightarrow t_0 = 0,3h \cdot 1,5 = 0,45h$$

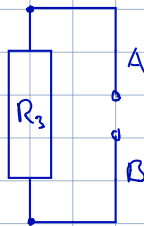
b)



$$R_1 = R \parallel 3R = \frac{R \cdot 3R}{R + 3R} = \frac{3R^2}{4R} = \frac{3}{4}R$$



$$R_2 = R + R_1 + R = \frac{11}{4}R = 2,75R$$

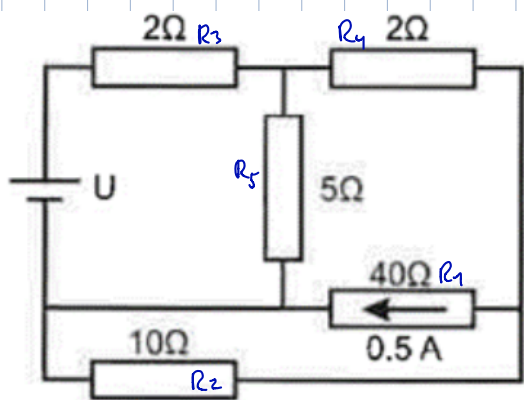


$$R_{ges} = R_3 = \frac{R_2 \cdot R}{R_2 + R} = \frac{2,75R^2}{3,75R} \approx 0,7333R$$

mit $R = 3\Omega$

$$\Rightarrow R_{ges} = 0,7333 \cdot 3\Omega = 2,2\Omega$$

c)



geg.: Widerstände, $I = 0,5 \text{ A}$ durch $R = 40 \Omega$

ges.: U

• $R_1: U = 40 \Omega \cdot 0,5 \text{ A} = 20 \text{ V}$

$\rightarrow U = 20 \text{ V}$ ist konstant.

• $R_2: I = \frac{U}{R} = \frac{20 \text{ V}}{10 \Omega} = 2 \text{ A}$

• $R_3: I = \frac{U}{R} = \frac{20 \text{ V}}{2 \Omega} = 5 \text{ A}$

• $R_4: I = \frac{U}{R} = \frac{20 \text{ V}}{2 \Omega} = 5 \text{ A}$

• $R_5: I = \frac{U}{R} = \frac{20 \text{ V}}{5 \Omega} = 4 \text{ A}$

Spannung $U = 20 \text{ V}$

Oder, da: $\frac{I_1}{I_2} = \frac{R_2}{R_1}$

• In $R_1 = 40 \Omega$ ist $U = 20 \text{ V}$, $I = 0,5 \text{ A}$

$\Rightarrow R_2 = 10 \Omega$, $R_2 \parallel R_1 \Rightarrow \frac{0,5 \text{ A}}{I_2} = \frac{10 \Omega}{40 \Omega}$ $I_2 = 2 \text{ A}$, $\Rightarrow U = 2 \text{ A} \cdot 10 \Omega = 20 \text{ V}$

• In $R_2 = 10 \Omega$ ist $U = 20 \text{ V}$, $I = 2 \text{ A}$

$\Rightarrow R_{3,4} = 4 \Omega$, $R_{3,4} \parallel R_1 \Rightarrow \frac{0,5 \text{ A}}{I_{3,4}} = \frac{4 \Omega}{40 \Omega}$ $I_{3,4} = 5 \text{ A} \Rightarrow U = 5 \text{ A} \cdot 4 \Omega = 20 \text{ V}$

• In R_3 und R_4 jeweils mit 2Ω ist $U = 20 \text{ V}$, $I = 5 \text{ A}$

$\Rightarrow R_5 = 5 \Omega$, $R_5 \parallel R_3 \Rightarrow \frac{5 \text{ A}}{I_5} = \frac{5 \Omega}{4 \Omega} \Rightarrow I_5 = 4 \text{ A}$, $U = 4 \text{ A} \cdot 5 \Omega = 20 \text{ V}$

• In $R_5 = 5 \Omega$ ist $U = 20 \text{ V}$, $I = 4 \text{ A}$