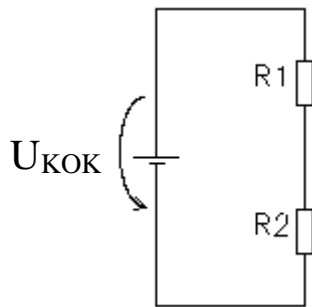


VASTUSTEN SARJAKYTKENTÄ

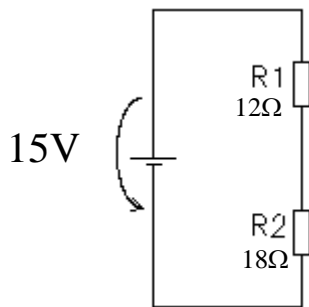


$$R_{KOK} = R1 + R2$$

$$I = I_{R1} = I_{R2} = \frac{U_{KOK}}{R_{KOK}}$$

$$U_{R1} = I \times R1 \qquad U_{R2} = I \times R2$$

esimerkki:



$$U_{KOK} = 15V, \quad R1 = 12\Omega, \quad R2 = 18\Omega$$

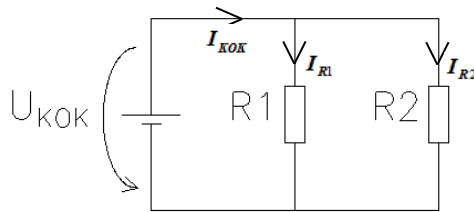
$$R_{KOK} = R1 + R2 = 12\Omega + 18\Omega = 30\Omega$$

$$I = I_{R1} = I_{R2} = \frac{U_{KOK}}{R_{KOK}} = \frac{15V}{30\Omega} = 500mA$$

$$U_{R1} = I \times R1 = 0,50A \times 12\Omega = 6,0V$$

$$U_{R2} = I \times R2 = 0,5A \times 18\Omega = 9,0V$$

VASTUSTEN RINNANKYTKENTÄ



$$I_{KOK} = I_{R1} + I_{R2}$$

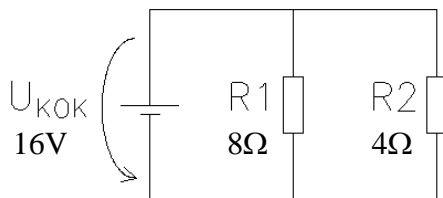
$$I_{KOK} = \frac{U_{KOK}}{R_{KOK}}$$

$$R_{KOK} = \frac{1}{\frac{1}{R1} + \frac{1}{R2}}$$

$$U_{R1} = U_{R2} = U_{KOK}$$

$$I_{R1} = \frac{U_{KOK}}{R1} \quad I_{R2} = \frac{U_{KOK}}{R2}$$

esimerkki:



$$U_{R1} = U_{R2} = U_{KOK} = 16V$$

$$I_{R1} = \frac{U_{KOK}}{R1} = \frac{16V}{8\Omega} = 2,0A$$

$$I_{R2} = \frac{U_{KOK}}{R2} = \frac{16V}{4\Omega} = 4,0A$$

$$I_{KOK} = I_{R1} + I_{R2} = 6,0A$$

$$R_{KOK} = \frac{U_{KOK}}{I_{KOK}} = \frac{16V}{6,0A} = 2,67\Omega$$

toinen reitti laskea samat asiat:

$$R_{KOK} = \frac{1}{\frac{1}{R1} + \frac{1}{R2}} = \frac{1}{\frac{1}{8\Omega} + \frac{1}{4\Omega}} = 2,667\Omega$$

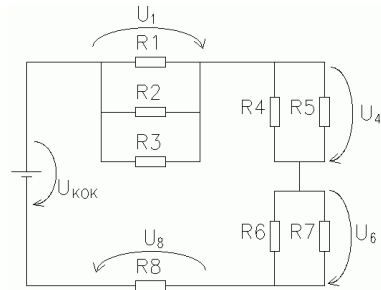
$$I_{KOK} = \frac{U_{KOK}}{R_{KOK}} = \frac{16V}{2,667} = 6,0A$$

$$I_{R1} = \frac{U_{KOK}}{R1} = 2,0A$$

$$I_{R2} = \frac{U_{KOK}}{R2} = 4,0A$$

KIRCHOFFIN JÄNNITELAKI

Virtapiirin lähdejännitteiden summa on sama kuin sen jännitehäviöiden summa



$$U_{KOK} = U_1 + U_4 + U_6 + U_8$$

esimerkki:

$$U_{KOK} = 28V$$

$$U_1 = 8,6V$$

$$U_4 = 6,2V$$

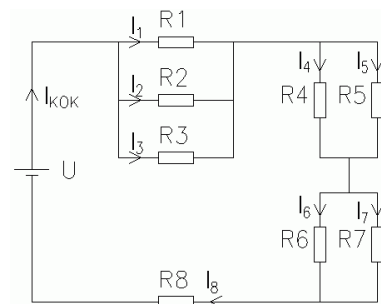
$$U_6 = 3,4V$$

$$U_8 = 9,8V$$

$$U_{KOK} = 8,6V + 6,2 + 3,4V + 9,8V = 28,0V$$

KIRCHOFFIN VIRTALAKI

Pisteeseen tulevien virtojen summa on sama kuin pisteestä lähtevien virtojen summa



$$I_{KOK} = I_1 + I_2 + I_3 = I_4 + I_5 = I_6 + I_7 = I_8$$

esimerkki:

$$I_1 = 2,3A$$

$$I_5 = 4,9A$$

$$I_{KOK} = 2,3A + 2,7A + 3,5A = 8,5A$$

$$I_2 = 2,7A$$

$$I_6 = 4,1A$$

$$I_{KOK} = 3,6A + 4,9A = 8,5A$$

$$I_3 = 3,5A$$

$$I_7 = 4,4A$$

$$I_{KOK} = 4,1A + 4,4A = 8,5A$$

$$I_4 = 3,6A$$

$$I_8 = 8,5A$$

$$I_{KOK} = I_8 = 8,5A$$