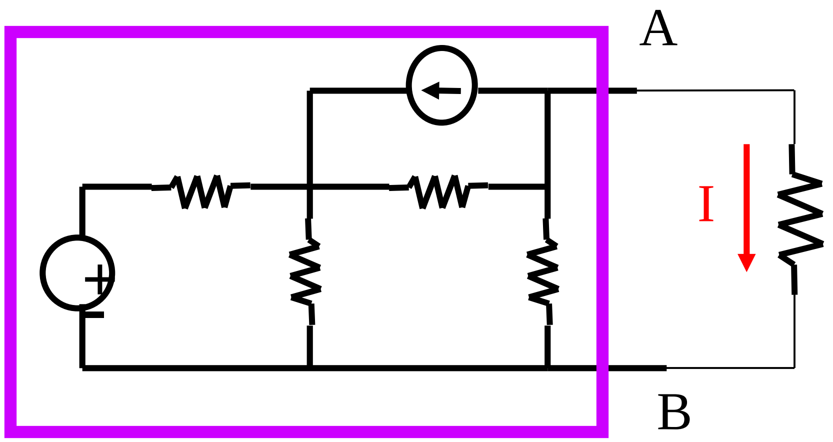
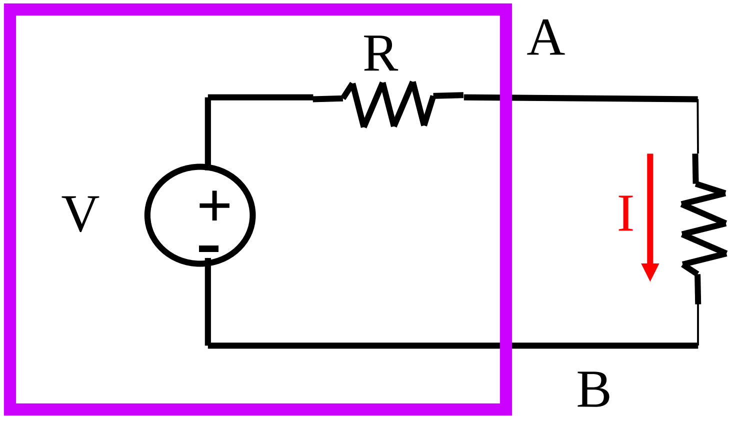
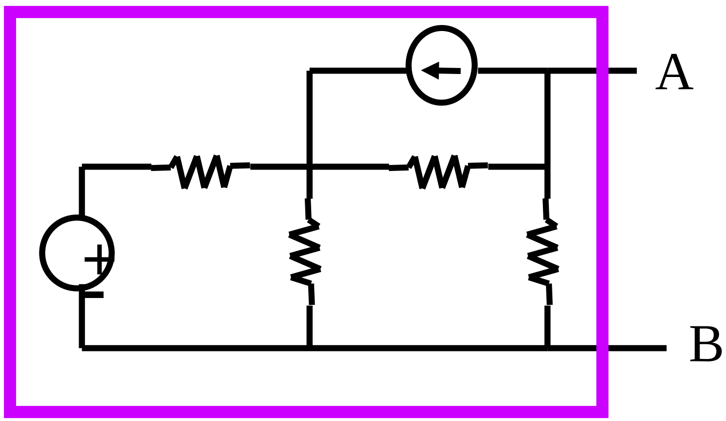
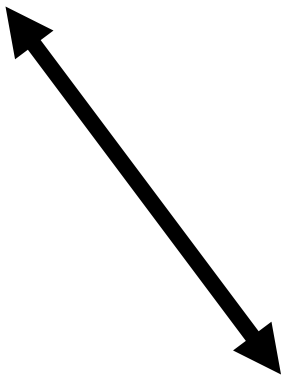
Thevenin’s theorem





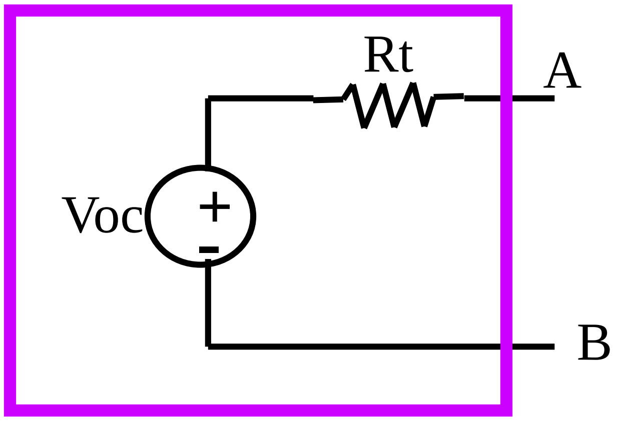
Thevenin's theorem

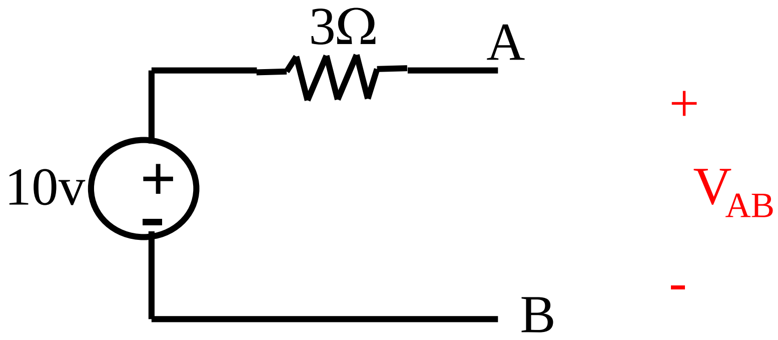




R_t = **?**

V_{oc} = **?**

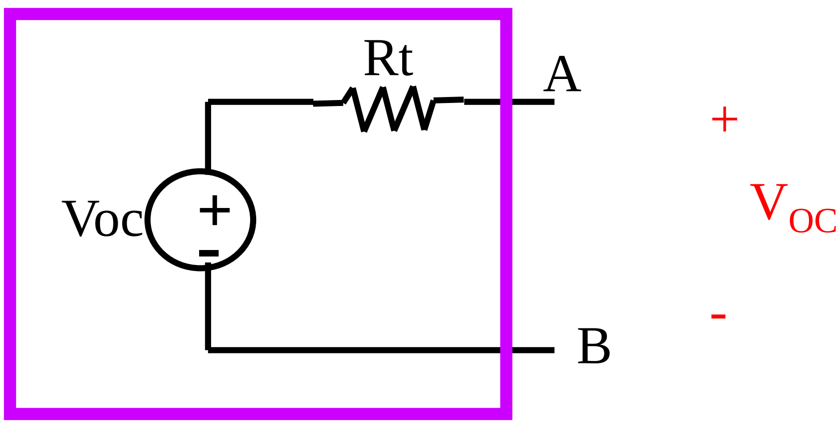




V_{AB} = ?

10v

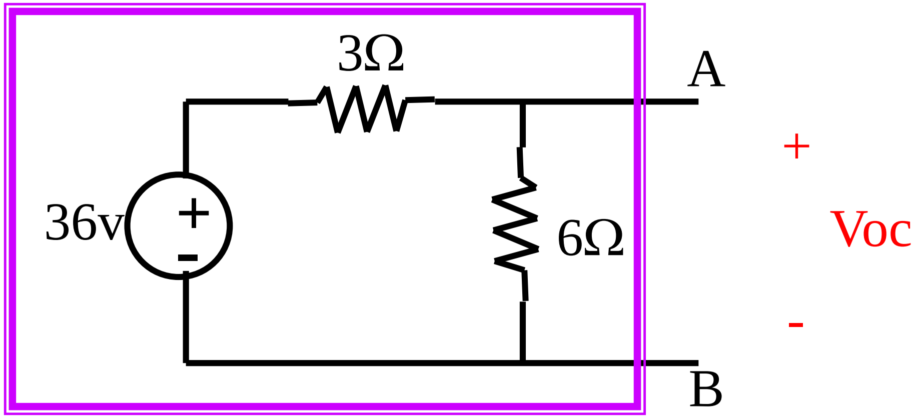
apply KVL to get V_{AB}



$V_{AB} = V_{oc}$

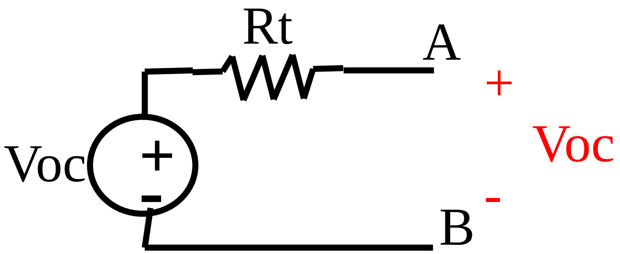
V_{OC} (Open Circuit)

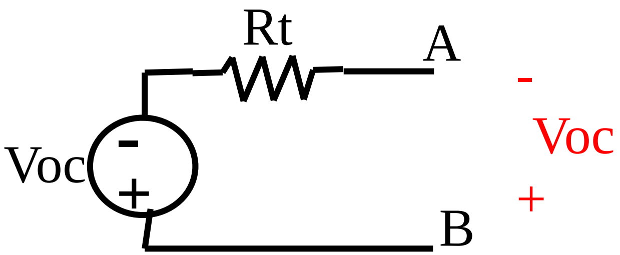
V_{OC}



V_{OC} = ?

V_{OC} (Open Circuit)

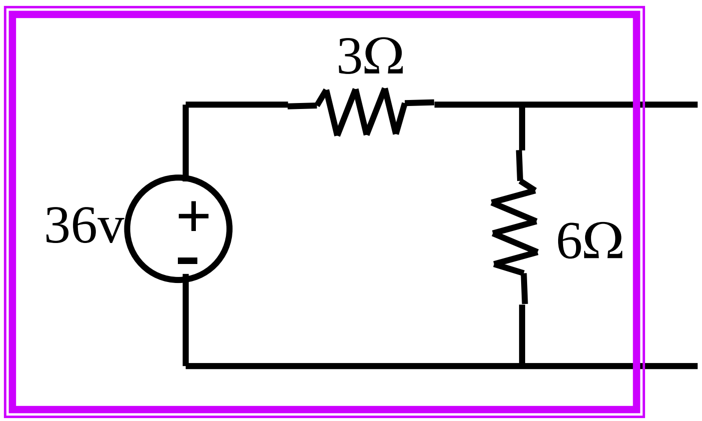


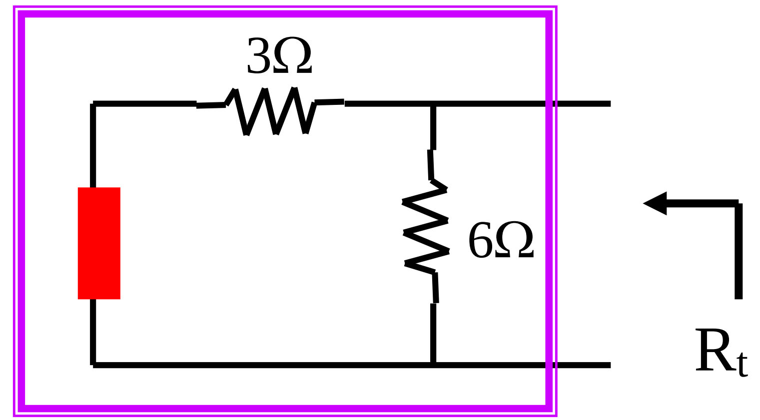


$$V_{OC} = \frac{6}{3+6} * 36 = 24$$

R_t Method 1

- current source □□□□ ***OPEN CIRCUIT***
- voltage source □□□□ ***SHORT CIRCUIT***

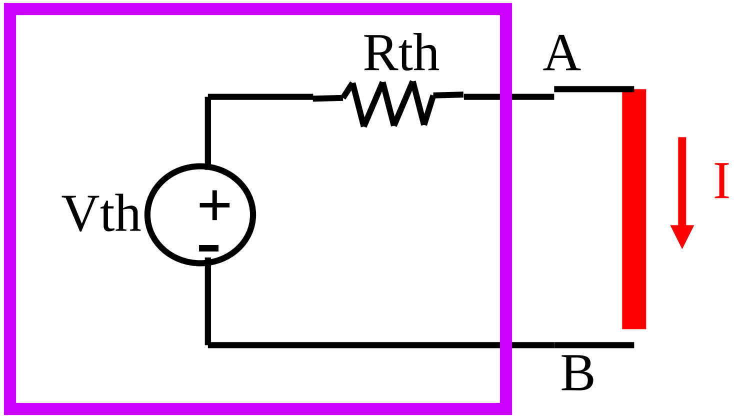




$$R_t = \frac{1}{\frac{1}{3}+\frac{1}{6}} = 2\Omega$$

R_t

Method 2



$I = I_{SC}$

(Short Circuit Current)

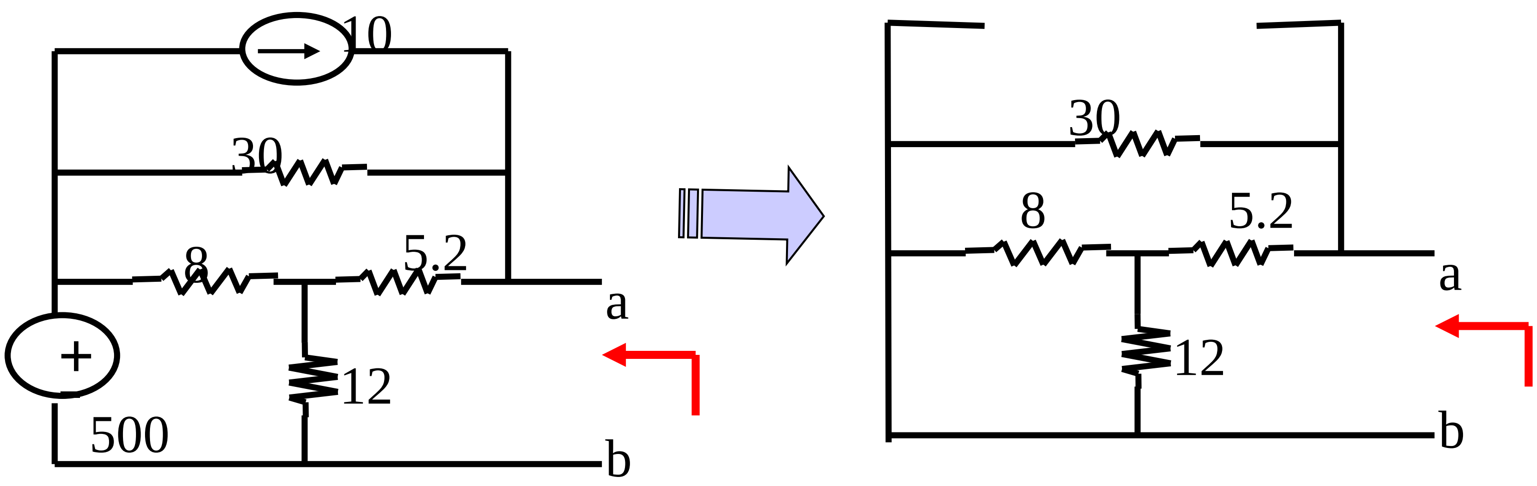
$$R_t = \frac{V_{oc}}{I}$$

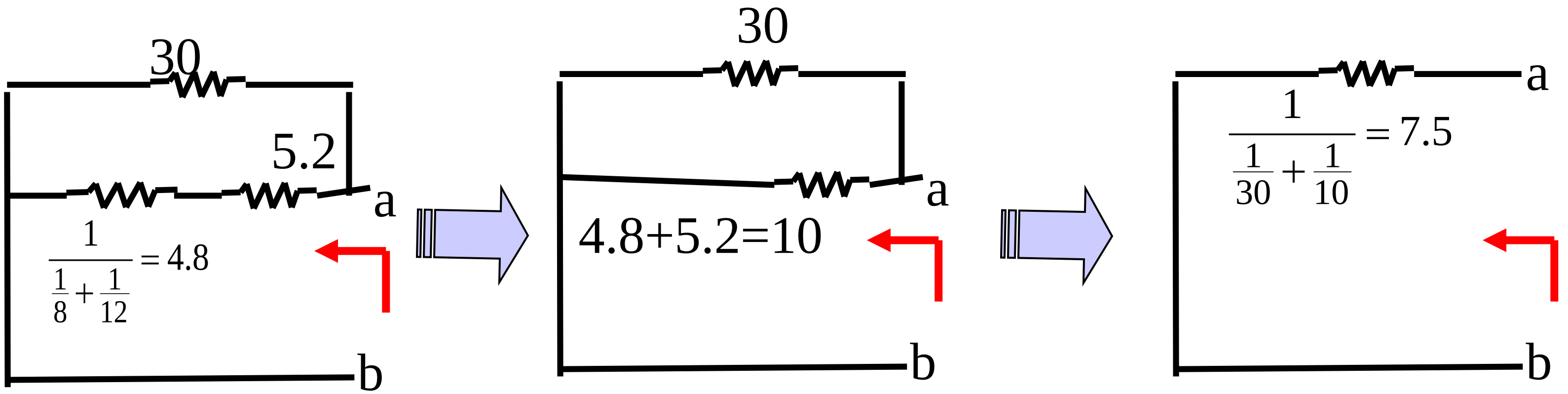
$$R_t = \frac{V_{oc}}{I_{SC}}$$

R_t

Use Method 1

$$R_t = ?$$



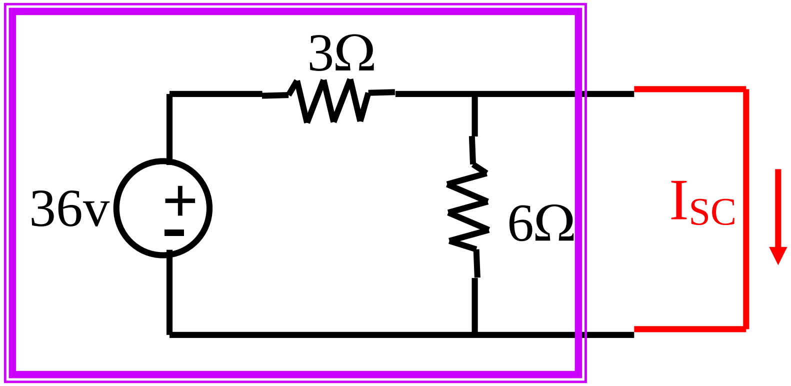


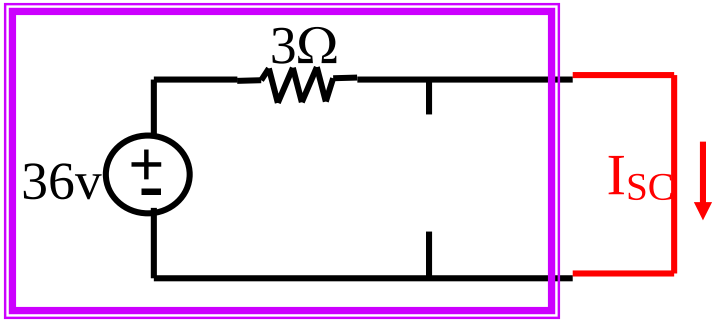
$$R_t = 7.5\Omega$$

R_t

Method 2

$$R_t = \frac{V_{oc}}{I_{SC}}$$

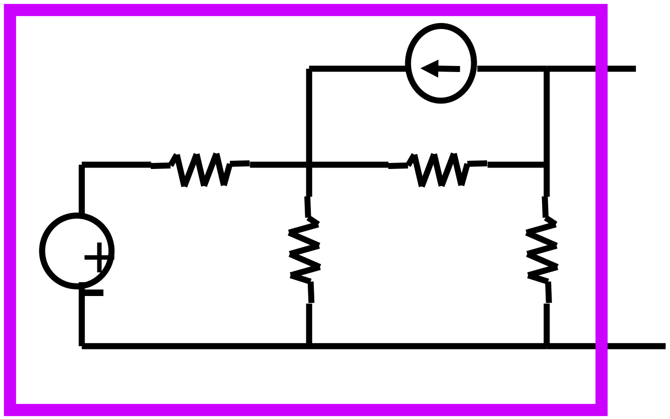


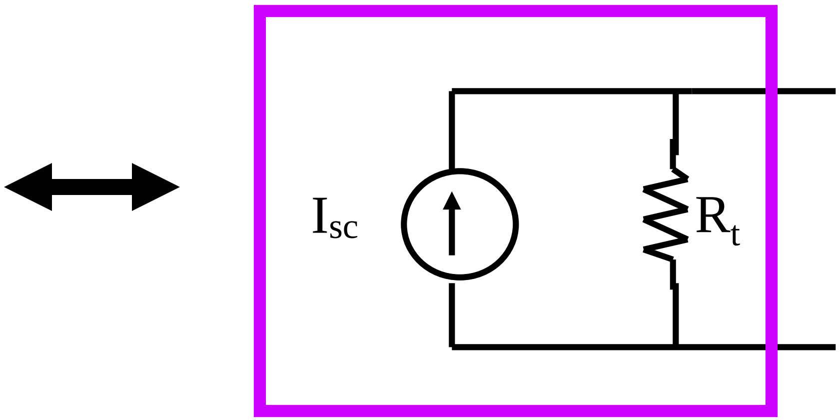


$$I_{SC} = \frac{36}{3} = 12A$$

$$R_t = \frac{V_{oc}}{I_{SC}} = \frac{24}{12} = 2\Omega$$

Norton's theorem

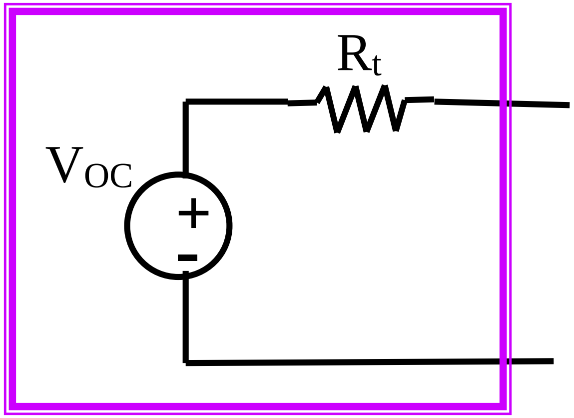


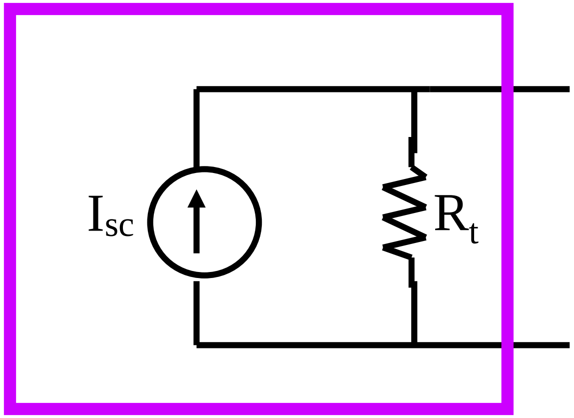


R_t = **?**

I_{sc} = **?**

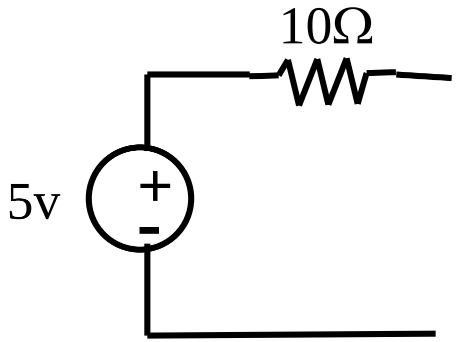
Thevenin ⇦⇨ Norton (Source Transform)



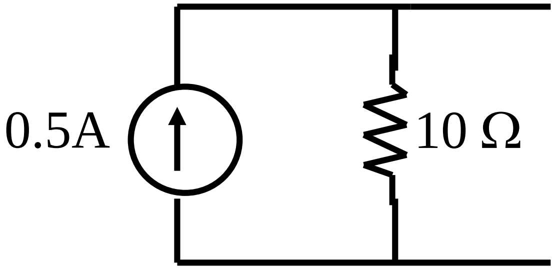


$V_{oc} = I_{SC} R_t$

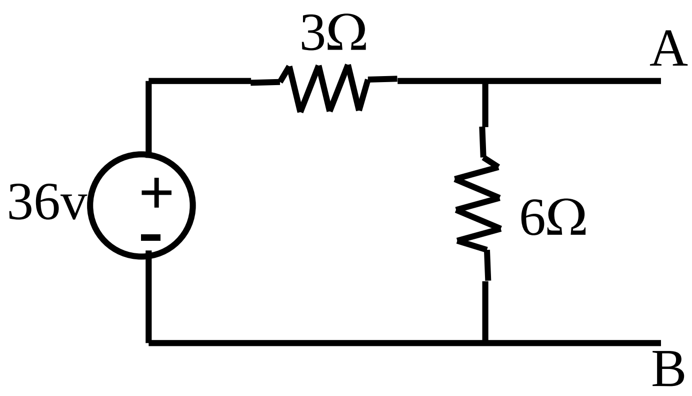
$$I_{sc} = \frac{V_{oc}}{R_t}$$



$$R_t = 10\Omega$$
$$V_{OC} = 5$$

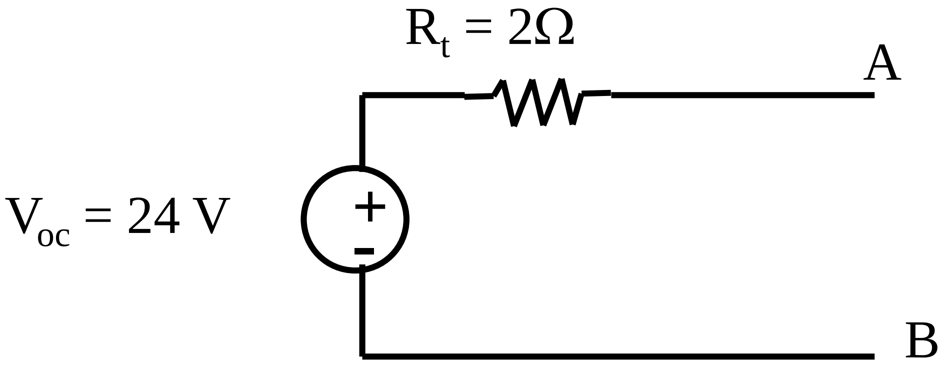


Ex.



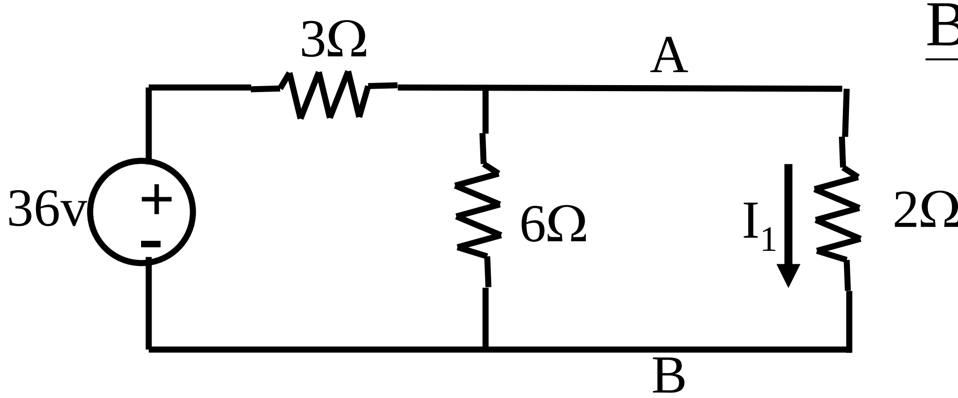
Thevenin equivalent at terminals A and B= ?

$$R_t = 2\Omega \qquad V_{oc} = 24$$

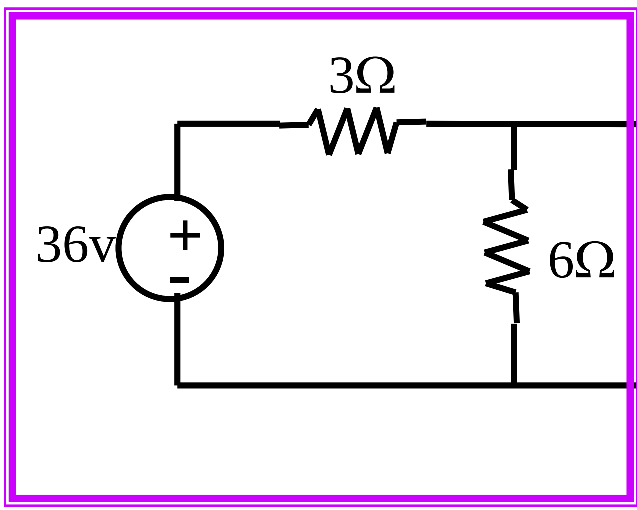


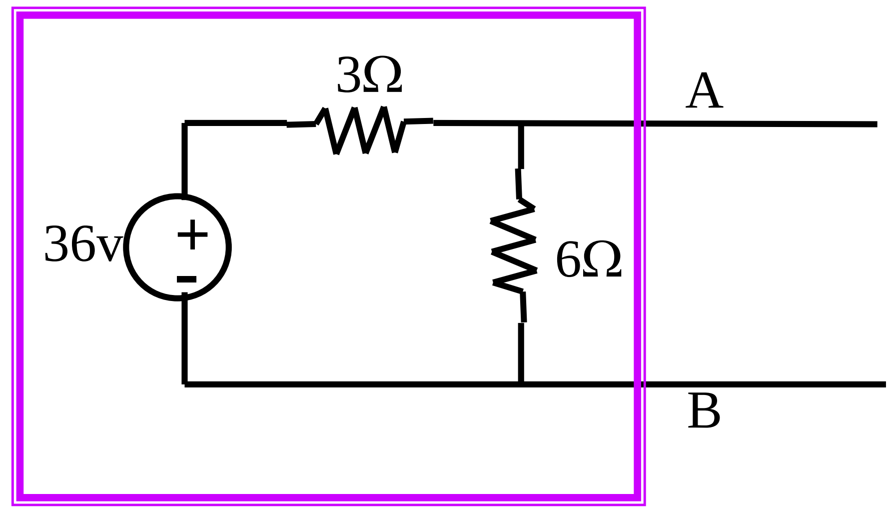
Ex.

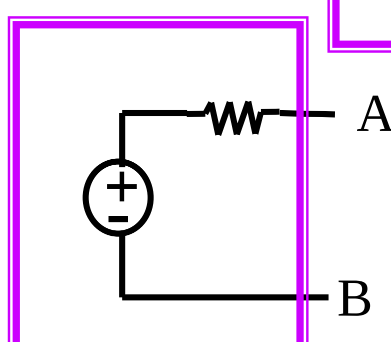
By Thevenin's theorem



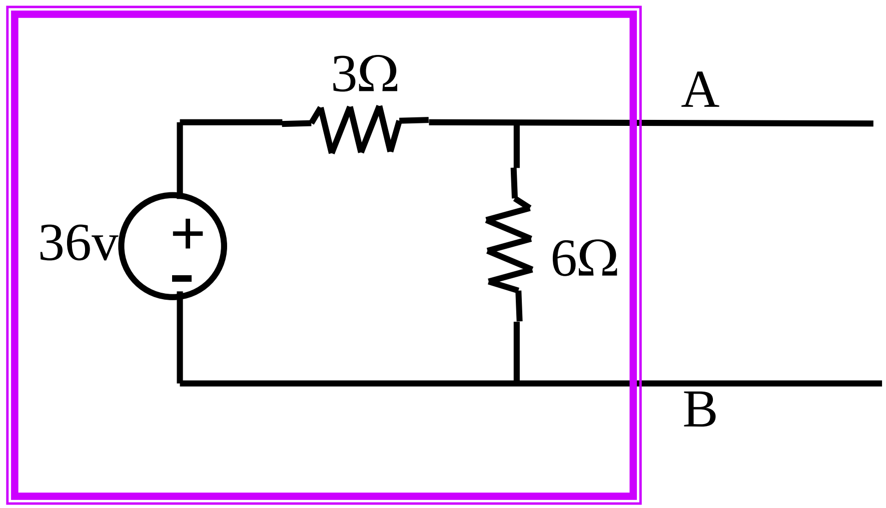
$I_1 = ?$

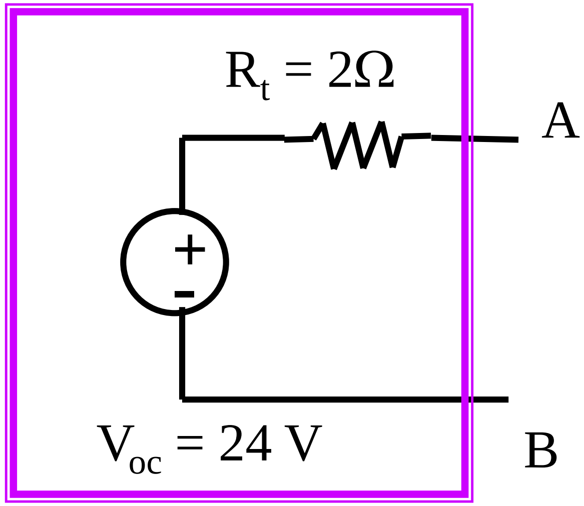


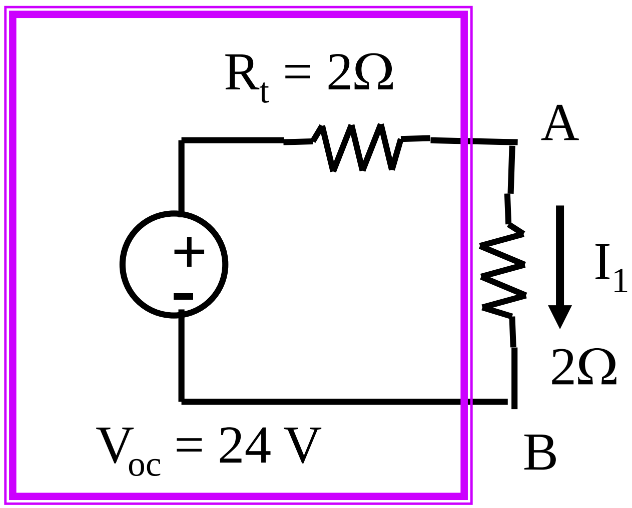




Ex.





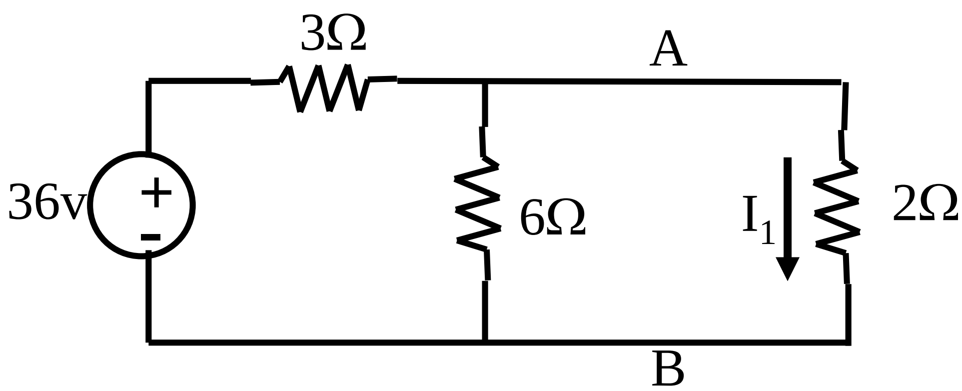


$$\Sigma \mathbf{V} = 0$$

$$24 - 2\mathbf{I}_1 - 2\mathbf{I}_1 = 0$$

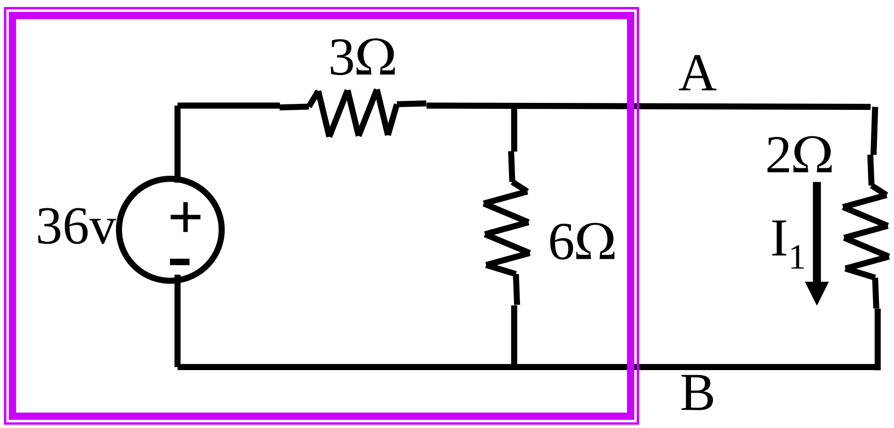
$$\mathbf{I}_1 = 6\ \mathbf{A}$$

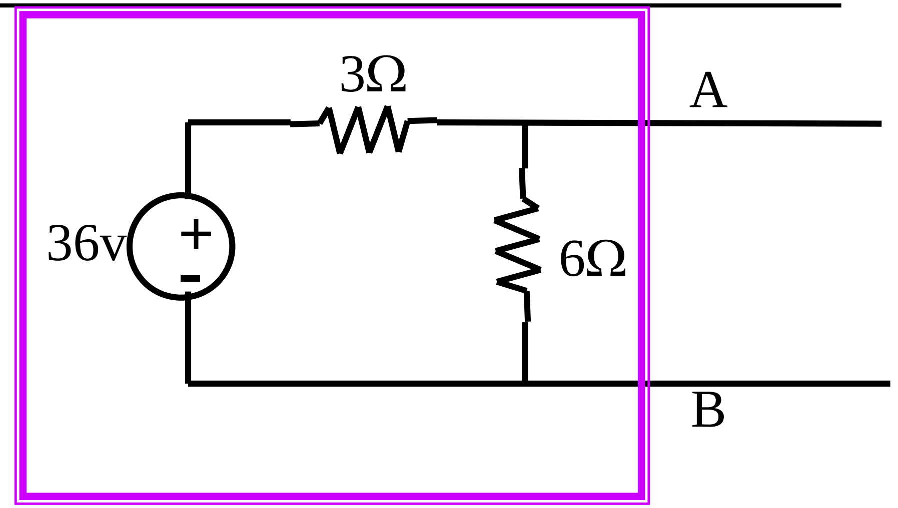
Ex.

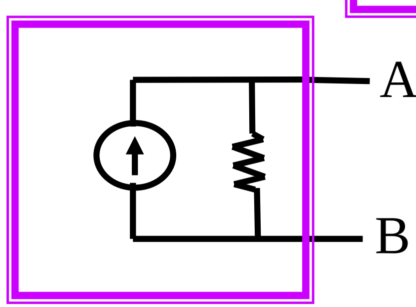


By Norton’s theorem

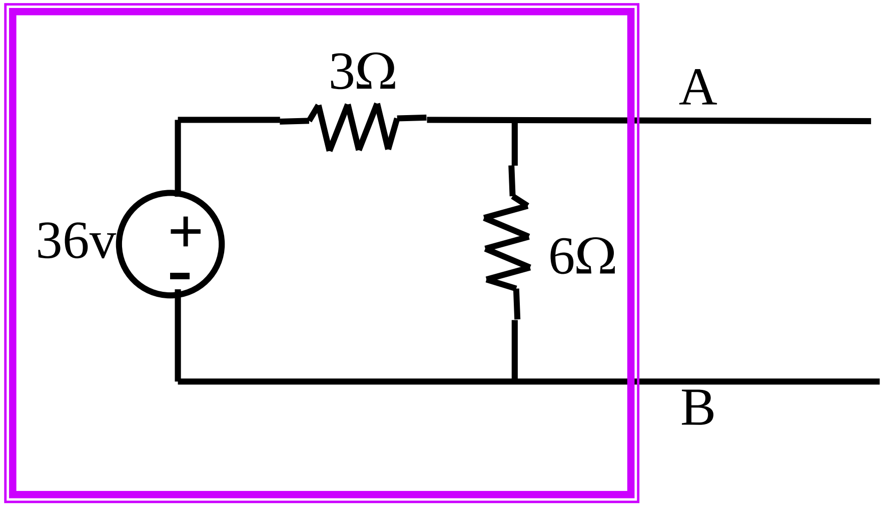
$I_1 = ?$

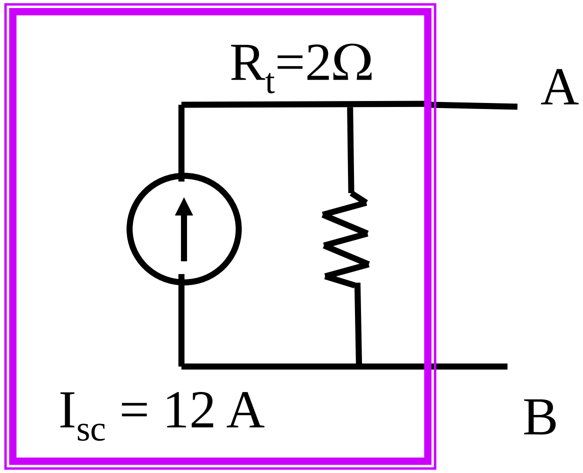


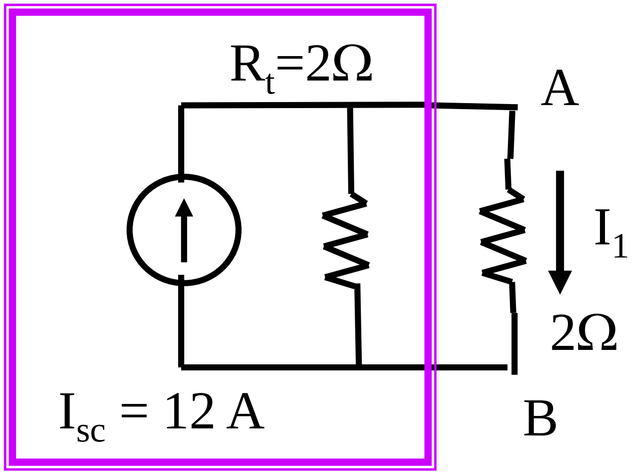




Ex.







$$\mathbf{I}_1 = \left(\frac{2}{2+2}\right)12$$

$$\mathbf{I}_1 = 6\ \mathbf{A}$$