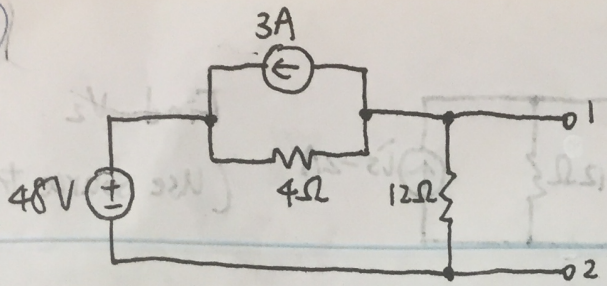
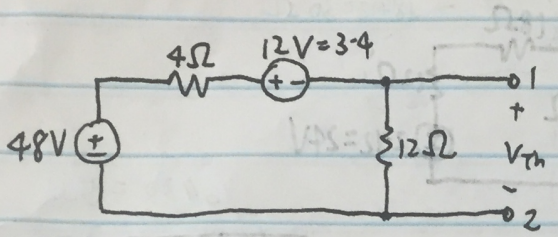
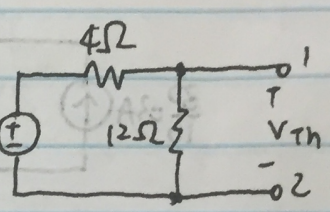
① Find V_{Th} and R_{Th} at terminals 1,2

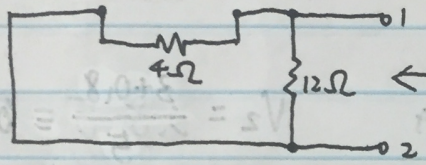




$\Rightarrow$

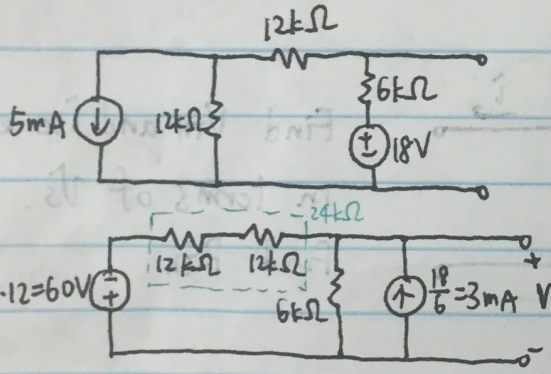


$$V_{Th} = 36 \cdot \frac{12}{12+4} = 27\ V \quad \text{(voltage divider)}$$

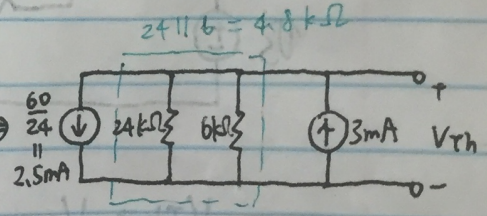


$$R_{Th} = 4 \parallel 12 = 3\ \Omega$$

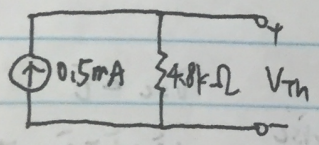
② Find V_{Th}, R_{Th}, and i_{sc}



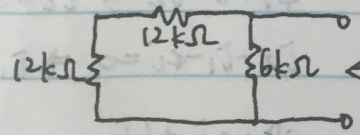
$\Rightarrow$



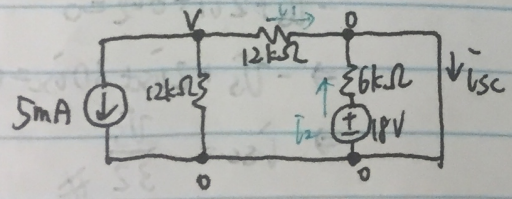
$\Rightarrow$



$$V_{Th} = 0.5 \cdot 4.8 = 2.4\ V$$



$$R_{Th} = (12+12) \parallel 6 = 4.8\ k\Omega$$



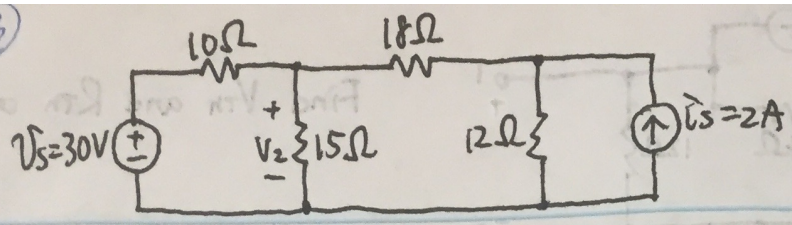
$$\frac{V}{12} + \frac{V}{12} + 5 = 0 \Rightarrow V = -30$$

$$i_1 = \frac{-30-0}{12} = -\frac{5}{2}$$

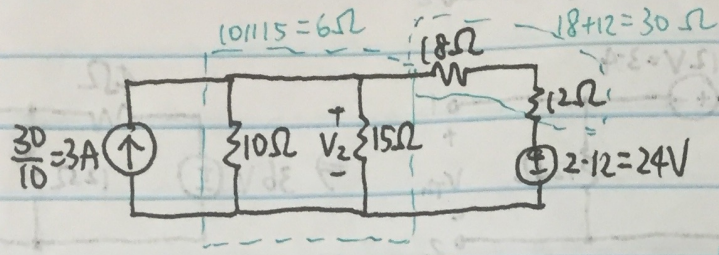
$$i_2 = \frac{18-0}{6} = 3$$

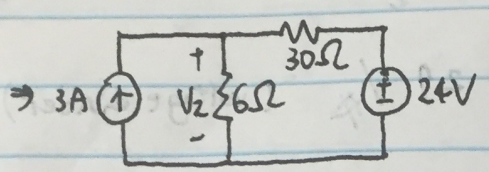
$$i_{sc} = i_1 + i_2 = 0.5\ mA$$

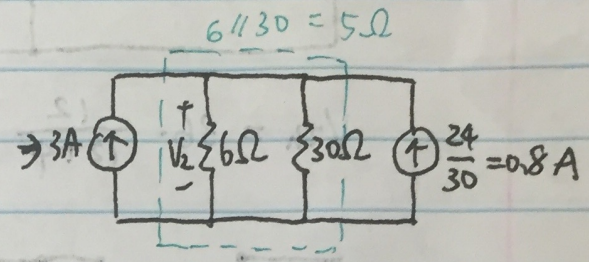
③

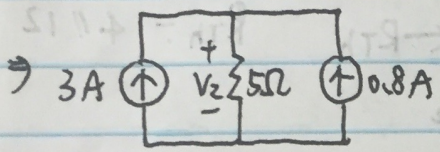


Find V_2.
(Use source transformation)



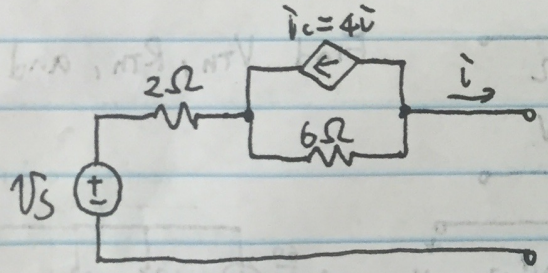






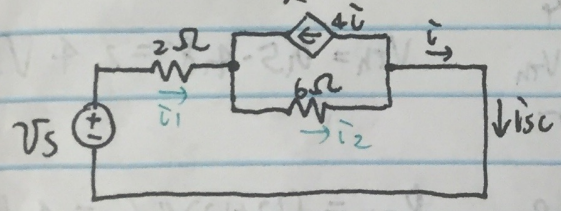
$V_2 = 3.8 \cdot 5 = 19\ V$ #

④



Find V_{Th} and i_{sc} expressed in terms of V_S. Then find R_{Th}.

$V_{Th} = V_S$ #



$i_{sc} = i$

$4i + i = i_2 \Rightarrow i_2 = 5i_{sc}$

$i_2 - i_1 - 4i = 0 \Rightarrow i_1 = i_{sc}$

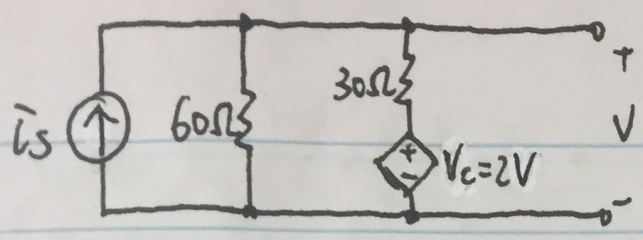
$-V_S + 2i_1 + 6i_2 = 0$

$\Rightarrow -V_S + 2i_{sc} + 30i_{sc} = 0$

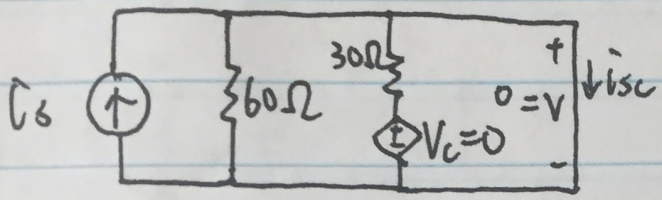
$\Rightarrow i_{sc} = \frac{V_S}{32}$ #

$R_{Th} = \frac{V_{Th}}{i_{sc}} = 32\ \Omega$ #

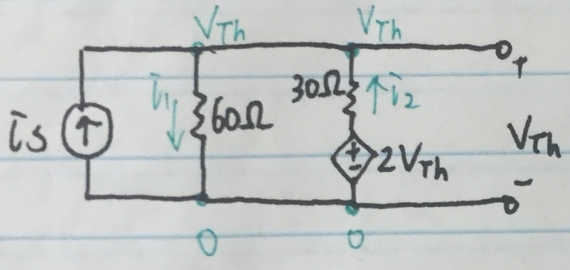
(5)



Find V_{Th}, R_{Th}, i_{sc} (in terms of i_s)



$i_{sc} = i_s$ #



$i_2 = \frac{2V_{Th} - V_{Th}}{30} = \frac{V_{Th}}{30}$

$i_1 = \frac{V_{Th}}{60}$

KCL: $-i_s + i_1 - i_2 = 0$

$\Rightarrow -i_s - \frac{V_{Th}}{60} = 0$

$\Rightarrow V_{Th} = -60\, i_s$ #

$R_{Th} = \frac{V_{Th}}{i_{sc}} = -60\,\Omega$ #