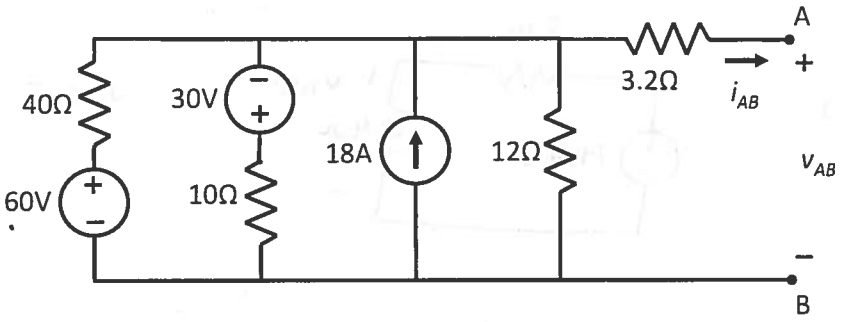
ECSE-200 Quiz # 5 (maximum number of unit spheres that can be arranged to touch a central unit sphere in 3 dimensions Oct 2018)

NAME_____ McGill ID#_____

READ each question carefully. Do your work independently. SHOW ALL YOUR WORK. Give units on your answers (where appropriate).

1) Write the equation that relates open circuit voltage v_{oc}, short circuit current i_{sc} and Thévenin resistance R_T. [1pt]

Consider the circuit diagram.



2) What is the Thévenin equivalent circuit (voltage source in series with resistance) with respect to the terminals A and B? [3pts]

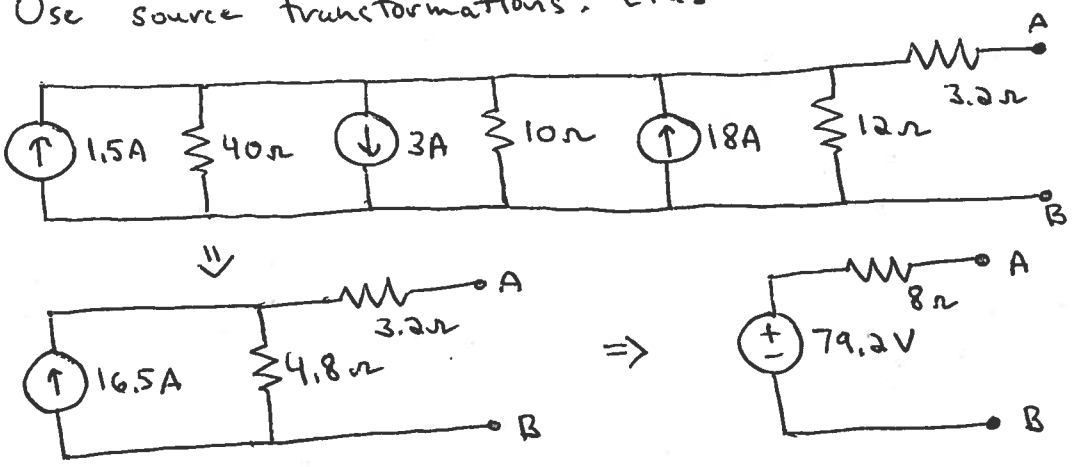
3) Draw the diagram of i_{AB} versus v_{AB}. Clearly indicate in your diagram the open circuit voltage and short circuit current. [2pts]

4) What is v_{AB} if a 16 Ω resistor is attached across terminals A and B? [1pt]

5) What is v_{AB} if a 4 Ω resistor is attached across terminals A and B? [1pt]

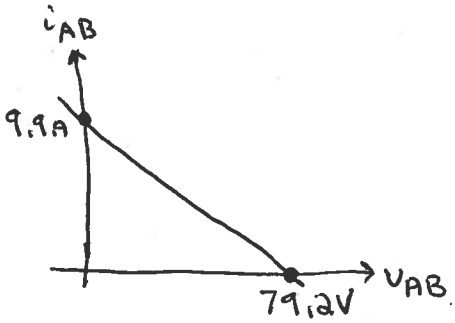
1) $v_{oc} = i_{sc} \cdot R_T$ [+1]

2) Use source transformations. [+2]



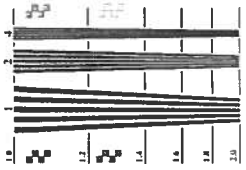
[+1]

3)

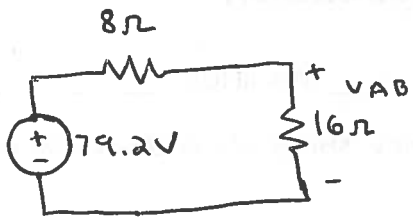


$i_{sc} = \frac{79.2V}{8\Omega} = 9.9A$

[+1] for shape
[+1] for values



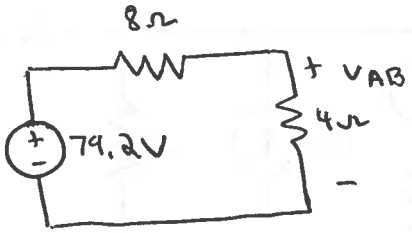
4)



$$V_{AB} = \frac{79.2V \cdot 16\Omega}{8\Omega + 16\Omega}$$

$$= 52.8V \quad [+1]$$

5)



$$V_{AB} = \frac{79.2V \cdot 4\Omega}{8\Omega + 4\Omega}$$

$$= 26.4V \quad [+1]$$