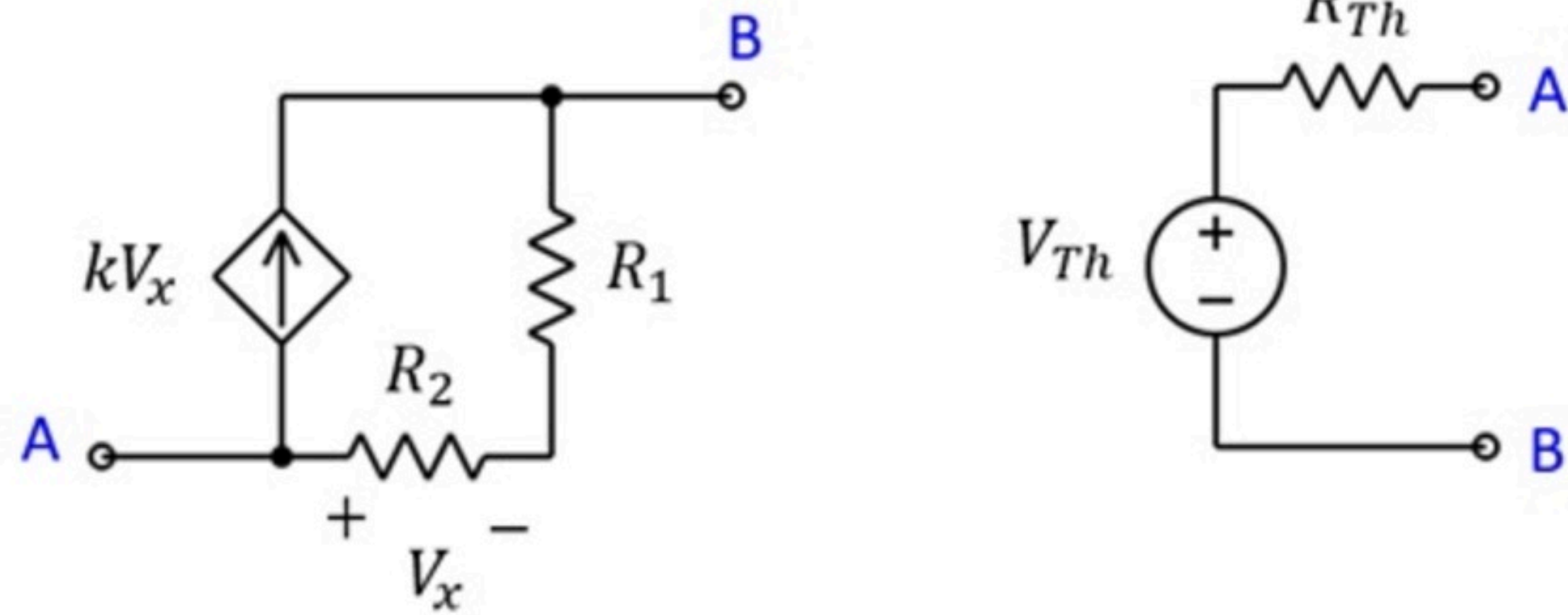


Circuit theorems 014

Problem has been graded.

The circuit on the right represent the Thevenin model of the circuit on the left. Find the value of V_{Th} and R_{Th} .



Given Variables:

R_1 : 4 ohm

R_2 : 2 ohm

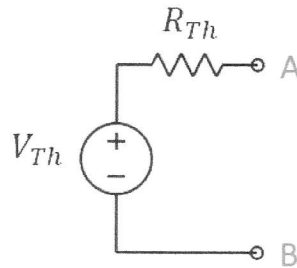
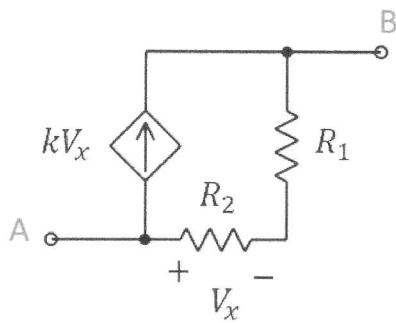
k : -2 A/V

Calculate the following:

V_{th} (V) :

R_{th} (ohm) :

The circuit on the right represent the Thevenin model of the circuit on the left. Find the value of V_{Th} and R_{Th} .

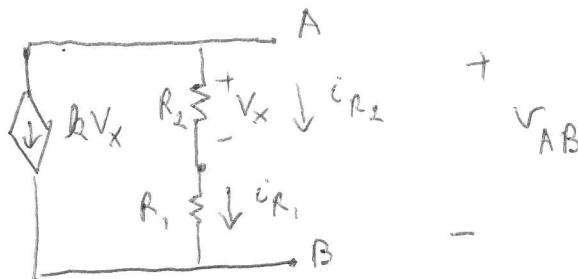


$$R_1 = 4 \Omega$$

$$R_2 = 2 \Omega$$

$$k = -2 \text{ A/V}$$

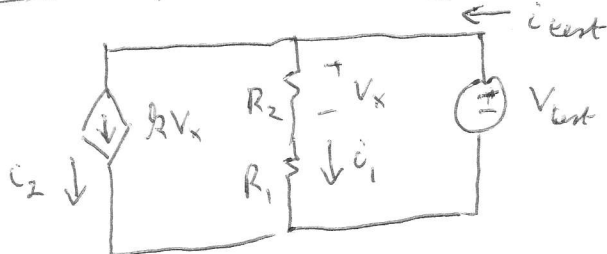
REDRAW:



① LEAVE A-B OPEN: KCL: $kV_x + \frac{V_x}{R_2} = 0 \Rightarrow (k + \frac{1}{R_2})V_x = 0 \Rightarrow V_x = 0$

$\Rightarrow i_{R_2} = i_{R_1} = 0 \text{ A} \Rightarrow V_{AB} = 0 \Rightarrow \boxed{V_{TH} = 0 \text{ V}}$

② FOR R_{TH} , APPLY TEST VOLTAGE



$$i_1 = \frac{V_{test}}{R_1 + R_2}$$

$$i_2 = kV_x = k V_{test} \frac{R_2}{R_1 + R_2}$$

voltage divider

$$i_{test} = i_1 + i_2 = V_{test} \frac{(1 + kR_2)}{R_1 + R_2}$$

$$\Rightarrow R_{TH} = \frac{V_{test}}{i_{test}} = \frac{R_1 + R_2}{1 + kR_2} = \frac{4 + 2}{1 + (-2)2} = \frac{6}{-3}$$

$$\boxed{R_{TH} = -2 \Omega}$$