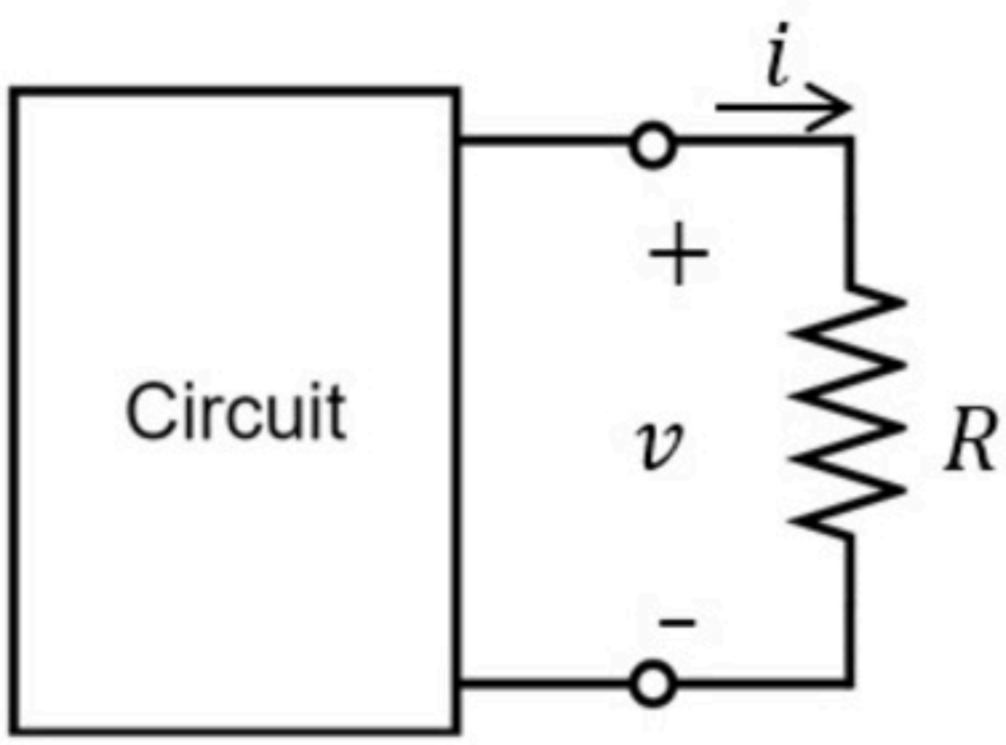
Circuit theorems 004

Unlimited Attempts.

The box contains a linear circuit.
When $R = R_1$, we measure $i = I_1$.
When $R = R_2$, we measure $i = I_2$.

What value of $R = R_3$ results in $i = I_3$?

What is the maximum value of $i = i_{max}$ that can be achieved (assuming of $R \geq 0$)?



Given Variables:

R1 : 1 ohm

R2 : 3 ohm

I1 : 10 A

I2 : 6 A

I3 : 2 A

Calculate the following:

R3 (ohm) :

---

imax (A) :

Hint: Replace the circuit by its Thevenin model

The box contains a linear circuit.
When $R = R_1$, we measure $i = I_1$.
When $R = R_2$, we measure $i = I_2$.

What value of $R = R_3$ results in $i = I_3$?

What is the maximum value of $i = i_{max}$ that can be achieved (assuming of $R \geq 0$)?

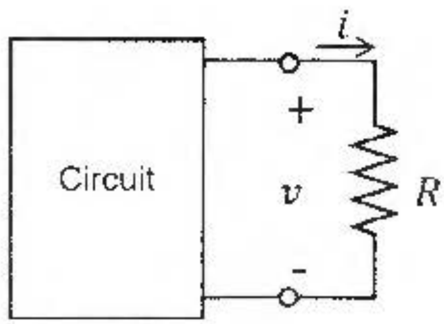
R1 = 5 ohm

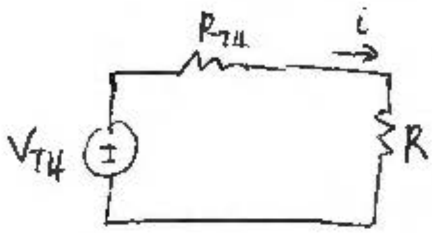
R2 = 8 ohm

I1 = 4 A

I2 = 3 A

I3 = 2 A





(1) $4 = \frac{V_{TH}}{R_{TH}+5} \Rightarrow 4R_{TH} + 20 = V_{TH}$

(2) $3 = \frac{V_{TH}}{R_{TH}+8} \Rightarrow 3R_{TH} + 24 = V_{TH}$

$\overset{(1)-(2)}{\Longrightarrow}$ $R_{TH} = 4\,\Omega$

$V_{TH} = 36\,V$

(a) $I_3 = 2 = \frac{V_{TH}}{R_{TH}+R} = \frac{36}{4+R} \Rightarrow R + R_{TH} = 18 \Rightarrow \boxed{R = 14\,\Omega}$

(b) i_{MAX} WHEN $R=0 \Rightarrow i_{MAX} = \frac{V_{TH}}{R_{TH}} = \frac{36}{4} = 9$

$\boxed{i_{MAX} = 9\,A}$