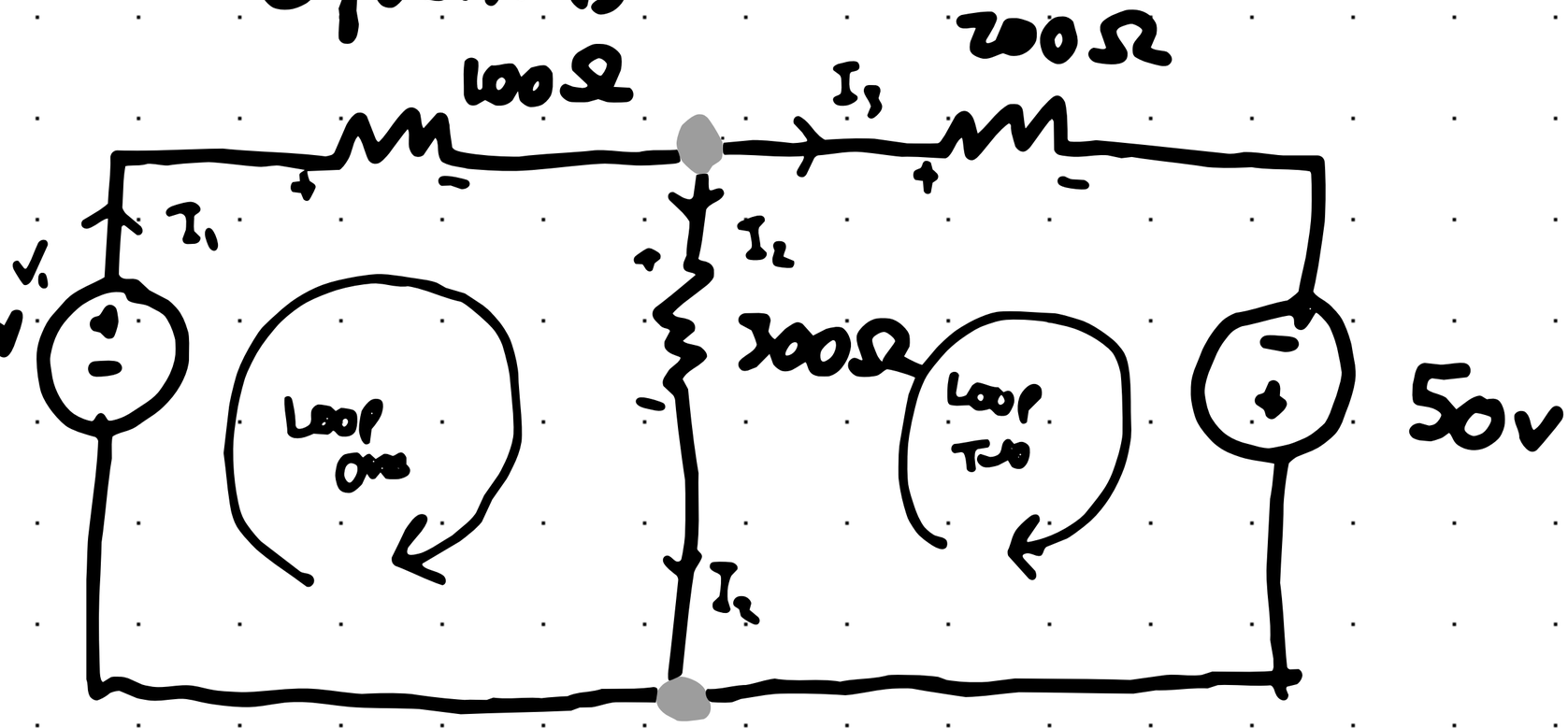
Lecture 3

Reminder:

KCL $\sum I = 0$

KVL $\sum V = 0$

Ex Write the current and voltage equations



Reminder! The direction doesn't matter, but if your assumption comes out negative, the assumption isn't right.

Equation One:

$V = IR$

$I_1 - I_2 - I_3 = 0$

Equation Two: Loop one

$100 - 100I_1 - 300I_2 = 0$

Equation Three

$300I_2 - 200I_3 + 50 = 0$

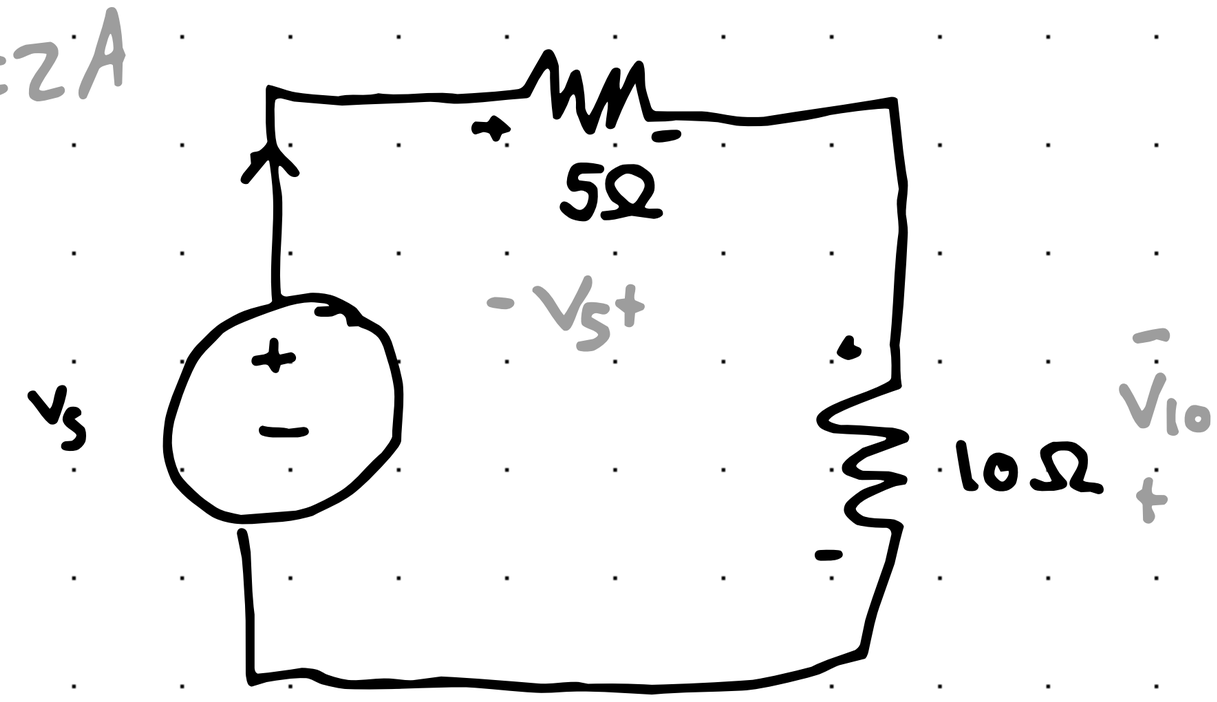
If we used the outer loop... (Redundant)

$100 - 100I_1 - 200I_3 + 50 = 0$

Either use Two inners or one inner, and one outer.

Calculate the value of V_5 and V_5 and V_{10}

$i = 2A$



This guy is easy for opposite polarities from the voltage!

$$\sum_i v = 0$$

$$V_5 - 5\Omega i - 10\Omega i = 0$$

(2) (2)

$V_5 = 30V$

$V_5 = 10V$

$V_{10} = 20V$

and for reverse polarities!

$V_5 = 30V$

$V_8 = -10V$

$V_{10} = -20V$

Power

$$P = Vi = I^2R = \frac{V^2}{R}$$

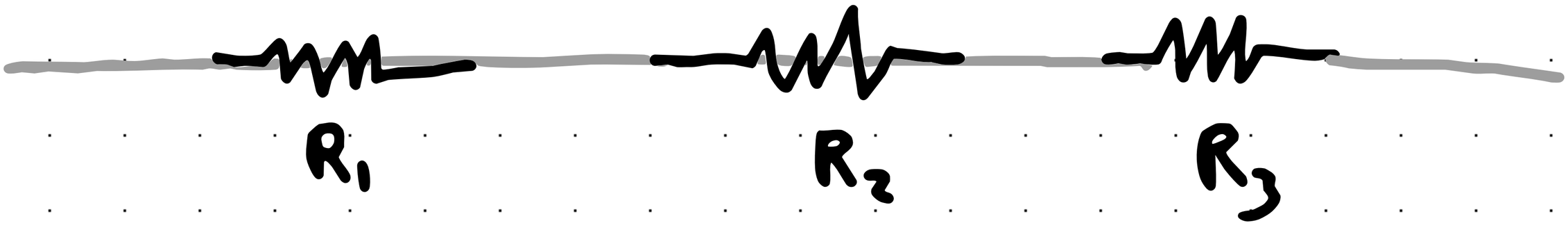
If P is $+$, the power is Absorbed

If P is $-$, the power is Generated

Just a reminder!!!! :)

Resistor Networks

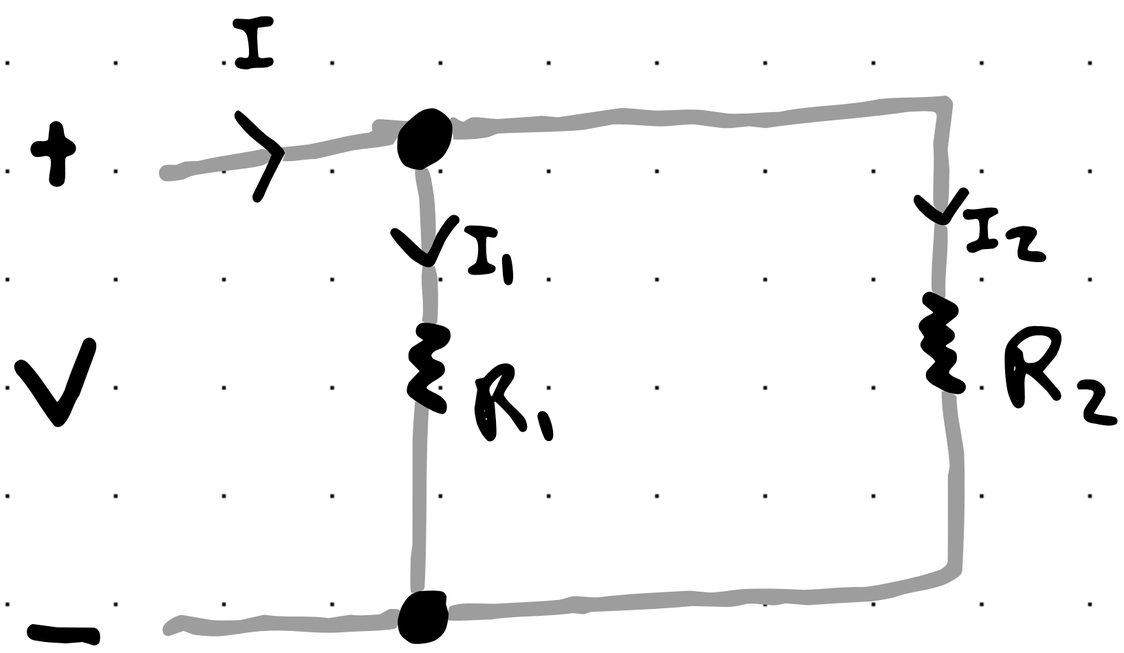
In Series...



It's the same thing!!

Remember to sum Resistors in Series

In parallel...



$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$

R_T = Total Equivalent Resistance

For any resistor connected in parallel,

$$\frac{1}{R_T} = \sum_{i=1}^{n} \frac{1}{R_i}$$

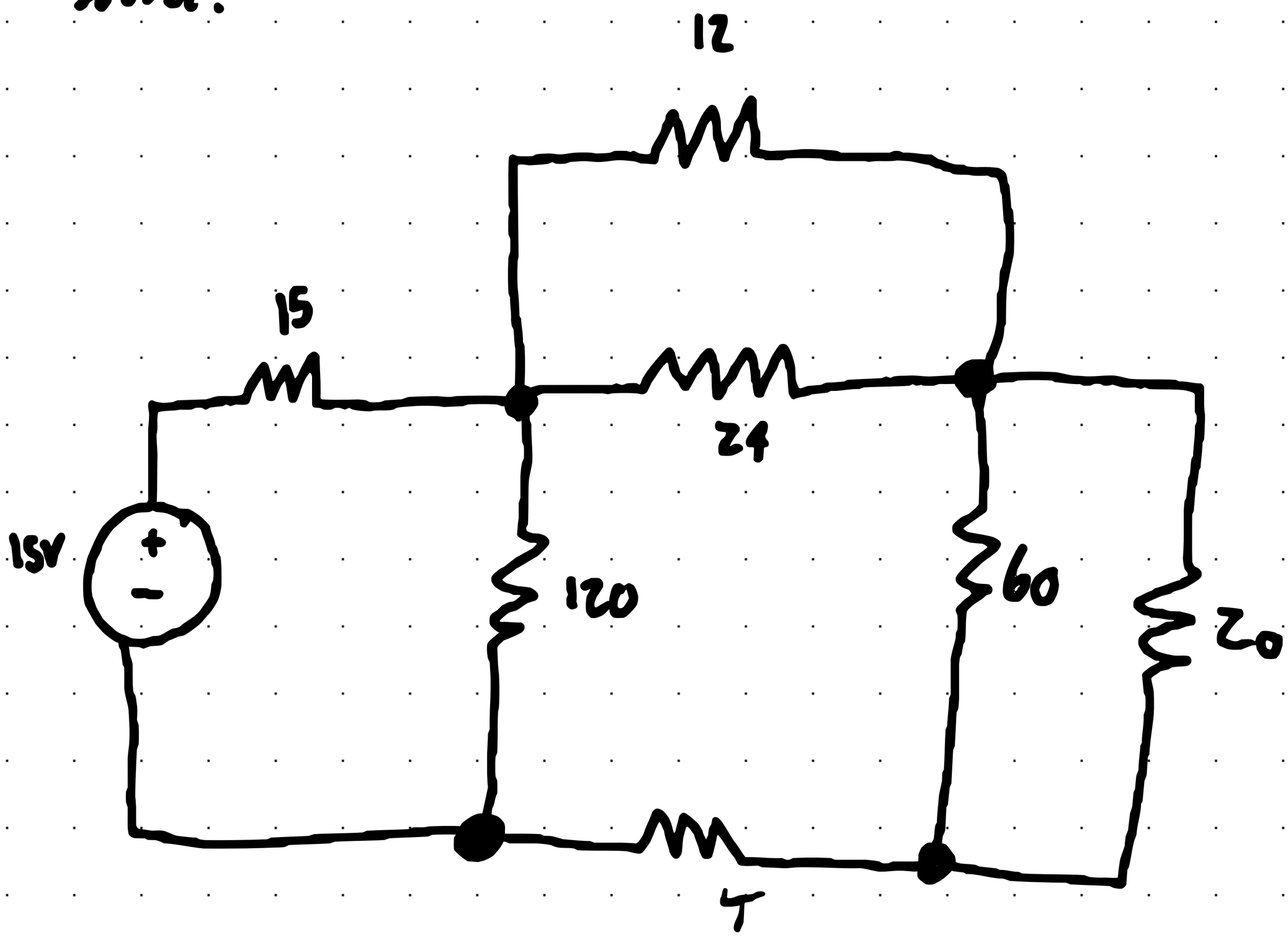
Quick trick for only two resistors!

(in parallel)

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{R_2 + R_1}{R_1 R_2}$$ (like denominators)

$$R_t = \frac{R_1 R_2}{R_1 + R_2}$$

Find the equivalent resistance seen by the voltage source.

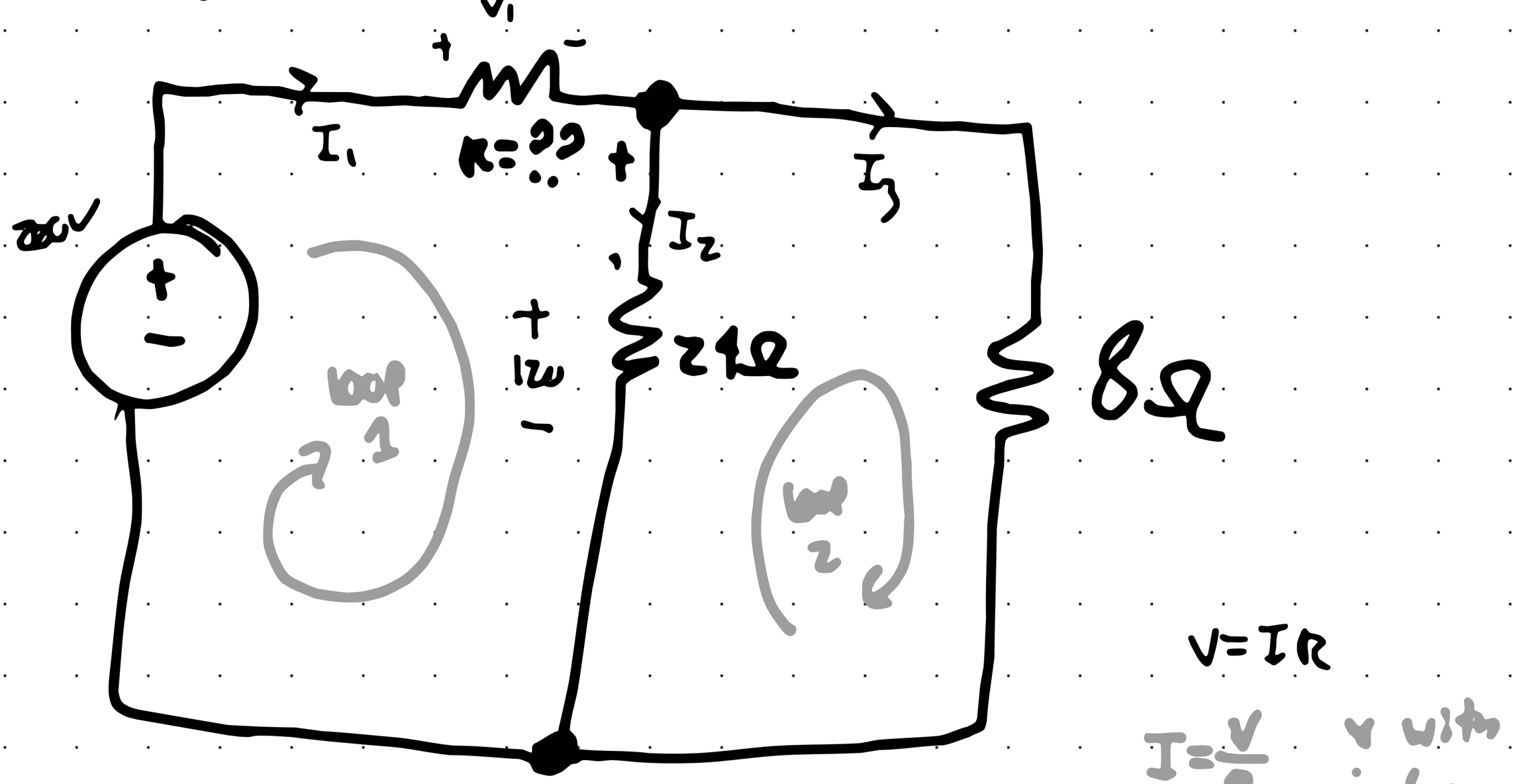


use the resistor formula!

$R_T = 39\Omega$

Use KVL and KCL to solve the following problem

Find the value of R_3 and find the unknown voltages and currents.



$V = IR$

$I = \frac{V}{R}$ V with just one voltage source!

$I_1 - I_2 - I_3 = 0$

$200 - I_1 R_1 - 120 = 0$

$-24 I_2 - 8 I_3 = 0$

$\frac{R_1 R_2}{R_1 + R_2}$

$V = I_2 R_2$

$120 = I_2\ 24$

$-24(5) = 8 I_3$

$I_2 = 5A$

$I_3 = -15A$

$I_1 = 20A$

$R_1 = 4\Omega$

$V_1 = 80V$