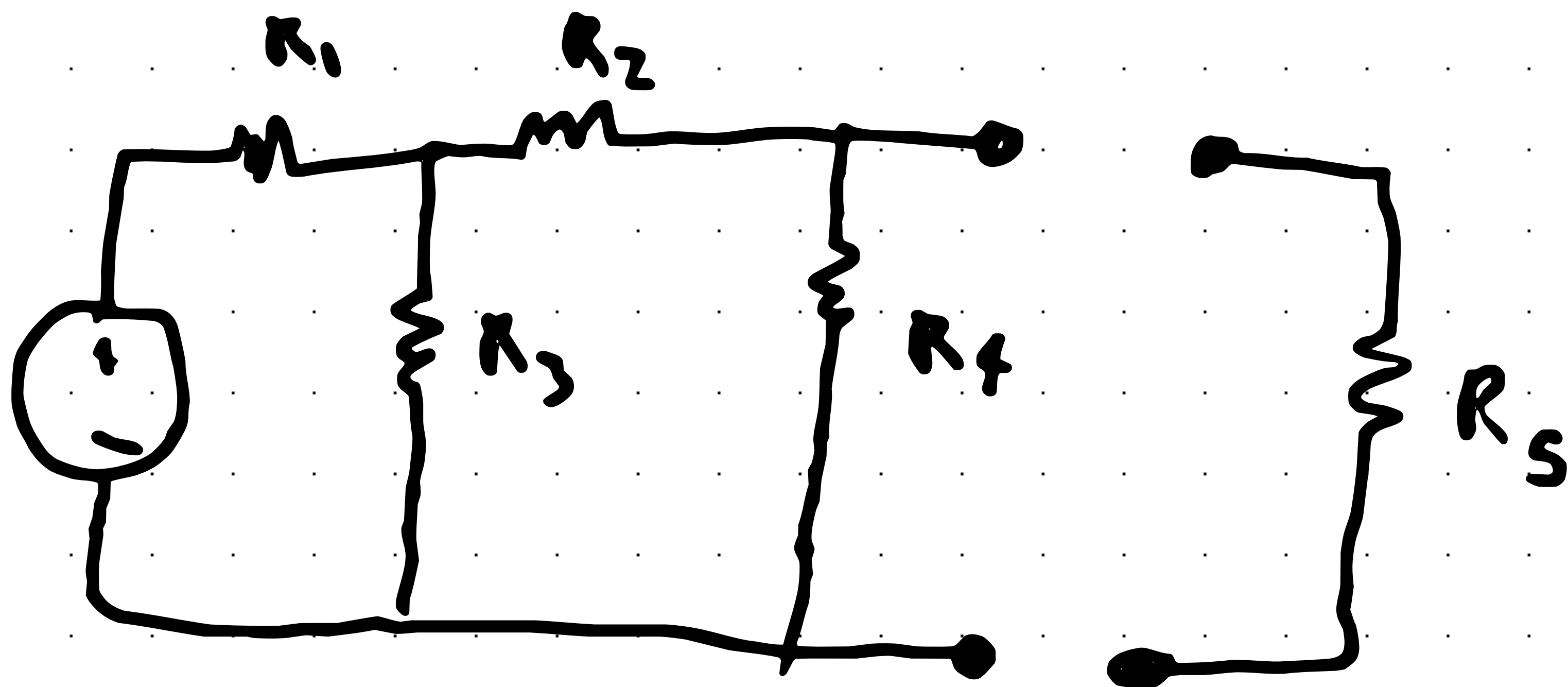


Tutorial One

Open Circuit (O.C)



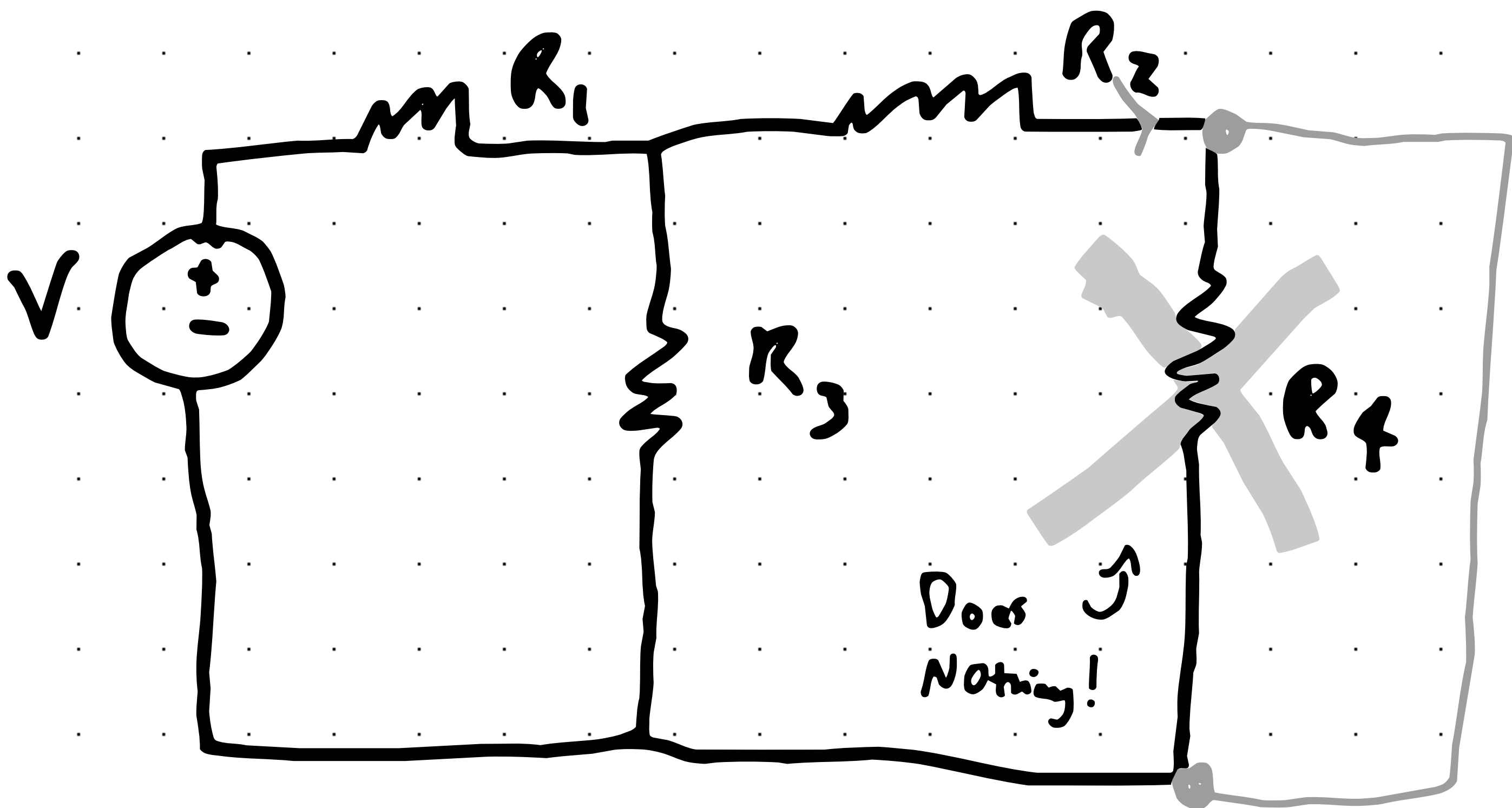
For an open circuit:

$$I = 0$$

But There is voltage!

would you stick your finger in
an outlet?

Short Circuit (S.C)



Why would i go through a resistor when it doesn't have to?

Currents pre fer lower resistance values.

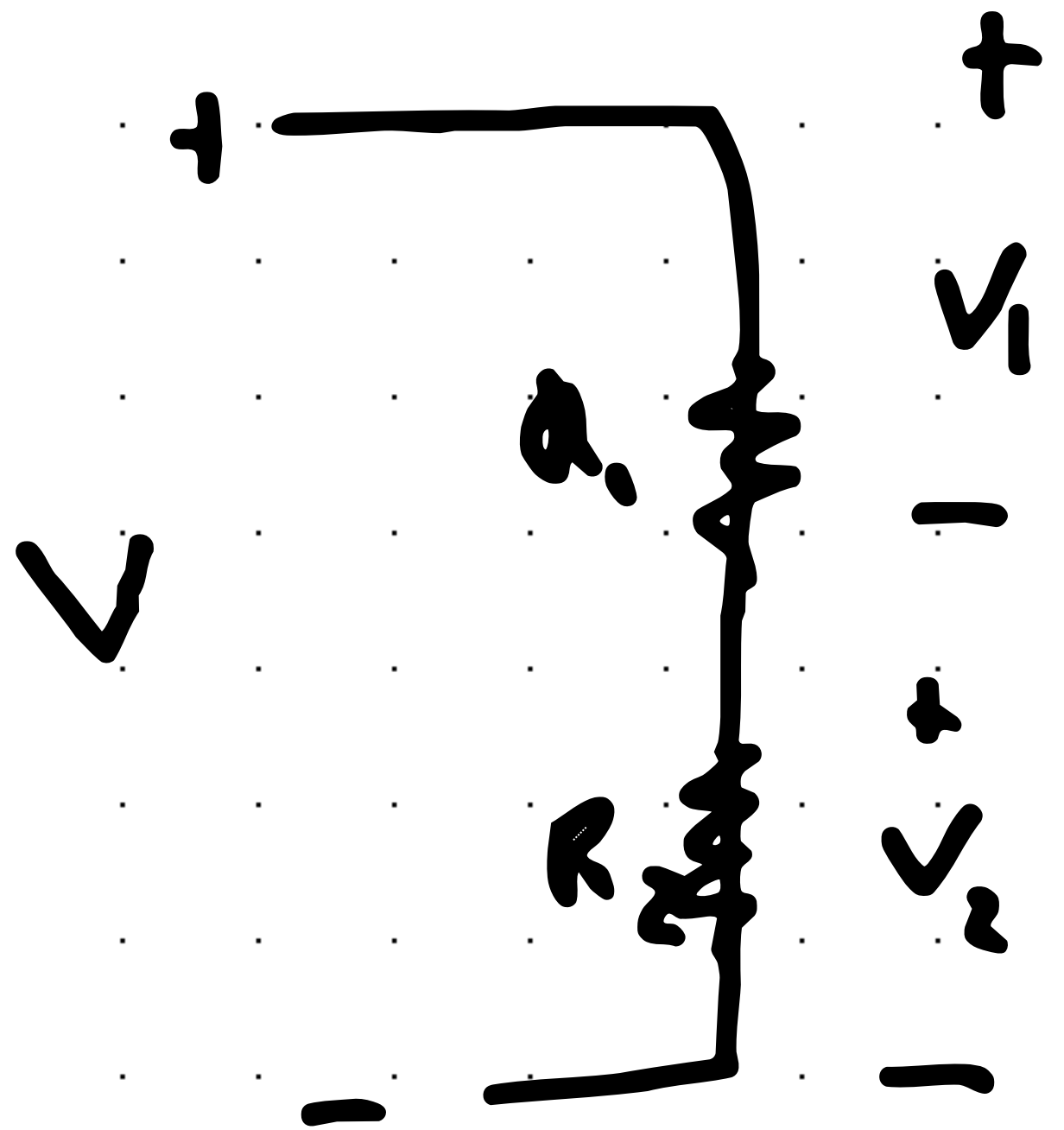
There is a current in the short circuit branch, but the voltage is equal to zero.

$$V = I(0) / R$$

Voltage divider

$$V_1 = \left(\frac{R_1}{R_1 + R_2} \right) V$$

$$V_2 = \left(\frac{R_2}{R_1 + R_2} \right) V$$

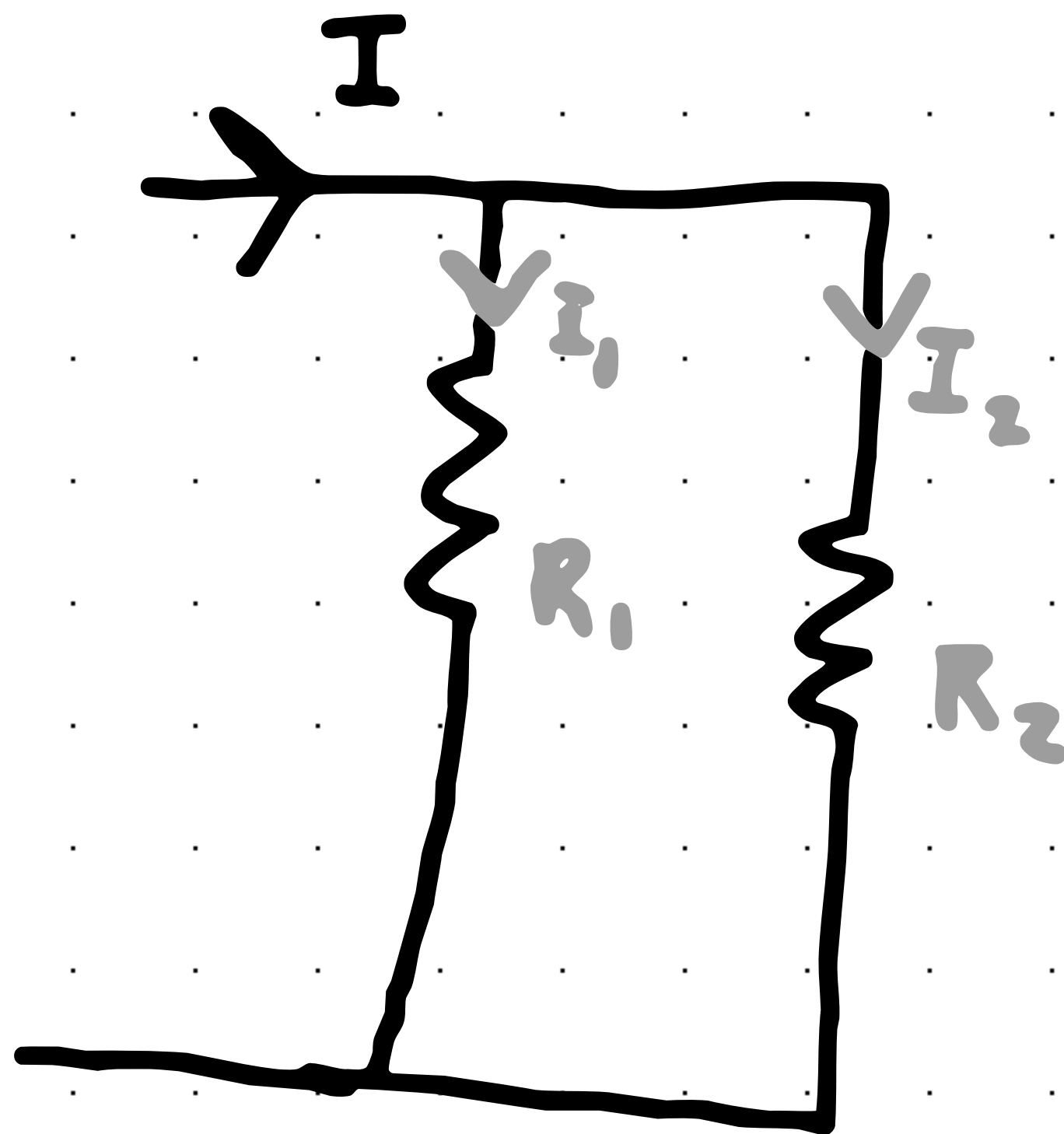


This applies for resistors in series!

Current divider

$$I_1 = I \frac{R_2}{R_1 + R_2}$$

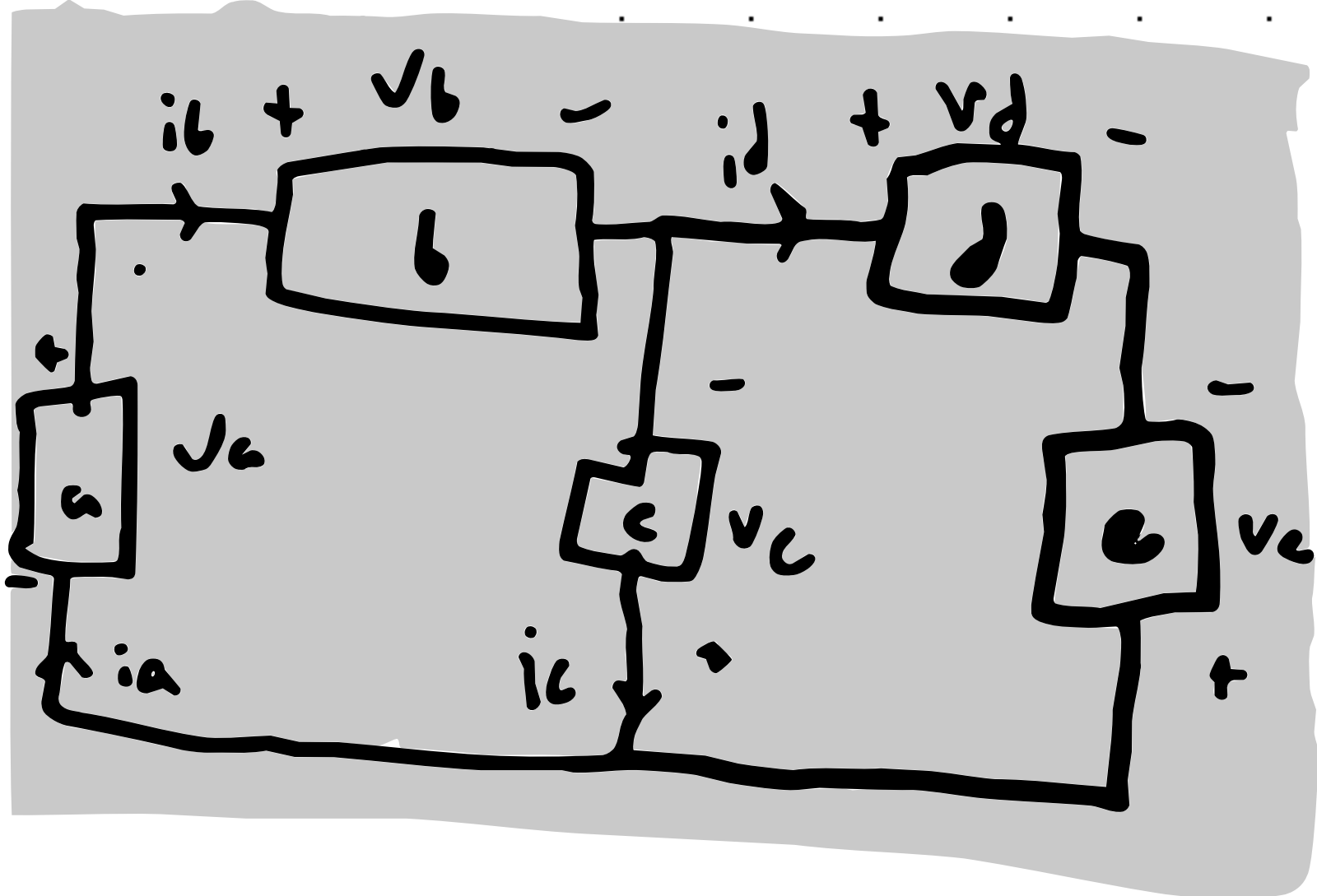
$$I_2 = I \frac{R_1}{R_1 + R_2}$$



This Applies to resistors in parallel!

Problem 1:

Does the interconnect satisfy the Power Check?



Element	voltage	Current
a	50	5
b	30	5
c	-20	-3
d	25	2
e	-30	2

$P_{gen} = \ominus$ to \oplus

$P_{abs} = \oplus$ to \ominus

$$P_a = -v_a i_a = -50(5) = -750W \text{ (A)}$$

$$P_b = v_b i_b = + (30)(5) = 150W \text{ (P)}$$

$$P_c = -v_c i_c = - (-20)(-3) = -60W \text{ (A)}$$

$$P_d = v_d i_d = + (25)(2) = 50W \text{ (P)}$$

$$P_e = -v_e i_e = - (-30)(2) = 60W \text{ (P)}$$

we were given the way polarity, but it's okay!

A is Active
Current goes low to high
($P_{gen}, -v_a i_a$)

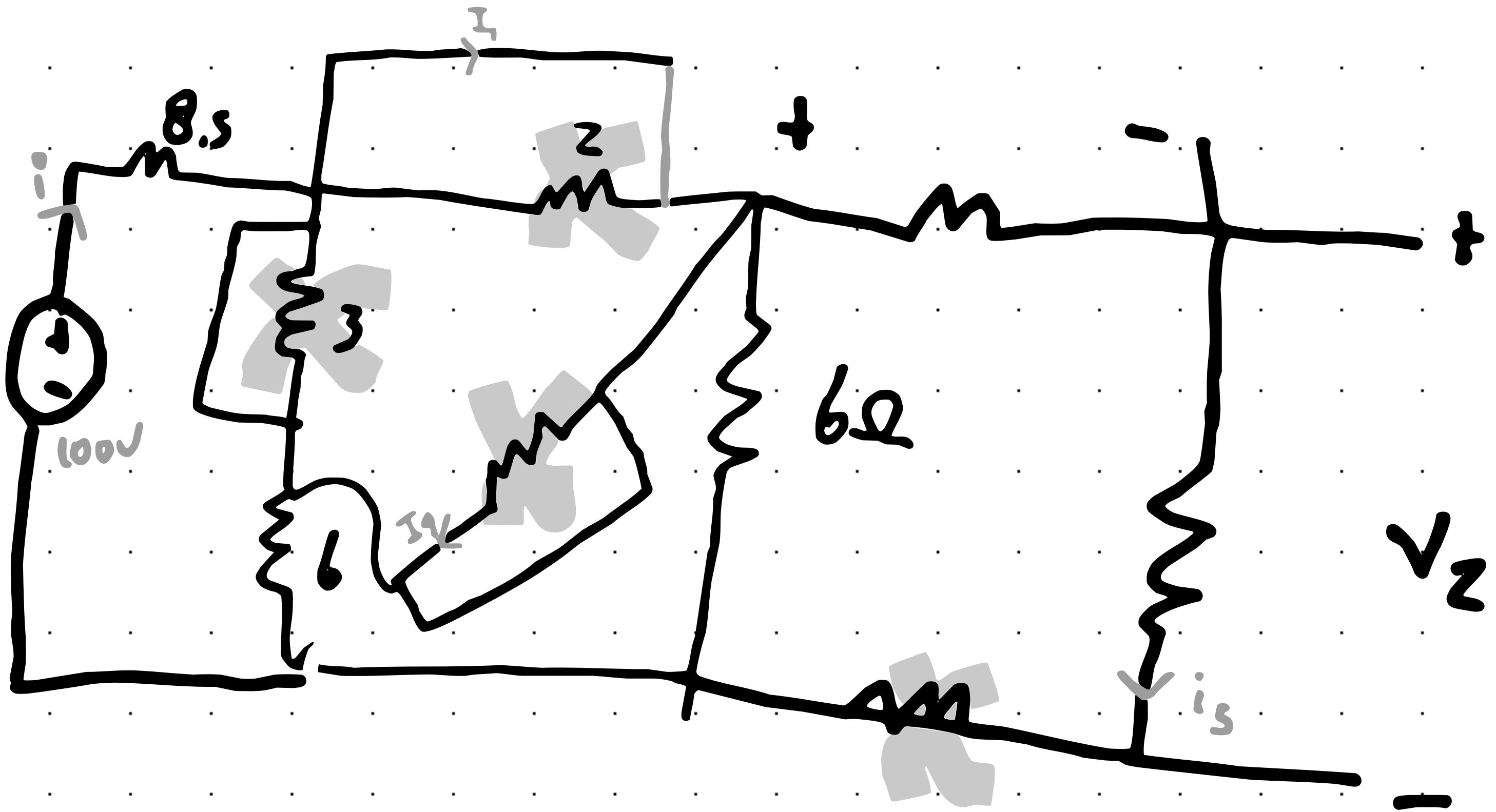
B is passive
(Current goes high to low)
($P_{abs}, v_b i_b$)

A = Active

P = passive

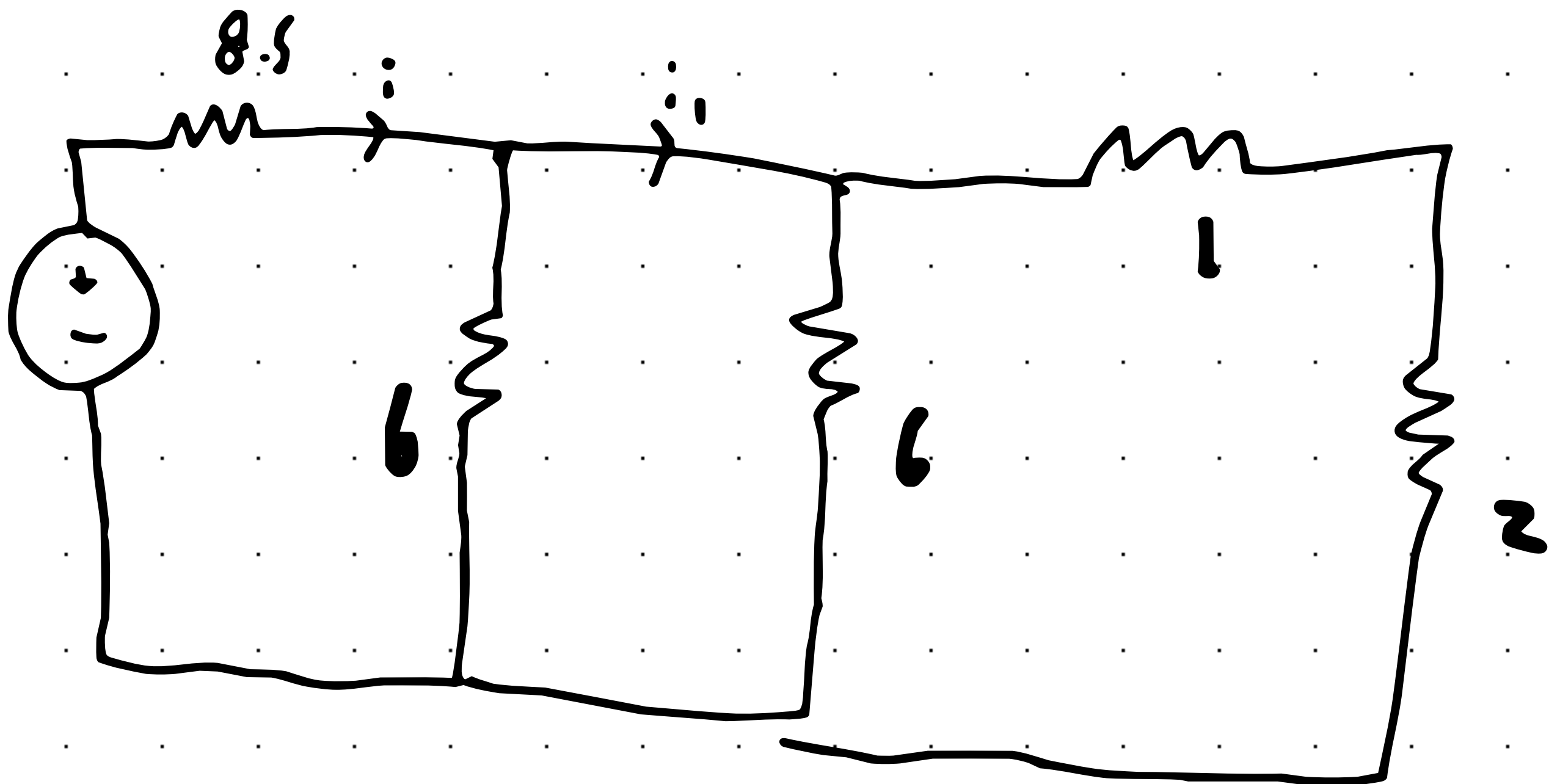
$$P_{gen} = -310W \neq P_{abs} = 260W$$

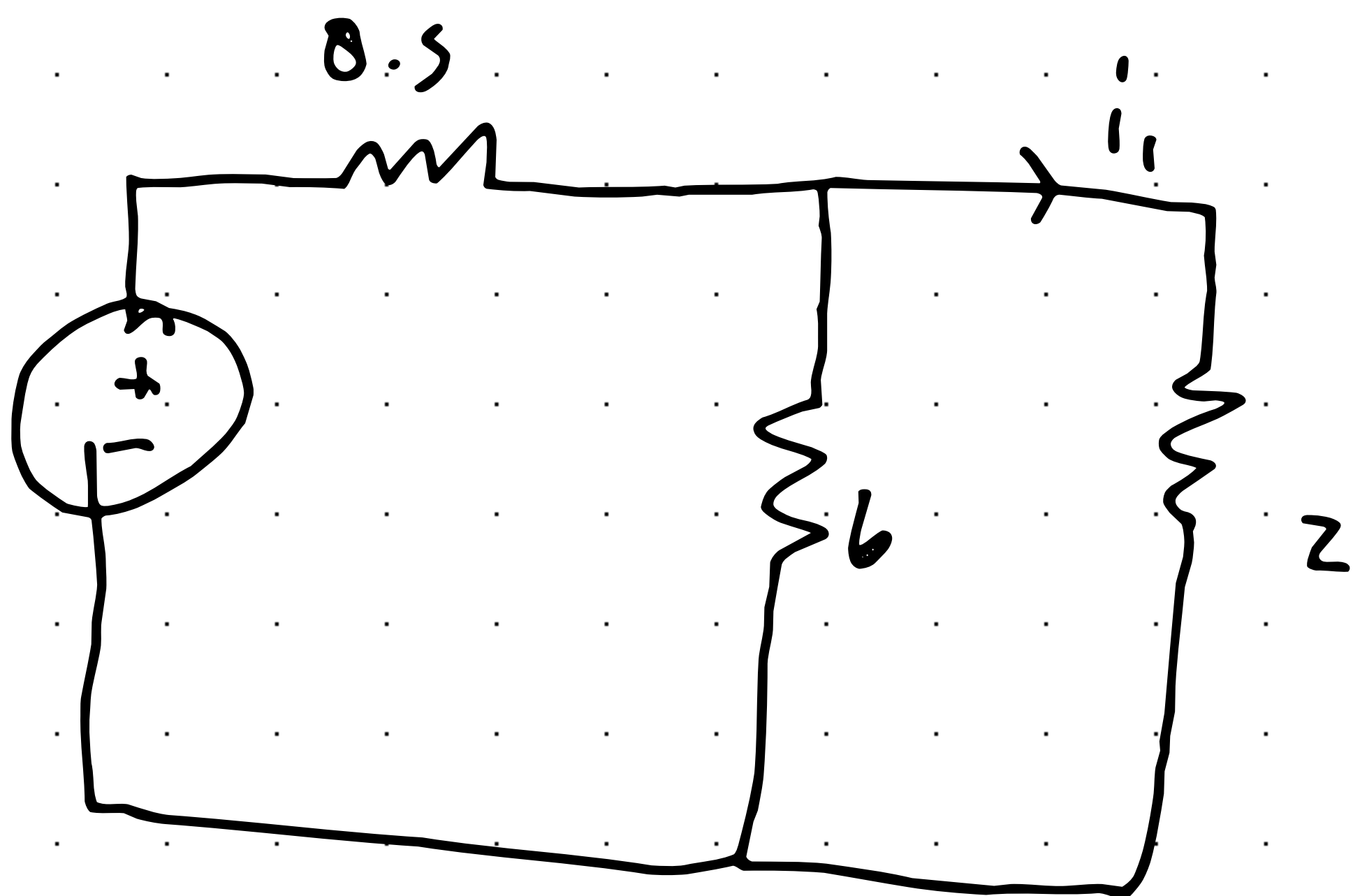
Problem 2



Because of Short Circuit:

$$i_1 = i_2 = i_4 = i_6 = 0$$





$$R_T = \left(\frac{2(6)}{2+6} \right) + 8.5$$

14V Series

$$R_T = 10\Omega$$

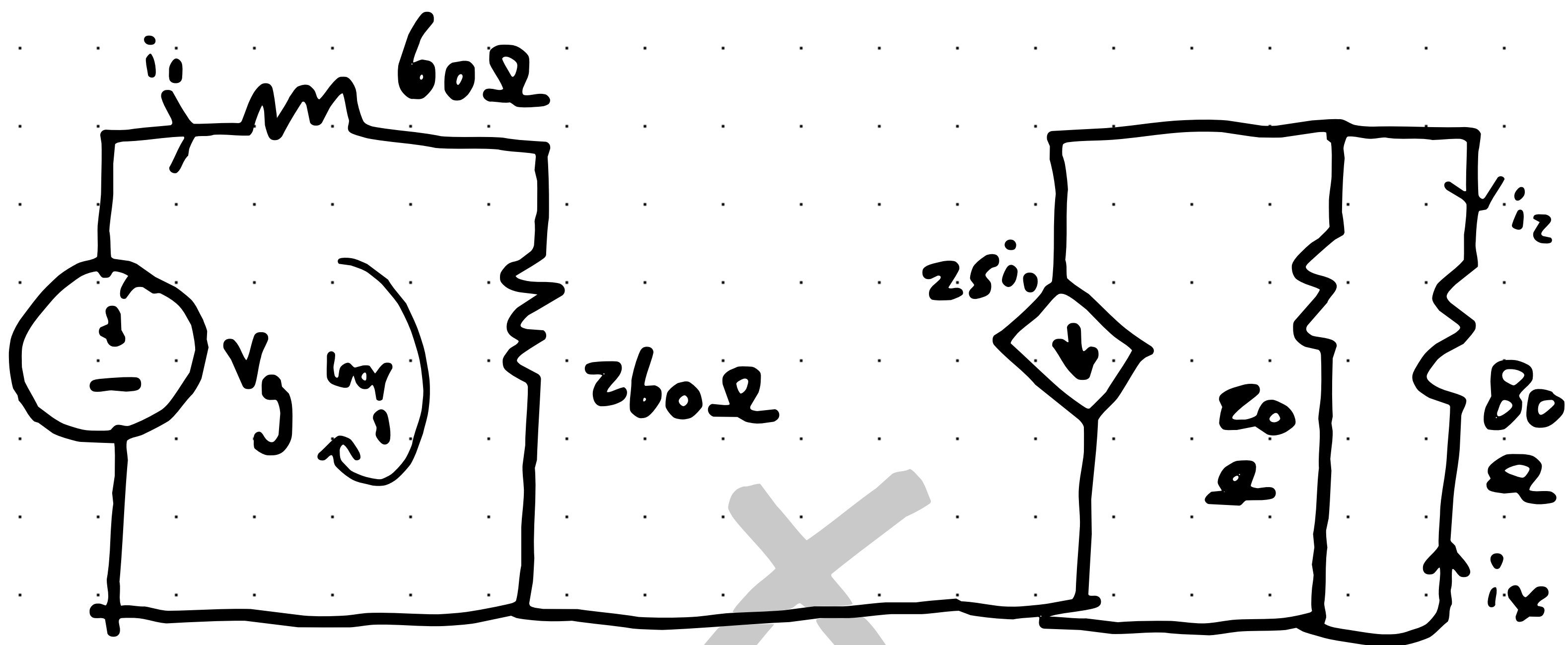
$$V = IR$$

$$10 = I(10)$$

$$I = 10A$$

Using the current divider

$$i_1 = i \left(\frac{6}{6+2} \right) = 10 \left(\frac{6}{8} \right) \quad 7.5A$$



Solve for V_g and
if $i_1 = 1A$

No current
on a unclosed
loop!

loop one

$$V_g - i_1(60) - i_1(260) = 0$$

$$V_g = 320V$$

Current divider

$$i_x = 25 \left(\frac{20}{20 + 80} \right) = 5A$$