IELe

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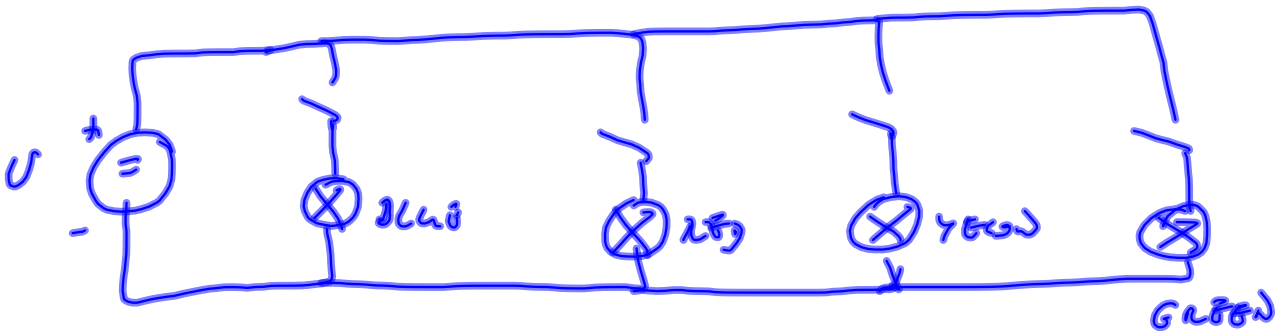
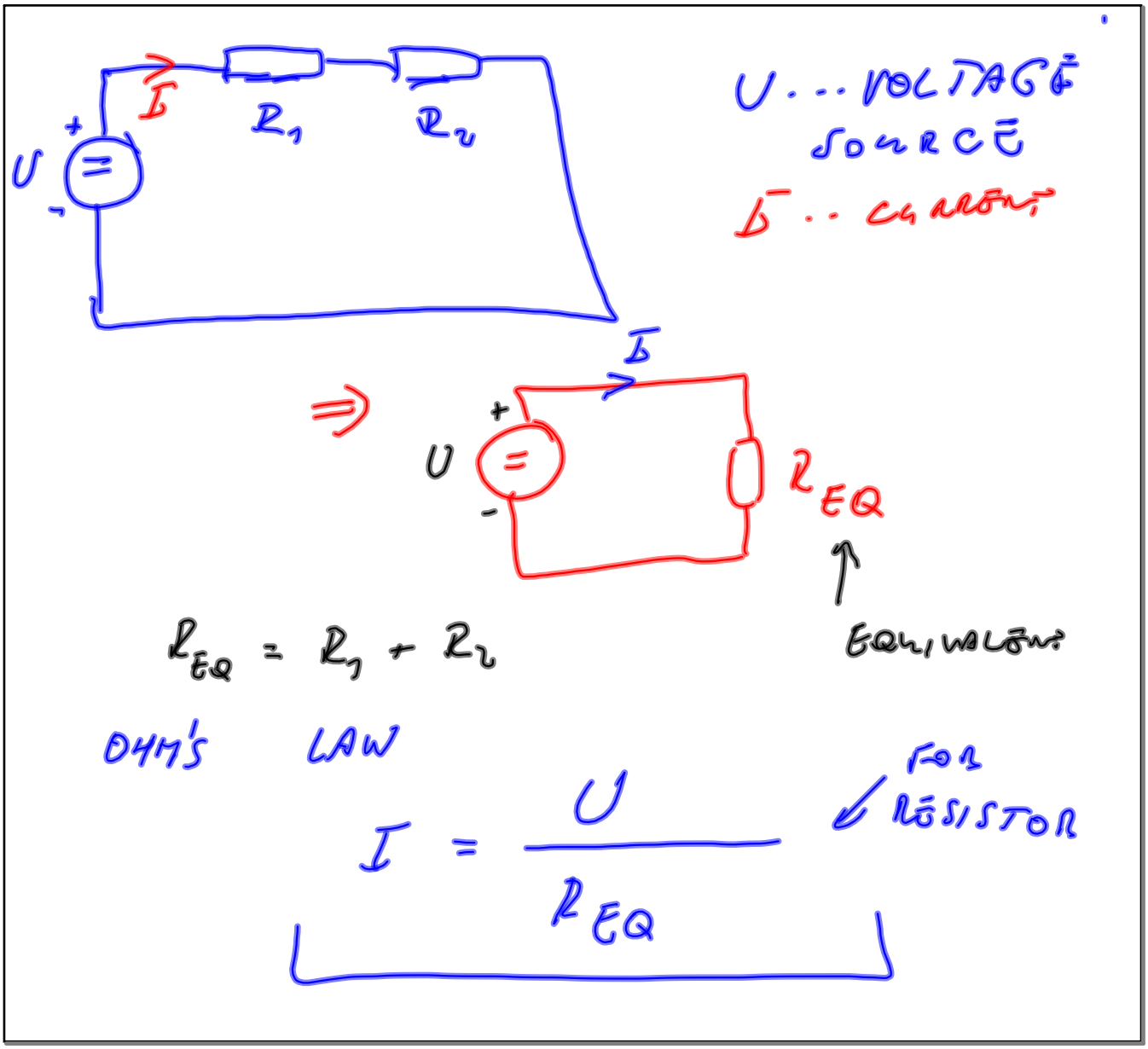
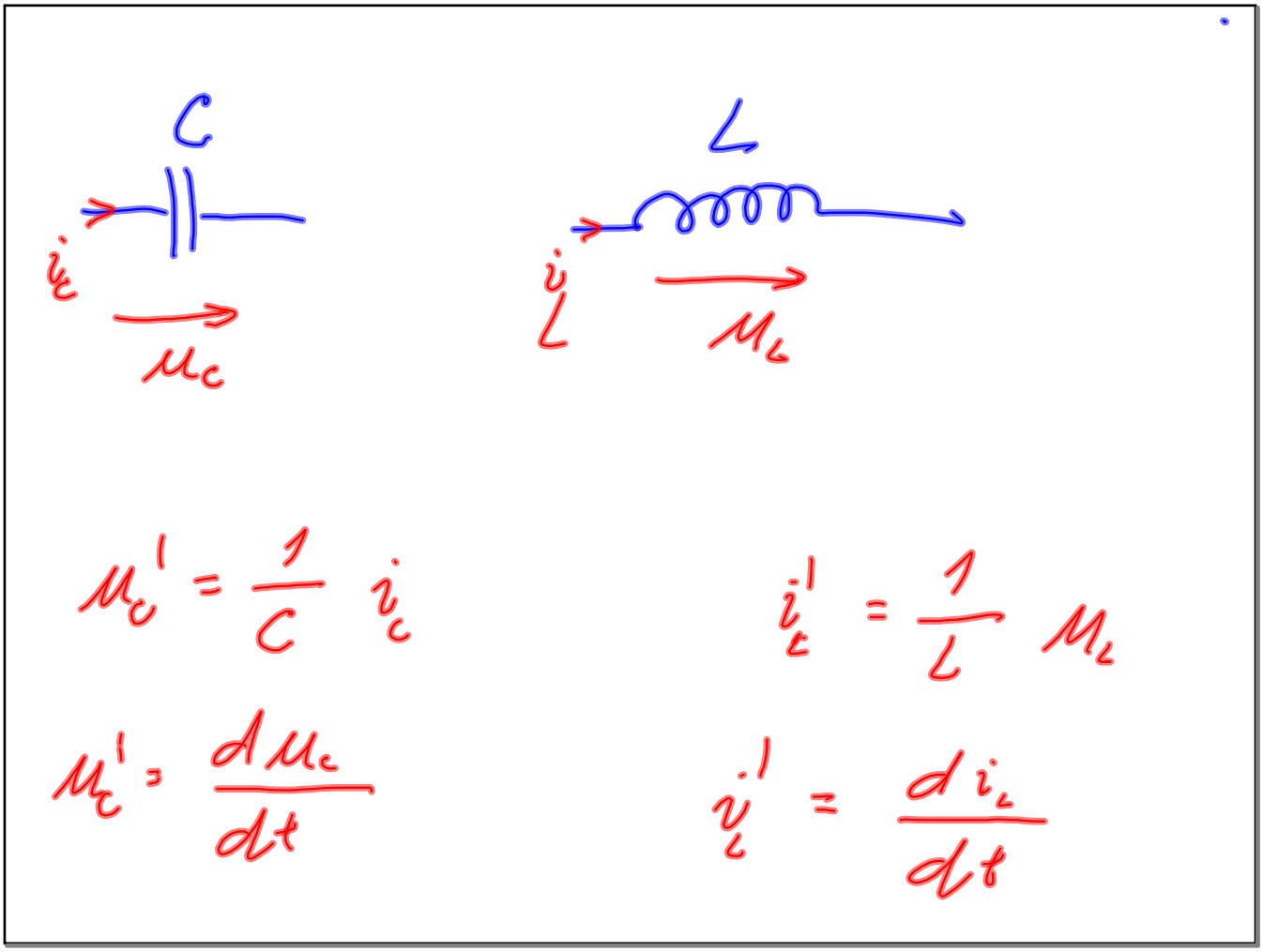
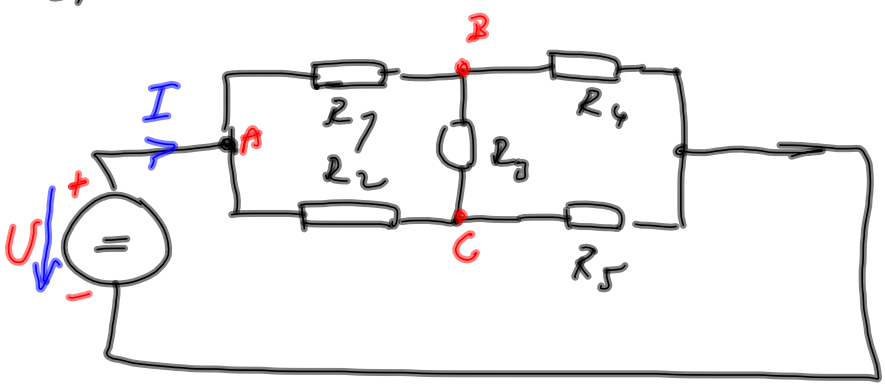


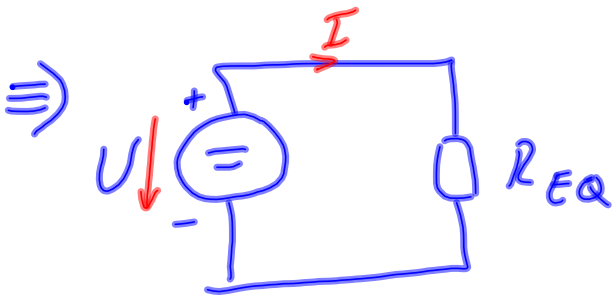

U ... VOLTAGE SOURCE
I ... CURRENT
I
R1
R2
U
+
=
-
I
U
+
=
-
REQ
REQUIVALENT
REQ = R1 + R2
OHM'S LAW
FOR RESISTOR
I = U / REQ


C
i_c
u_c
L
i_L
u_L
$u_c' = \frac{1}{C} i_c$
$i_L' = \frac{1}{L} u_L$
$u_c' = \frac{du_c}{dt}$
$i_L' = \frac{di_L}{dt}$

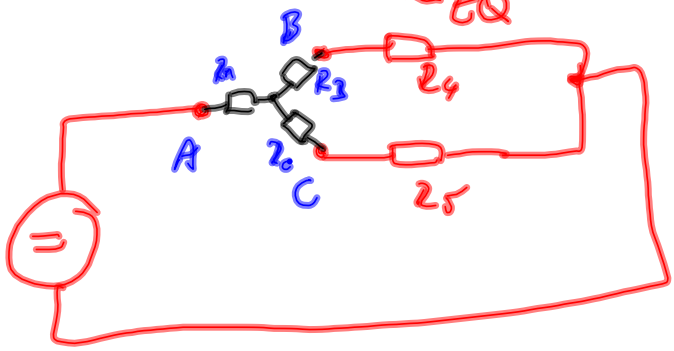
CIRCUIT WITH ONE SOURCE



$\equiv$



$$I = \frac{U}{R_{EQ}}$$



$$R_A = \frac{R_1 \cdot R_2}{R_1 + R_2 + R_3}$$

$$R_C = \frac{R_2 \cdot R_3}{R_1 + R_2 + R_3}$$

$$R_B = \frac{R_1 \cdot R_3}{R_1 + R_2 + R_3}$$

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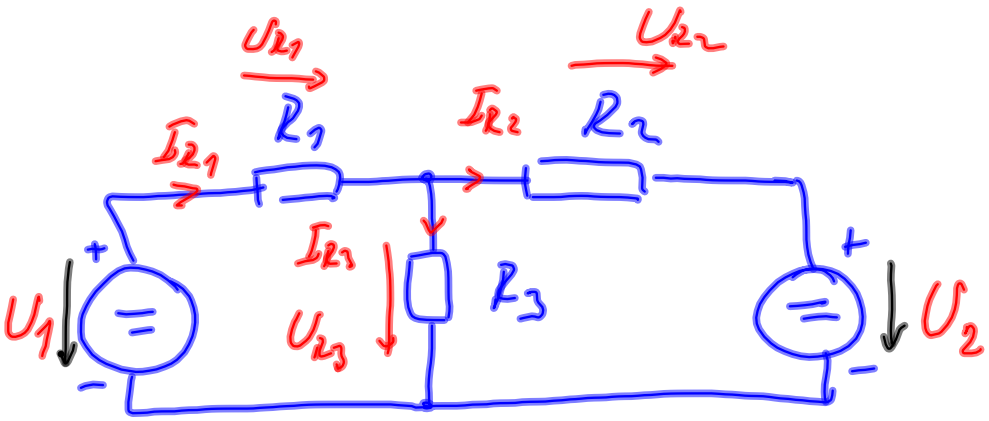
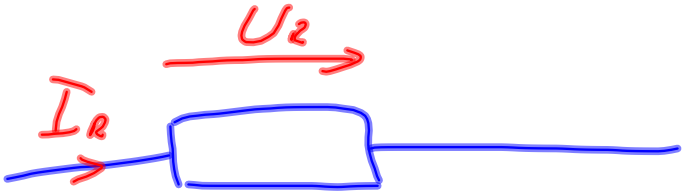
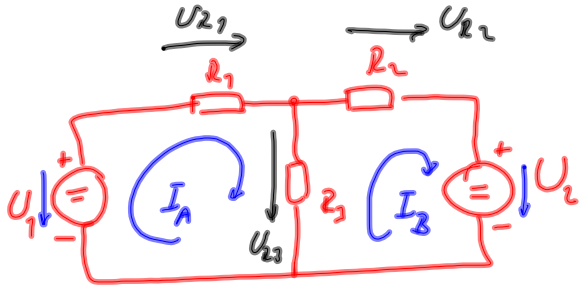
MORE VOLTAGE SOURCES



$I_{R1}, I_{R2}, I_{R3} \equiv ??$

$U_{R1}, U_{R2}, U_{R3} \equiv ?$





$U_{R_1} = I_A \cdot R_1$

$U_{R_3} = R_3 (I_A - I_B)$

$I_A = ?$ $I_B = ?$

II. KIRCHHOFF'S LAW

Σ VOLTAGES IN LOOP $= 0$

LOOP A: $U_{R_1} + U_{R_3} - U_1 = 0$

$R_1 \cdot I_A + R_3 (I_A - I_B) - U_1 = 0$

LOOP B

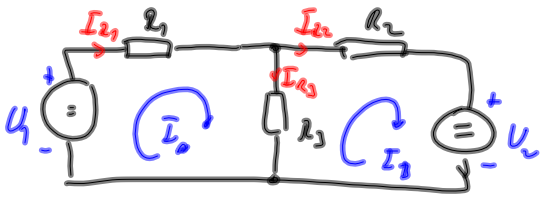
$U_{R_2} + U_2 - U_{R_3} = 0$

$R_2 I_B + U_2 - R_3 (I_A - I_B) = 0$

TWO EQUATIONS FOR TWO UNKNOWN $\Rightarrow$ I_A, I_B

FINAL QUESTION

$I_{R_1}, I_{R_2}, I_{R_3} = ?$



$I_{R_1} = I_A$

$I_{R_2} = I_B$

$I_{R_3} = I_A - I_B$

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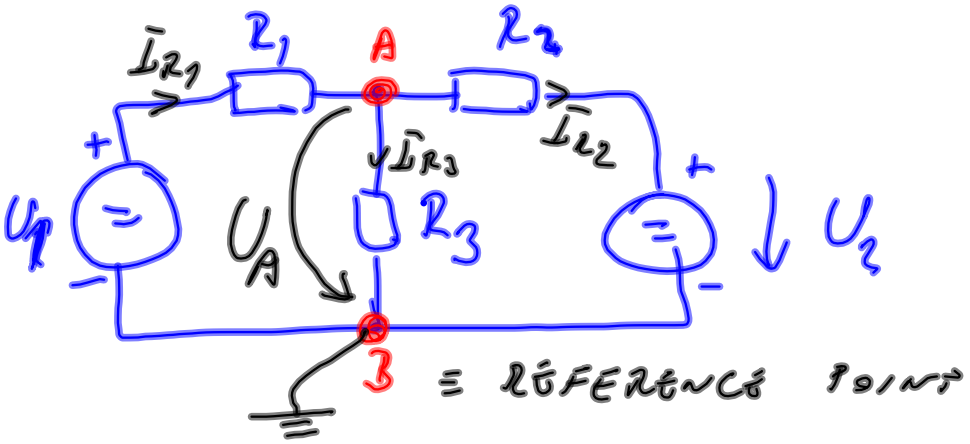
NODE METHOD

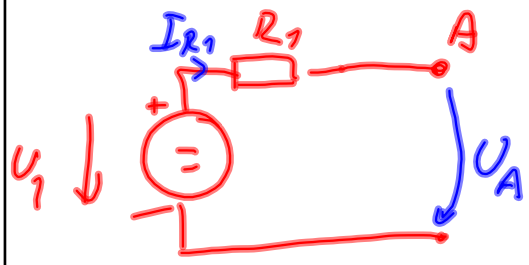
$U_A = ?$



Node ≡ at least 3 elements are connected

$$I_{R_1} = I_{R_2} + I_{R_3}$$

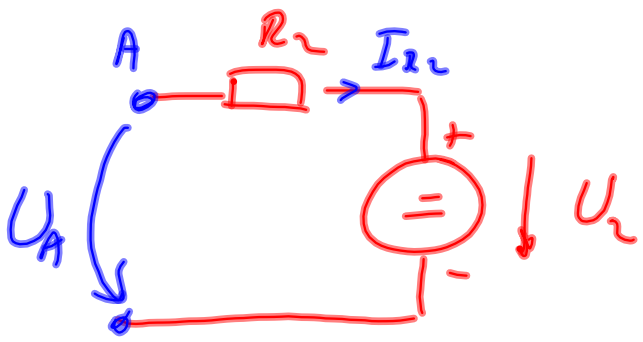
EQUIVALENT CIRCUIT FOR I_{R_1}



$$I_{R_1} \cdot R_1 + U_A - U_1 = 0$$

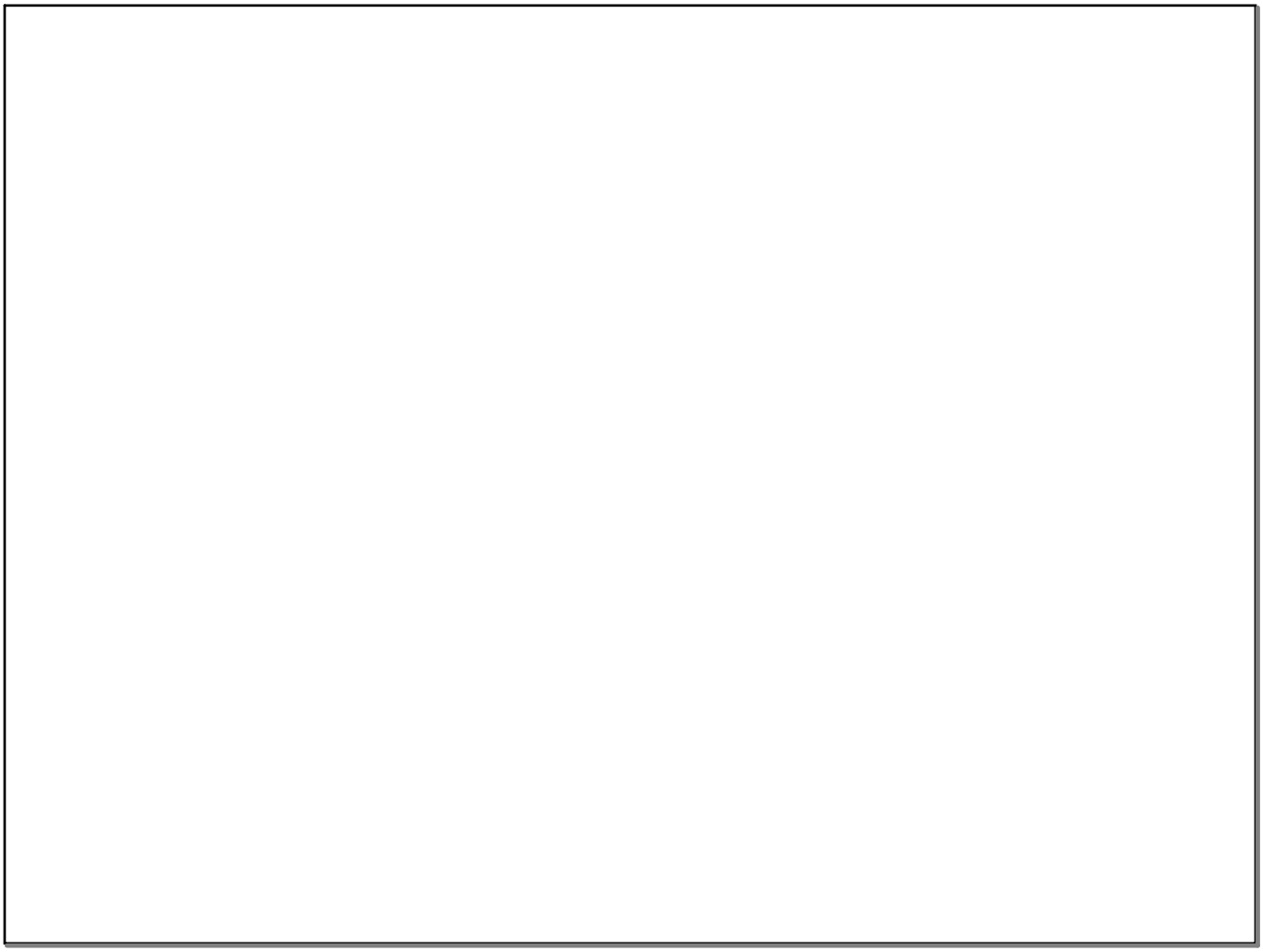
$$\boxed{I_{R_1} = \frac{U_1 - U_A}{R_1}}$$

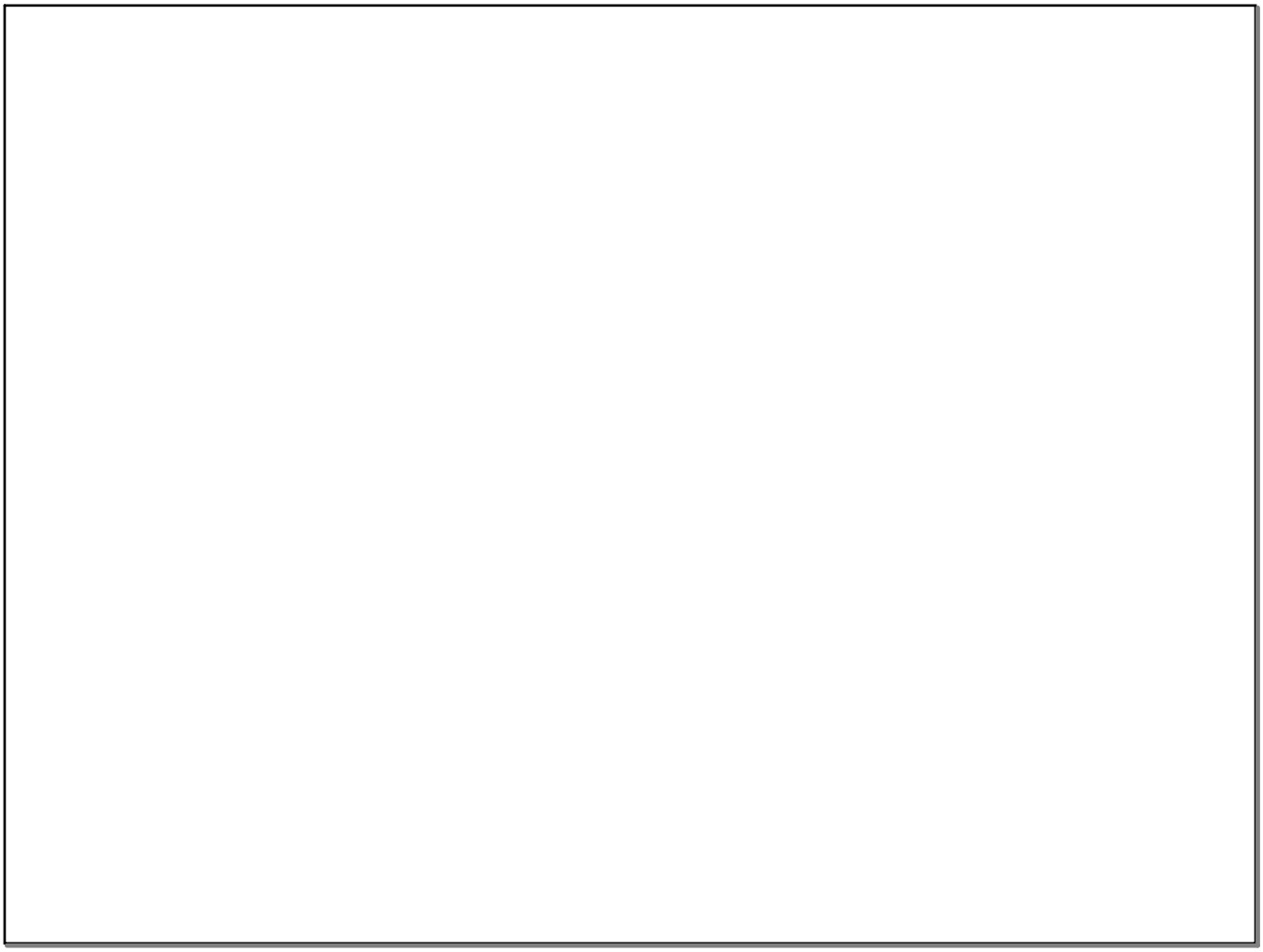
CIRCUIT FOR I_{R_2}

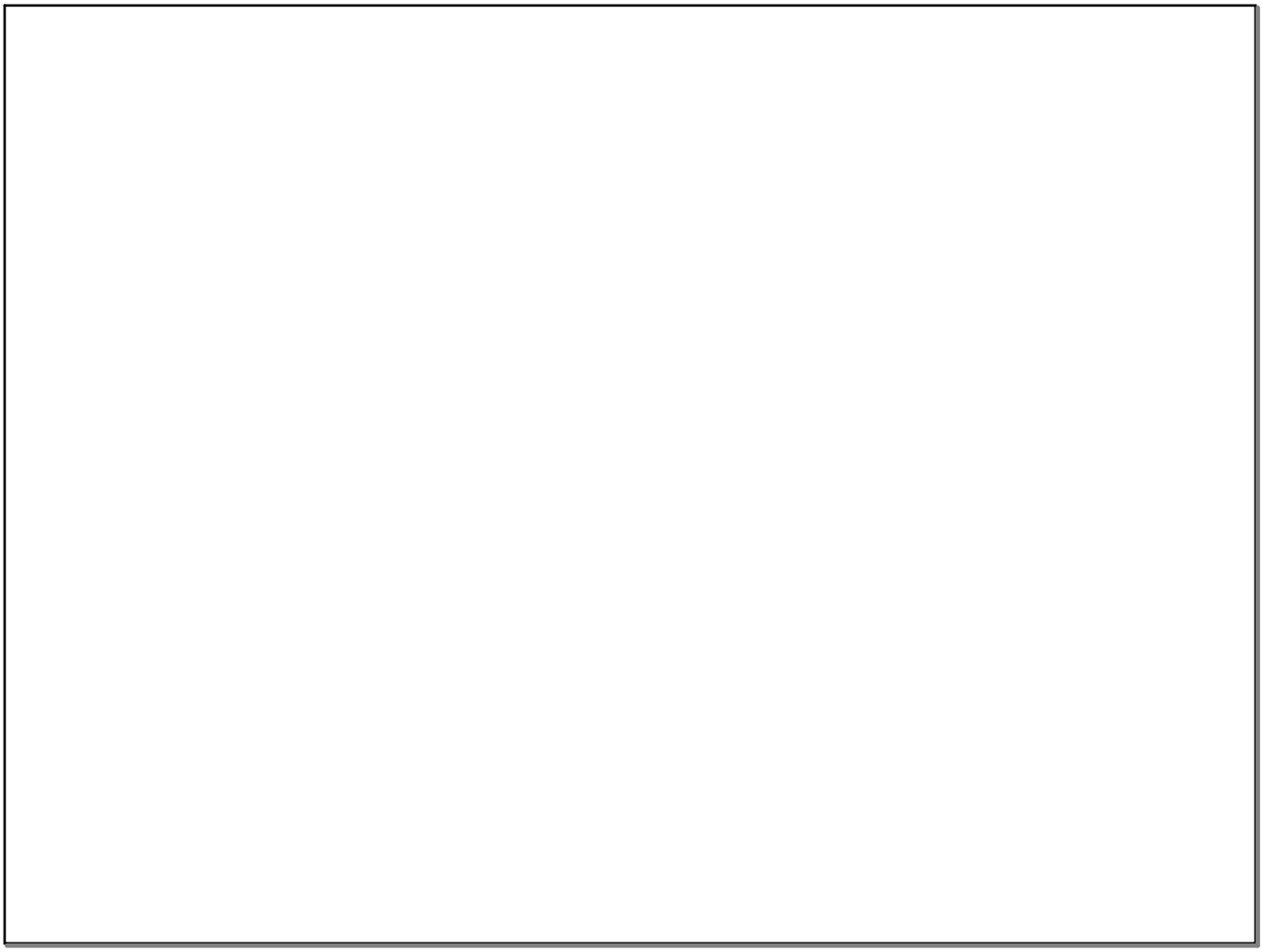


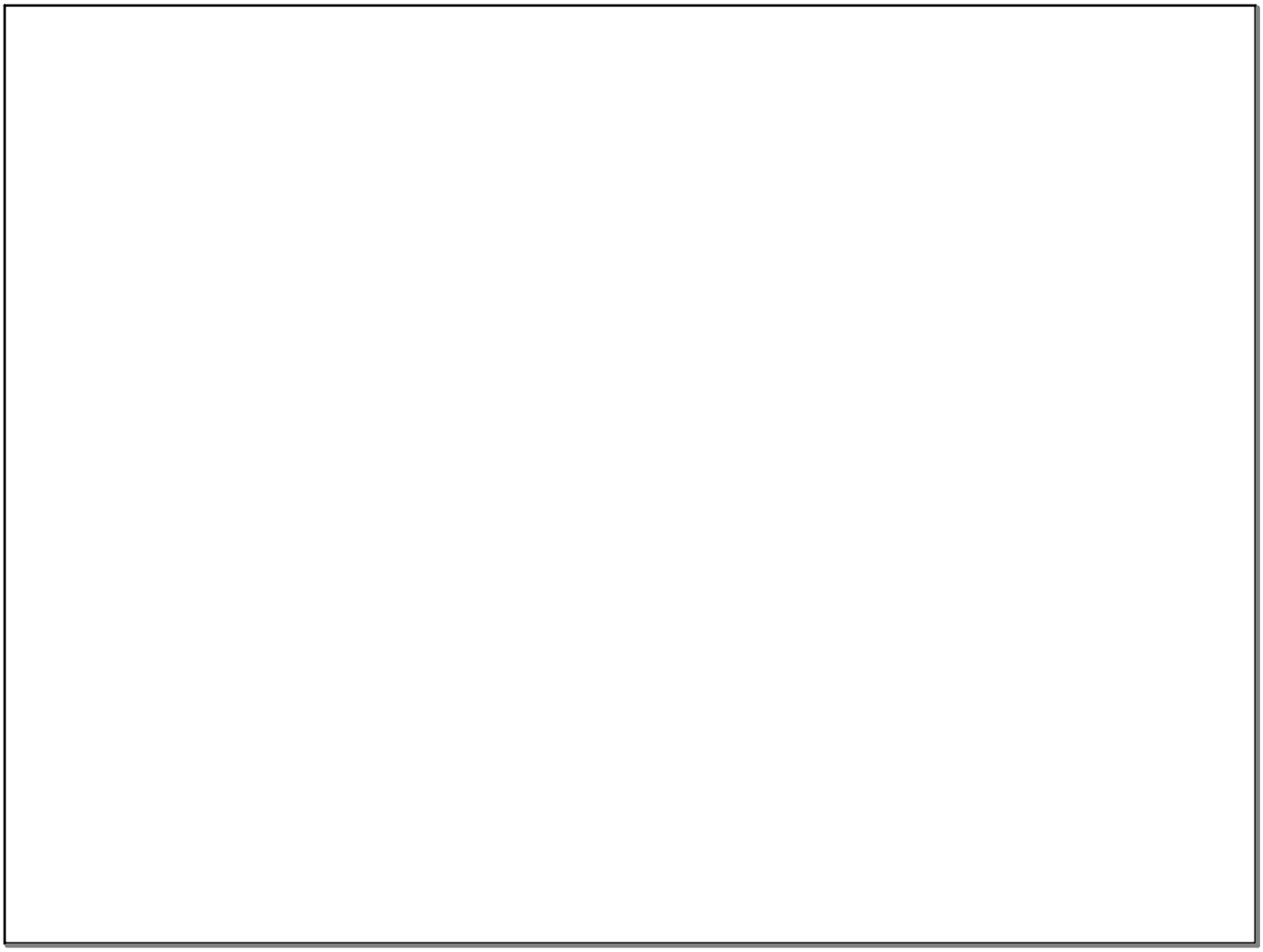
$$R_2 \cdot I_{R_2} + U_2 - U_A = 0$$

$$I_{R_2} = \frac{U_A - U_2}{R_2}$$

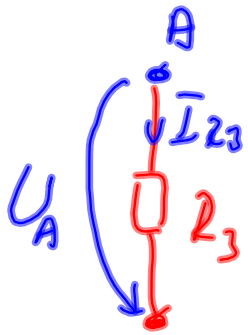








For I_{R_3}



$$I_{R_3} = \frac{U_A}{R_3}$$

$$I_{R_1} = I_{R_2} + I_{R_3}$$

$$\frac{U_1 - U_A}{R_1} = \frac{U_A - U_2}{R_2} + \frac{U_A}{R_3}$$

ONLY 1 UNKNOWN U_A