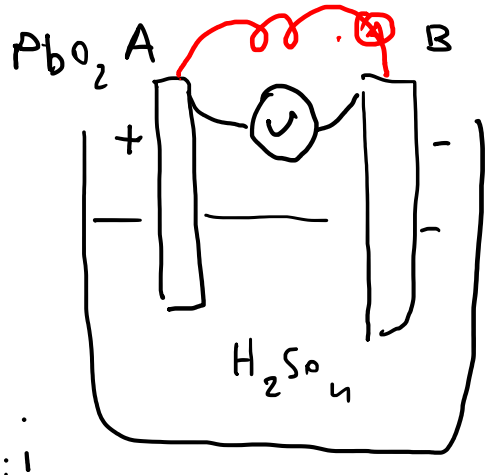
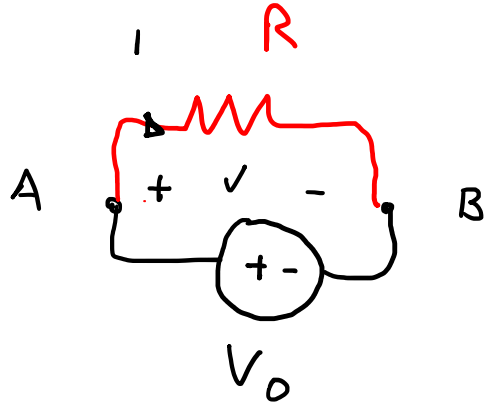
BATTERIA





$V = V_{AH} + V_{HB}$

ABHA

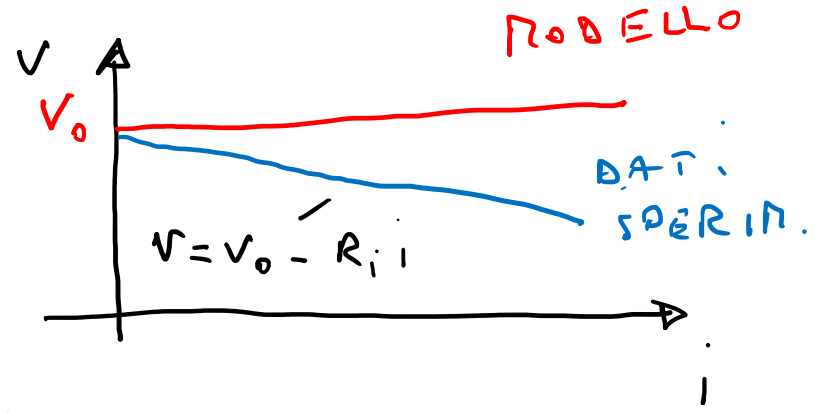
$V_{AB} + V_{BH} + V_{HA} = 0$

$V = V_{AH} + V_{HB} = V_0 - R_i i$

V_0 = TENSIONE A VUOTO DELLA BATTERIA

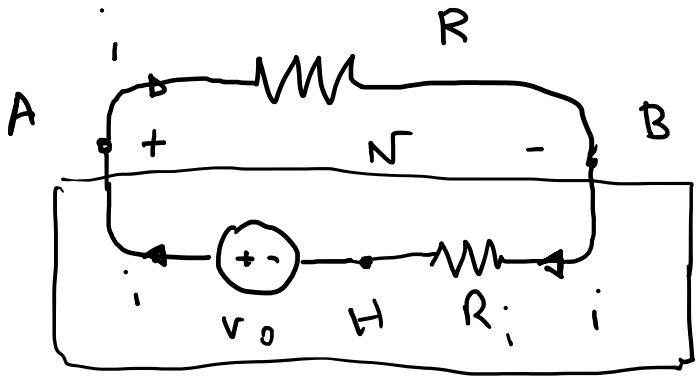
↓

CORRENTE = 0



$R = \rho \frac{L}{S}$ $\quad i = \frac{V_0}{R}$

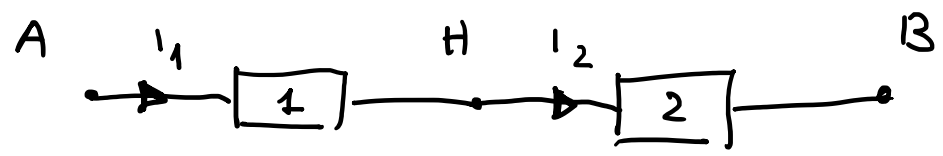
R_i = RESISTENZA INTERNA



$i = \frac{V_0}{R + R_i} \Leftrightarrow R i + R_i i - V_0 = 0$

— CIRCUITO EQUIVALENTE BATTERIA

COLLEGAMENTO IN SERIE

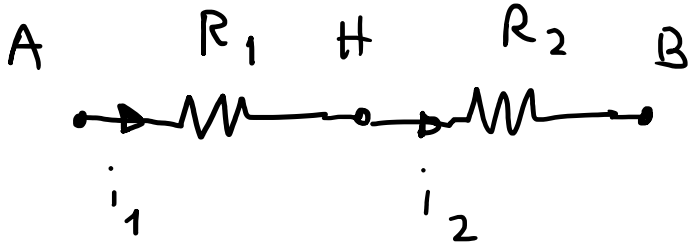


(H)

I DUE RAMI HANNO UN NODO IN COMUNE E SU QUEL NODO NON INCIDE NESSUN ALTRO RAMO

$$\Downarrow$$

LKC H) $\quad -I_1 + I_2 = 0 \quad \Rightarrow \quad I_2 = I_1$



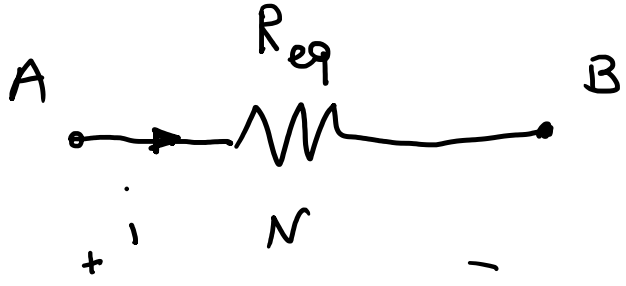
$i_1 = i_2 = i$

$v_{AH} = R_1 i$

$v_{HB} = R_2 i$

$v_{AB} = v_{AH} + v_{HB}$

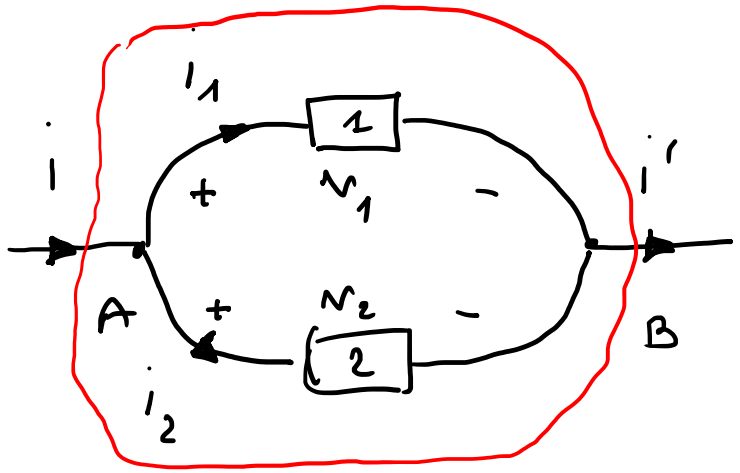
$v_{AB} = R_1 i + R_2 i = (R_1 + R_2) i$



$v_{AB} = R_{eq} i$

$R_{eq} = R_1 + R_2$

COLLEGAMENTO IN PARALLELO



$v_1 = v_{AB}$

$v_2 = v_{AB}$

$\Rightarrow v_1 = v_2$

$i' = i$

$i = i_1 + i_2$

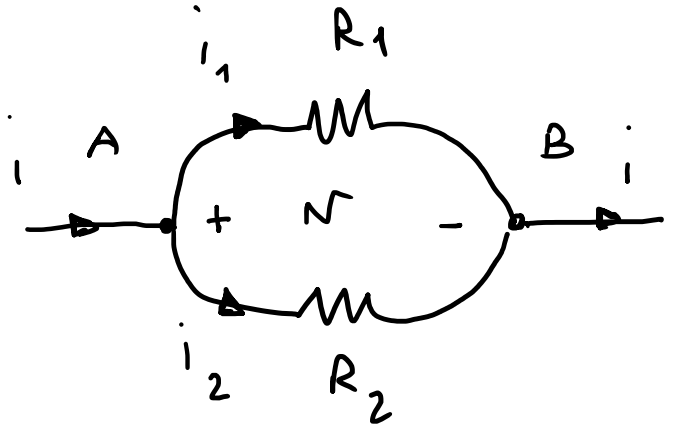
$i' = i_1 + i_2$

$\Rightarrow i' = i$

I DUE BIPOLI SONO COLLEGATI ALLA STESSA COPPIA DI NODI

$\Downarrow$

STESSA TENSIONE DI RAMO



$$v = R_1 i_1 \qquad R_1, R_2 > 0$$

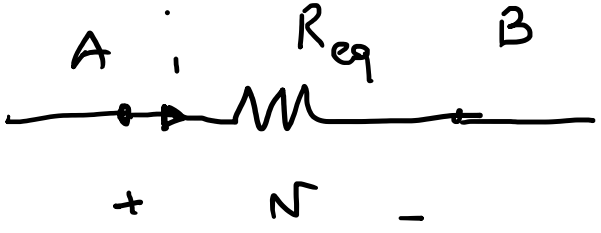
$$v = R_2 i_2$$

$$i = i_1 + i_2$$

$$i_1 = \frac{v}{R_1} \qquad i_2 = \frac{v}{R_2}$$

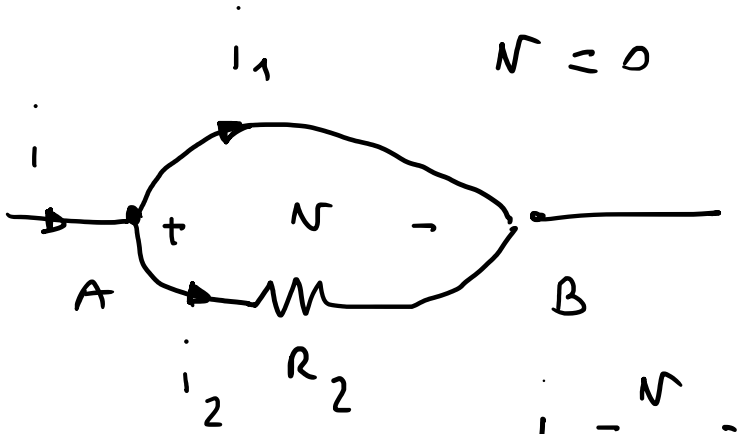
$$i = \frac{v}{R_1} + \frac{v}{R_2} = v\left(\frac{1}{R_1} + \frac{1}{R_2}\right)$$

$$i = v\,\frac{R_1 + R_2}{R_1 R_2} \quad \Rightarrow \quad v = \frac{R_1 R_2}{R_1 + R_2}\, i$$

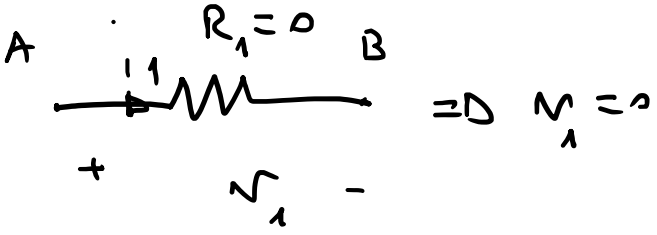


$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} \qquad v = R_{eq}\, i$$

$R_1 = 0$, $R_2 > 0$



$V_1 = R_1 I_1 = 0 \cdot I_1 = 0$



$\Rightarrow V_1 = 0$

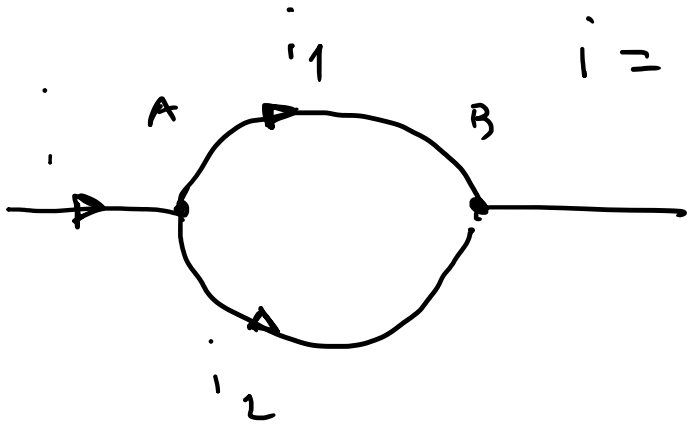
$I_2 = \frac{V}{R_2} = \frac{0}{R_2} = 0$

← CONNESSIONE IDEALE (CORTO - CIRCUITO)

$I = I_1 + I_2 = I_1 + 0 = I_1$

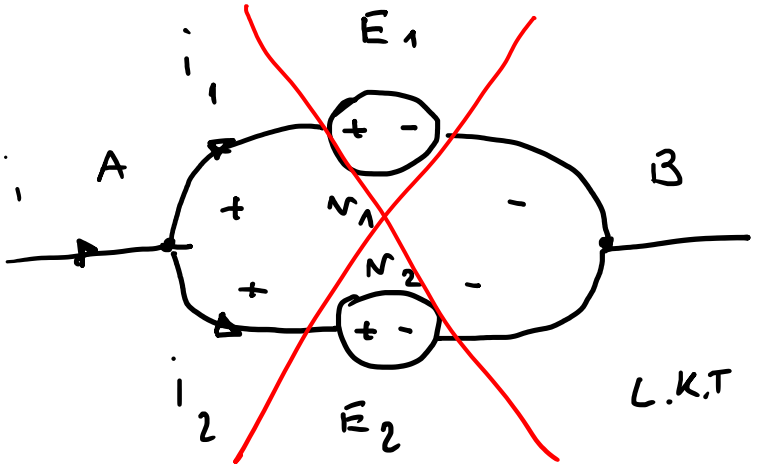
$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{0 \times R_2}{0 + R_2} = 0$

$R_1 = 0$, $R_2 = 0$



$i = i_1 + i_2$

$V_1 = V_2 = 0$



$i = i_1 + i_2$

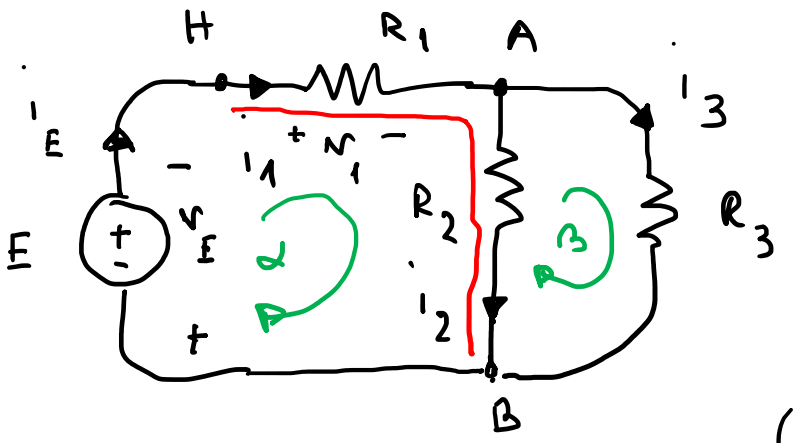
$V_1 = E_1$

$V_2 = E_2$

L.K.T $V_1 - V_2 = 0$ $\Rightarrow V_1 = V_2$

$E_1 = E_2$

$E_1 \neq E_2$



$E = 18\,V,\ R_1 = 4\,\Omega,\ R_2 = 3\,\Omega,\ R_3 = 6\,\Omega$

$N_{RAMI} = 4$

$N_{NODI} = 3$

REGOLA UTILITATORE PER I VERSI POSITIVI DELLE TENSIONI DI RAMO

$(N_{NODI} - 1)$ LKC — 2 LKC

$(N_{RAMI} - N_{NODI} + 1)$ LKT — 2 LKT

N_{RAMI} EQ. COST — 4 EQ. COST.

A) $-i_1 + i_2 + i_3 = 0$

B) $-i_2 - i_3 + i_E = 0$

α) $v_1 + v_2 + v_E = 0$

β) $v_3 - v_2 = 0$

H) $-i_E + i_1 = 0 \Rightarrow i_E = i_1$

INCOGNITE N_{RAMI} CORRENTI E TENSIONI

$v_1 = R_1 i_1$

$v_2 = R_2 i_2$

$v_3 = R_3 i_3$

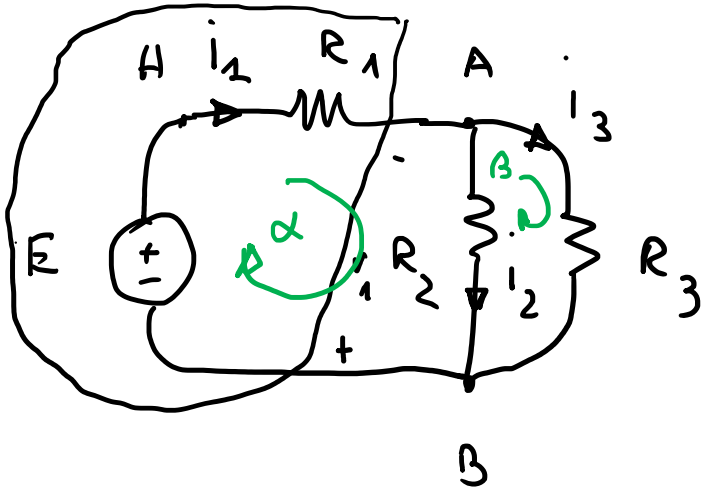
$v_E = -E$

A) $-i_1 + i_2 + i_3 = 0$

B) $-i_2 - i_3 + i_E = 0$

α) $R_1 i_1 + R_2 i_2 - E = 0$

β) $R_3 i_3 - R_2 i_2 = 0$



$$V_1 = V_{BH} + V_{HA} = -E + R_1 i_1$$

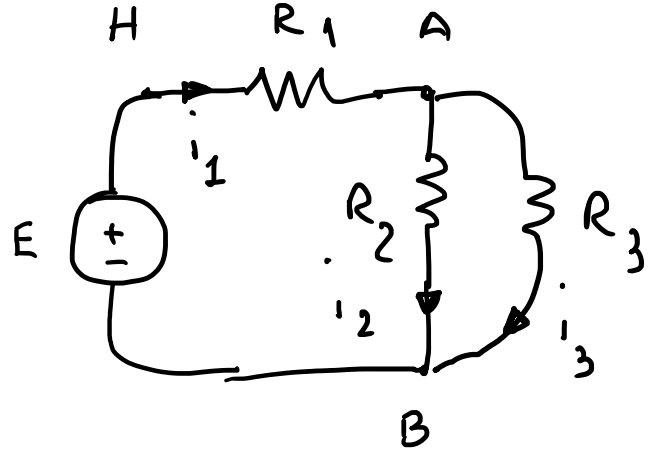
$$N_{RAMI} = 3$$

$$N_{NODI} = 2$$

1 LK.C. A) $-i_1 + i_2 + i_3 = 0$

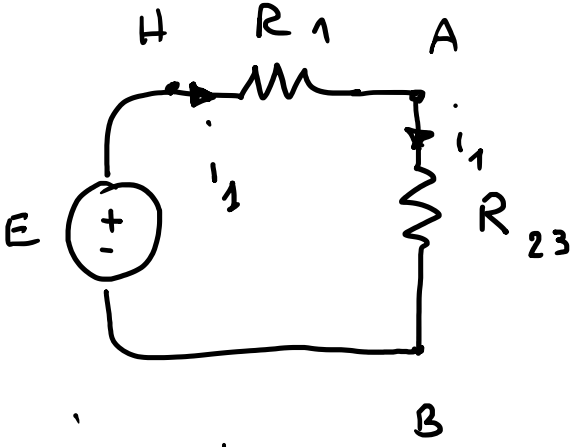
2 LKT α) $-E + R_1 i_1 + R_2 i_2 = 0$

β) $R_3 i_3 - R_2 i_2 = 0$



R_2 e R_3 SONO IN PARALLELO

$$R_{23} = \frac{R_2 R_3}{R_2 + R_3} = \frac{3 \times 6}{3 + 6} = 2\ \Omega$$



R_1 e R_{23} SONO IN SERIE

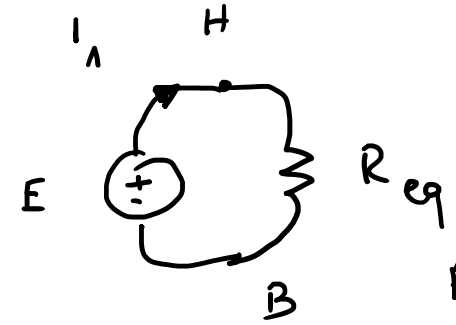
$$R_{eq} = R_1 + R_{23} = 4 + 2 = 6\ \Omega$$

$$i_1 = \frac{E}{R_{eq}} = \frac{18}{6} = 3\ A$$

$$P_E = E\, i_1 = 18 \times 3 = 54\ W$$

$$P_{R_1} = R_1 i_1^2 = 4 \times 3^2 = 36\ W$$

$$P_{R_1} + P_{R_2} + P_{R_3} = 54\ W$$



$$V_{AB} = R_{23}\, i_1 = 2 \times 3 = 6\ V$$

$$P_{R_2} = R_2 i_2^2 = 3 \times 2^2 = 12\ W$$

$$P_{R_3} = R_3 i_3^2 = 6 \times 1^2 = 6\ W$$

$$i_2 = \frac{V_{AB}}{R_2} = \frac{6}{3} = 2\ A$$

$$i_3 = \frac{V_{AB}}{R_3} = \frac{6}{6} = 1\ A$$