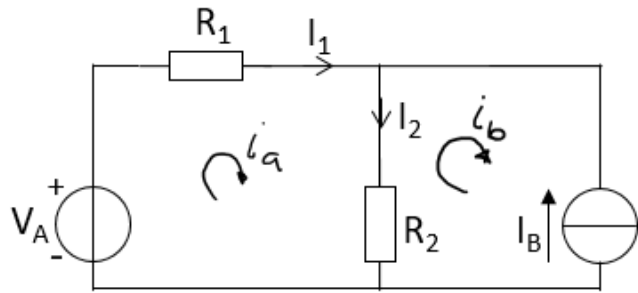# Mesh Current Method

1. Assign a mesh current (I_1, I_2, I_3.....V_N) to all loops in the circuit
2. Use KVL in the loop and express the voltages in the loop using the defined mesh currents ((I_1, I_2, I_3.....I_N)
3. Solve the equations to find all the mesh currents
4. Determine all voltages and currents in the circuit from the now known mesh currents (I_1, I_2, I_3.....I_N)

R_1=18 kΩ, R_2=12 kΩ
V_A=6 V, I_B=3 mA

Determine I_1 and I_2

KVL for the left mesh (i_a): $V_A - R_1 i_a - R_2 i_a + R_2 i_b = 0$ $\Big\}$ $\Rightarrow$ $V_A - (R_1 + R_2) i_a - R_2 I_B = 0$

$i_b = -I_B$

$\Rightarrow$ $i_a = \dfrac{V_A - R_2 \cdot I_B}{R_1 + R_2}$

$I_1 = i_a = \dfrac{V_A}{R_1 + R_2} - \dfrac{R_2}{R_1 + R_2} I_B = \dfrac{6}{18 + 12} - \dfrac{12}{18 + 12} 3 = \dfrac{6 - 36}{30} = -\dfrac{30}{30} = -1 mA$

$I_2 = i_a - i_b = I_1 + I_B = -1 + 3 = 2 mA$

check KVL in left loop: $V_A - R_1 I_1 - R_2 I_2 = 0$

$6 - 18 \cdot (-1) - 12 \cdot 2 = 24 - 24 = 0$ ✓