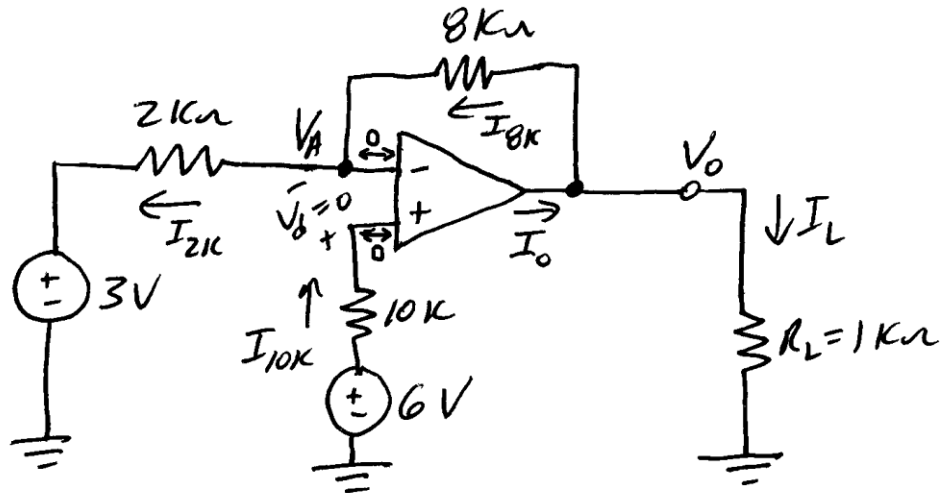


Assuming the op-amp in the circuit is ideal, find the labeled currents and voltages.



$$\text{Ideal op-amp } (R_i \rightarrow \infty) \Rightarrow \underline{\underline{I_{10k} = 0}}$$

Ideal op-amp ($V_d = 0$), Ohm's Law, & KVL

$$-6V + I_{10k}^{\uparrow} (10k\Omega) + V_d^{\uparrow} + V_A = 0$$

$$\underline{\underline{V_A = 6V}}$$

$$\text{Ohm's Law } I_{2k} = \frac{V_A - 3}{2k\Omega} = \frac{6 - 3}{2000} \Rightarrow \underline{\underline{I_{2k} = 1.5mA}}$$

KCL @ Node A
and Ideal op-amp

$$I_{8k} - I_{2k} + I_{50} = 0$$

$$\underline{\underline{I_{8k} = I_{2k} = 1.5mA}}$$

$$\text{KVL: } -V_A - I_{8k}(8k\Omega) + V_0 = 0$$

$$V_0 = 6 + 1.5 \times 10^{-3} (8000) \Rightarrow \underline{\underline{V_0 = 18V}}$$

$$\text{Ohm's Law: } I_L = \frac{V_0 - 0}{R_L} = \frac{18}{1000} \Rightarrow \underline{\underline{I_L = 18mA}}$$

$$\text{KCL @ output node: } I_0 = I_{8k} + I_L = 1.5 + 18 \Rightarrow \underline{\underline{I_0 = 19.5mA}}$$