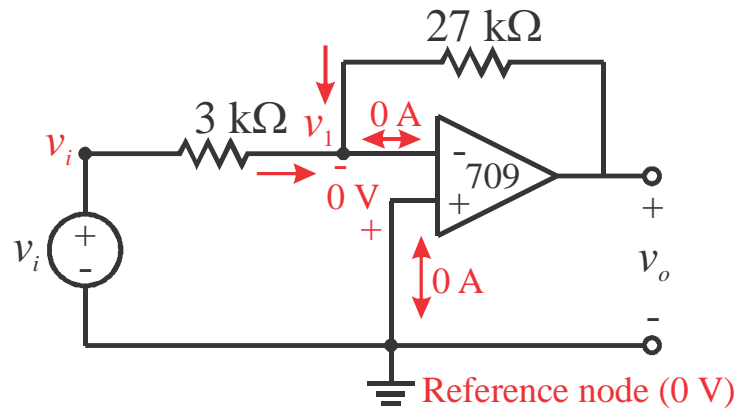


**Re-work previous example assuming an ideal op-amp.**



**Apply nodal analysis to node 1:**  $\frac{v_i - v_1}{3000} + 0 + \frac{v_o - v_1}{27000} = 0$

**From circuit, note with the ideal op-amp assumption  $v_1 = 0$ .**

**⇒ Modify node 1 equation:**  $\frac{v_i - 0}{3000} + \frac{v_o - 0}{27000} = 0$

**Solve modified equation for the closed loop gain  $A_v = v_o/v_i$ :**

$$\frac{v_o}{27000} = \frac{-v_i}{3000}$$

$$\frac{v_o}{v_i} = \frac{-27000}{3000}$$

$$\underline{A_v = \frac{v_o}{v_i} = -9}$$

**Comparing with the previous result-**

Ideal op-amp	LM709 op-amp	% difference
$A_v = -9$	$A_v = -8.997975771$	<b>0.0225 %</b>

➤ **Even with a very primitive early op-amp, the difference between the ideal op-amp and real op-amp results would be VERY difficult to measure.**