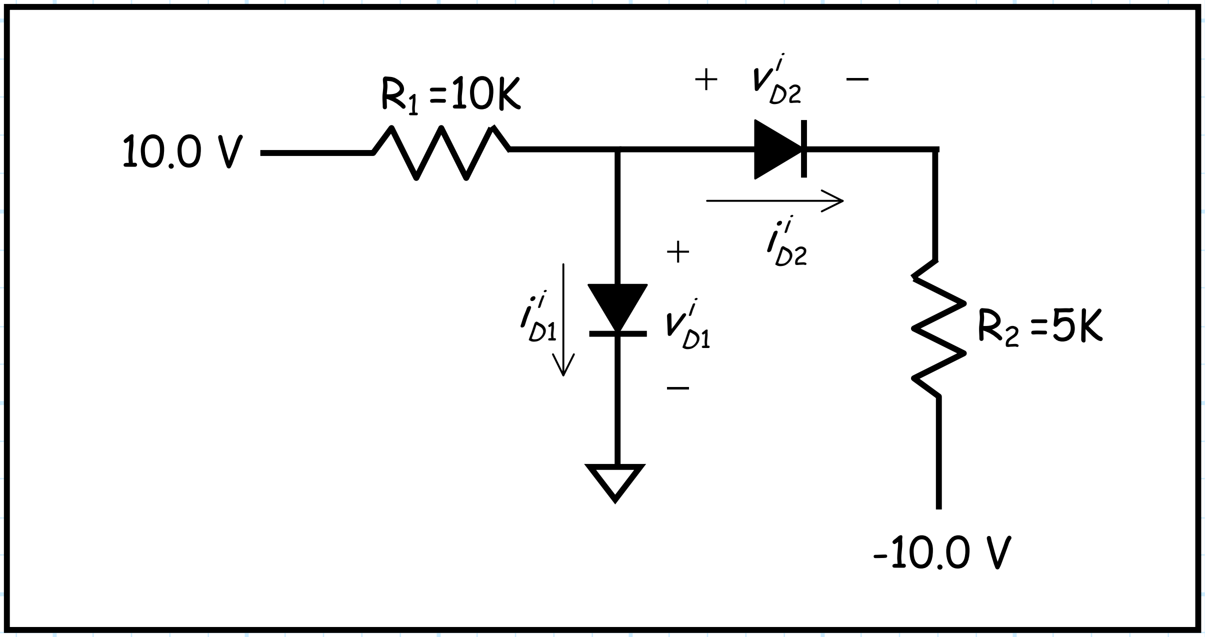
# Example: Analysis of a Complex Diode Circuit

Consider this circuit with **two ideal diodes**:



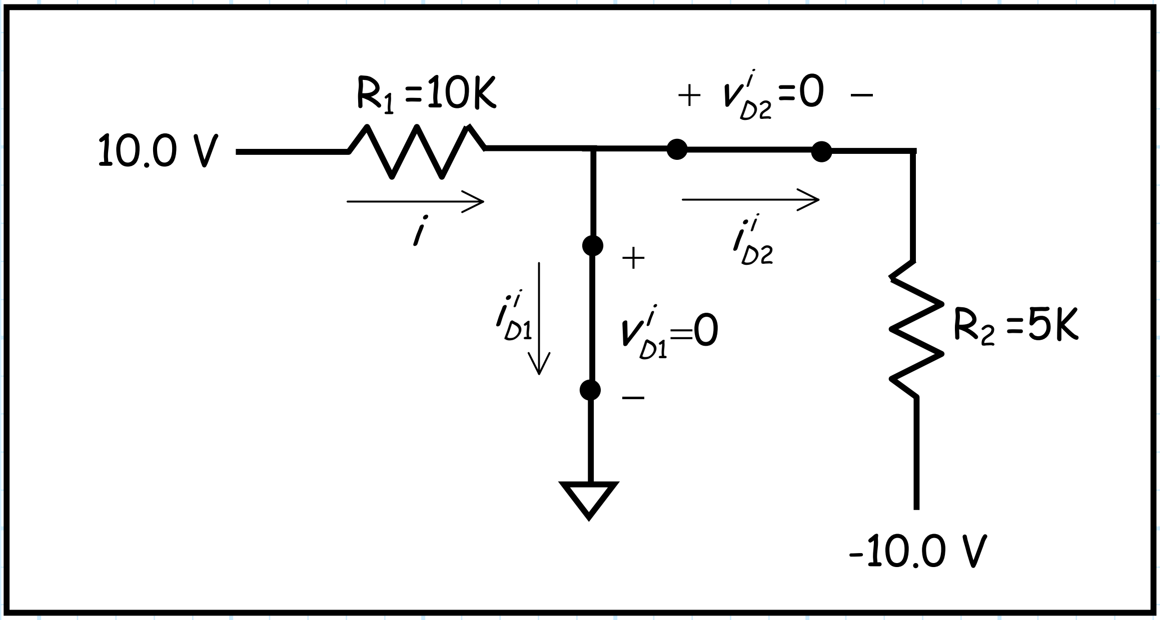

Let's analyze this circuit and find $v_{D1}^i$, $i_{D1}^i$, $v_{D2}^i$, and $i_{D2}^i$ !

Remember, we must accomplish each of the **five** steps:

**Step 1:** *ASSUME* that both $D_1$ and $D_2$ are **"on"** (might as well!).

**Step 2:** *ENFORCE* the **equalities** $v_{D1}^i = 0 = v_{D2}^i$, by replacing each ideal diode with a **short** circuit.

**Step 3:** *ANALYZE* the resulting circuit, and find $i_{D1}^{i}$ and $i_{D2}^{i}$.




Begin with **KCL**:

$$i = i_{D1}^{i} + i_{D2}^{i}$$

where $i =$

and $i_{D2}^{i} =$

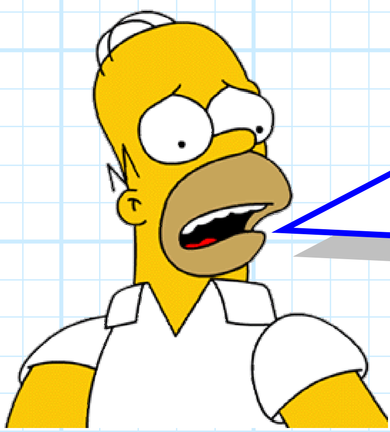
Therefore, $i_{D1}^{i} =$

**Step 4:** Now we must *CHECK* **inequalities** to see if our assumptions are correct!

$i_{D1}^{i} =$

$i_{D2}^{i} =$

One assumption is therefore **INCORRECT**. We must proceed to **step 5**—change our assumptions and **completely** start again!



**Q:** *Wait a second! We don't have to **completely** start from the beginning, do we? After all, our assumption about diode $D_2$ turned out to be **true**—so we **already** know that $i_{D2}^{i} =$ and $v_{D2}^{i} = 0$, **right?***

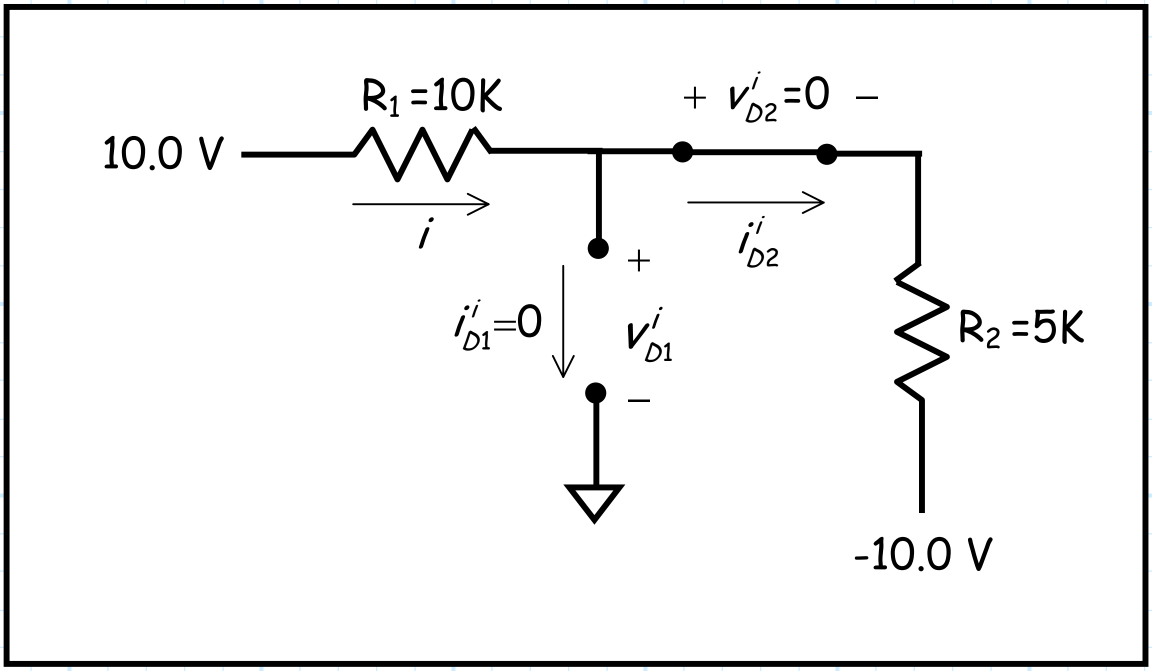
**A:** **NO!** The solution for diode $D_2$ is dependent on the state of both diodes $D_1$ and $D_2$. If the assumption of just **one** diode turns out to be incorrect, then the solutions for **all** diodes are **wrong**!

So, let's change our assumption and start all over again!

**Step 1:** Now *ASSUME* that $D_1$ is **"off"** and $D_2$ is **"on"**.

**Step 2:** *ENFORCE* $i_{D1}^{i} = 0$ ($D_1$ open) and $v_{D2}^{i} = 0$ ($D_2$ short).

**Step 3:** *ANALYZE* resulting circuit, and find $v_{D1}^{i}$ and $i_{D2}^{i}$.




Note $i = i_{D2}^{i} =$

and from KVL:

$\therefore \; v_D^{i} =$

4) CHECK our assumptions.

$i_{D2}^{i} =$

$v_{D1}^{i} =$

$\therefore$ Assumptions are **correct**! We are finished!

| | |
|---|---|
| $v_{D1}^{i} =$ | $i_{D1}^{i} = 0$ |
| $v_{D2}^{i} = 0$ | $i_{D2}^{i} =$ |