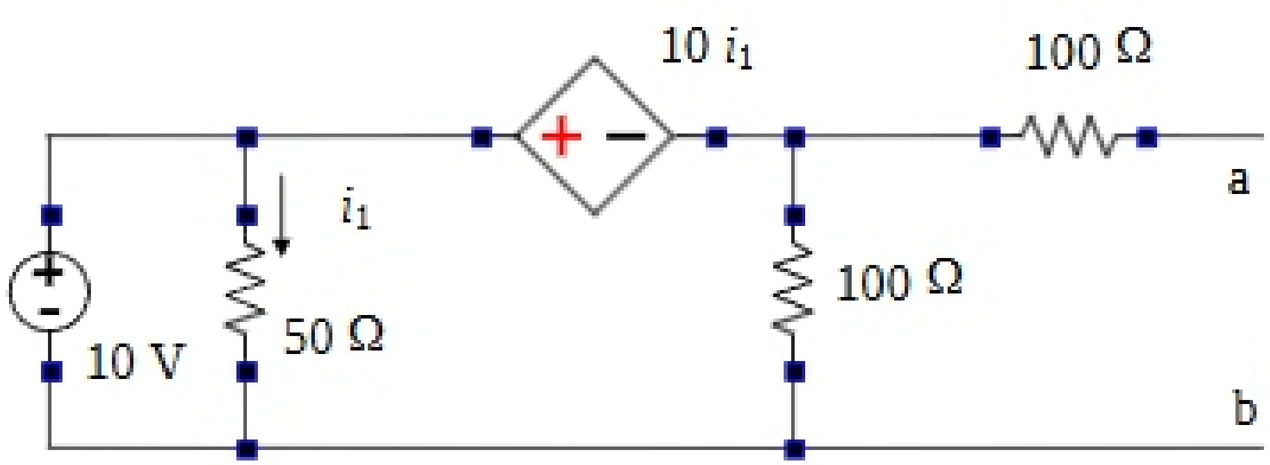
## Two Port Circuits:

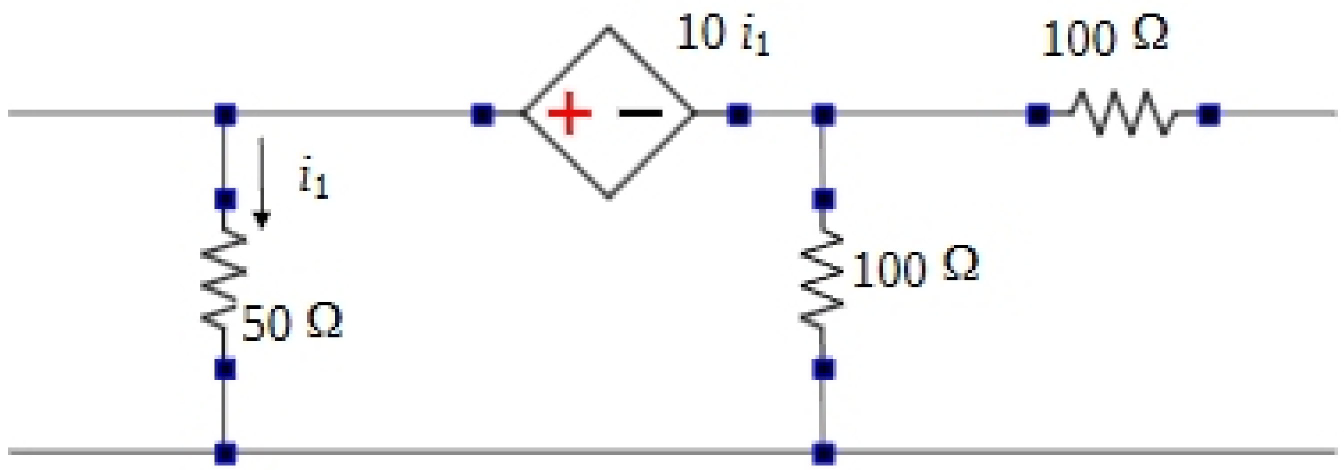
**Network parameters characterize linear circuits that have both input and output terminals, in terms of linear equations that describe the voltage and current relationships at those terminals. This model provides critical information for understanding the effects of connecting circuits, loads, and sources together at the input and output terminals of a two-port circuit.**

**A similar model was used when dealing with one-port circuits.**

**Review example: Thevenin and Norton Equivalent Circuits:**




**Show that $V_{oc}$=8 V, $I_{sc}$ = 0.08 A, and $R_{th}$ = 100**
**Now take away the source from the previous example:**




***Why wouldn't it make sense to talk about a Thevenin or Norton equivalent circuit in this case?***

**The Thevenin and Norton models must be extended to describe circuit behavior at two ports.**

**Label the terminal voltage and currents as $v_1$, $i_1$, $v_2$, and $i_2$ and develop a mathematical relationship to show their dependencies.**

## ABCD (or Chain) -Parameter Model:

**If the circuit is linear, then a most general linear relationship between the terminal voltages and currents can be expressed as:**

$$v_2 = av_1 + bi_1 + V_2$$
$$i_2 = cv_1 + di_1 + I_2$$

**Since the above system of equations forms a linear surface over the $v_1$ - $i_1$ plane, only three points on the surface are necessary to determine the *a, b, c, d,* $V_2$, and $I_2$ values that uniquely determine the surface. So if the circuit response is known for three different values of the $v_1$ and $i_1$ pair, six equations with six unknowns can be generated and solved.**

**This problem can be simplified by strategically setting the $v_1$ and $i_1$ values to zero in order to isolated certain unknown parameters and simplify the resulting equations.**

**Example:**
**Determine the abcd-parameter model for the given circuit.**