Open and Short Circuits

An **open circuit** is a condition of discontinuity between two points, like points 1 and 2 below.

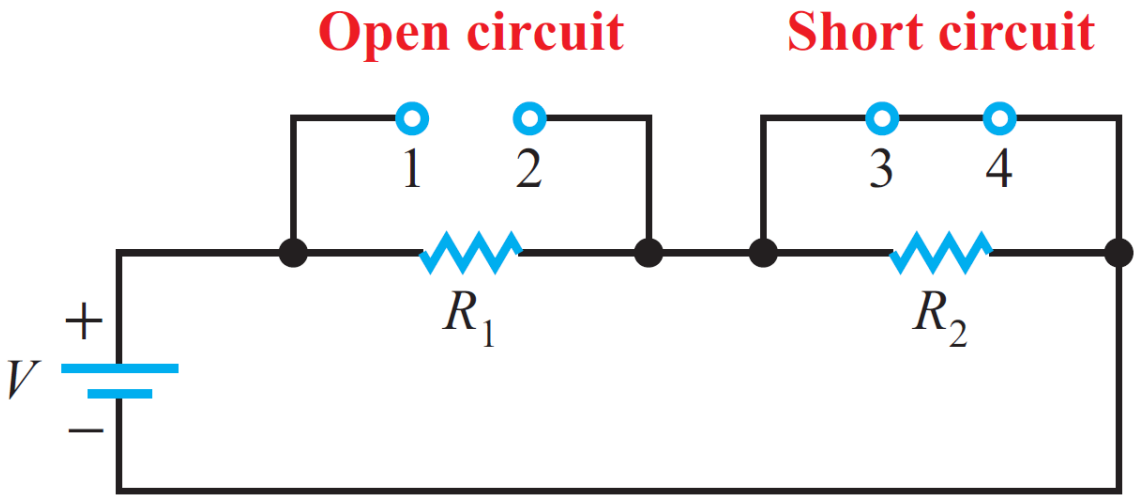
For an open circuit:

- The current across the open circuit is definitionally zero.

$$i_{oc} = 0$$

- The voltage across the open is not defined by the open circuit (this can only be found from an analysis of the open circuit and the rest of the circuit). It is a common mistake to think that $v_{oc} = 0$ or $v_{oc} = \infty$ definitionally, but this is wrong. As an example, note that in the circuit below, points 1 and 2 are also connected via R_1; once we solve for the voltage across R_1, we'd also know the voltage across the open circuit.

- Lastly, $R = \infty$ for an open circuit.



A **short circuit** is a condition of perfect continuity between two points, like points 3 and 4, above.

For a short circuit:

- The voltage across the short circuit is definitionally zero.

$$v_{sc} = 0$$

- The current across the short is not defined by the short circuit (this can only be found from an analysis of the short circuit and the rest of the circuit). It is a common mistake to think that $i_{sc} = 0$ or $i_{sc} = \infty$ definitionally, but this is wrong. As an example, note that in the circuit above, points 3 and 4 are connected to the rest of the circuit and also in parallel to R_2 and; once we solve for the current across R_1, we'd also know the current across the short circuit.

- Lastly, $R = 0$ for a short circuit