**Kirchhoff’s Rules**

In multi-loop circuits with more than one power source, often the simple series and parallel combinations will not allow one to reduce the circuit to a single equivalent resistor. In these cases, and indeed in any case, the circuit can be analyzed using two simple fundamental rules known as Kirchhoff’s rules.

The **loop rule**: the sum of all the potential drops and increases around any closed loop in a circuit must equal zero. This is a consequence of the ultimate fact that electric fields are conservative vector fields and that this implies that the path integral of E around a closed loop, which equals the potential around that loop, must be zero.

The **junction rule**: the sum of all the currents into and out from a junction point must add to zero. This rule is a consequence of conservation of electric charge.

Example of a multi-loop circuit.