A circuit is basically an electronic loop of current flow through a path of conductors.

A complete circuit requires 3 parts:
1. A **voltage source**, like a battery, to provide power to the circuit.
2. A **conductive path**, or route through which the current flows back to ground.
3. A **load**, which uses the power, like a light or motor.

The voltage source for the Odyssey Board is the 5 volts supplied through the USB cable from a computer or device. However, once a sketch is uploaded, a battery supply can be used to provide the voltage source. Jumper wires provide the conductive path and various electronic components provide the load.
Odyssey Board Blocks and Electrical Components Used for Circuits.

**Wiring Tip:** It is customary to use black wires connected to ground. The instructions will typically use black or blue. If you do not have black or blue, a good way to remember which wire is the ground wire is to always use the darkest wire for ground and the lightest color for voltage or signal.

**Socket Block**
- 2 Wire socket holes
- 3 Wire socket holes
- 4 Wire socket holes

**Types of Jumper Wires**
- Female to Female
- Resistor
- Male to Female
- Male to Male

Female to Female wires are used for most of the circuits in the Odyssey Board kit.

**Components**
- LEDs (light-emitting diodes) are small lights used in many applications.
- Resistors restrict the flow of current.

**Important:** Always insert wires from the back side of the blocks only until they are snug. If the wires get stuck in the socket, do not try to pull them out by the wires. Use the screwdriver to push them out from the front.
Materials needed to wire one LED.

- Odyssey Board
- 1 dowel
- Socket block
- Wire clip (optional)
- 1 Female to Female (F/F) wire
- 1 F/F resistor wire
- LED

Note: The color of the wires, LED, and blocks does not matter.

Set up the Odyssey Board, dowel, and socket block. (Wire clip is optional.)

Your blocks may use any horizontal or vertical dowel holes. They do not have to look exactly like the ones shown.

Note: The wires may fit quite snuggly in the sockets at first. They should loosen over time. You can also try to clean debris from the socket corners using the screwdriver.
LED = Light-Emitting Diode

The long wire leg is called the anode and must connect to the + (positive).

The short wire leg is called the cathode and must connect to the - (negative).

Current can only flow through a diode in one direction....so

The leg lengths matter!

The power supply can be too much for the small light diodes. To prevent damage to the LED, always use a resistor in your circuit to reduce the current.

220 ohm resistor
Make a Complete Circuit.

Remember: Although wires can be any color, we will typically use black or blue for our ground wire.

1. Slide a black Female (F) wire end and a resistor wire (pictured in red) together into one of the small holes the socket block.

2. Place the short leg of the LED into the black (ground) wire connector in the socket block.

3. Place the long leg of the LED in the resistor wire end socket.

4. Place the black wire on any ground pin (blue row).

5. Place a 220 ohm (red, red, brown) resistor wire on any pin in the red row. (This provides constant 5 volts.)

6. Set the switch to 5v.

Plug in the USB and see if your LED lights up. Can you trace the path of current?

If the light comes on, congratulations! If not,
1. Check to be sure the LED is turned the correct way.
2. Make sure you have a 220 ohm resistor in the circuit.
3. Check to see that the wires form a complete circuit.
4. Try a different LED.

Always unplug the power when changing wiring in your circuits.

Schematic of LED circuit.
A switch is a component that continues or interrupts ("breaks") the current in a circuit. A switch can also divert (change) current from one conductor to another. It can be placed either on the signal or ground side of your LED circuit.

One wire from the switch must connect to the LED or component.

The other wire from the switch connects to the UNO board, either to a ground pin or to the signal pin.

Since you already have a complete circuit assembled, the switch will replace one of the wires between the UNO and the LED. Just be sure to keep a resistor somewhere in your LED circuit.
Adding a switch to your circuit.

1. Unplug the USB cable from the computer or UNO.
2. Place the switch in the Odyssey Board using a dowel.
3. Since the resistor wire is connected to voltage, remove the ground wire from the circuit.
4. Place one of the Female connectors from the switch to the short leg of the LED.
5. Place the other Female connector from the switch to a ground (GND) pin.
6. Plug in the USB cord.

You should now be able to control the light by pushing the switch.