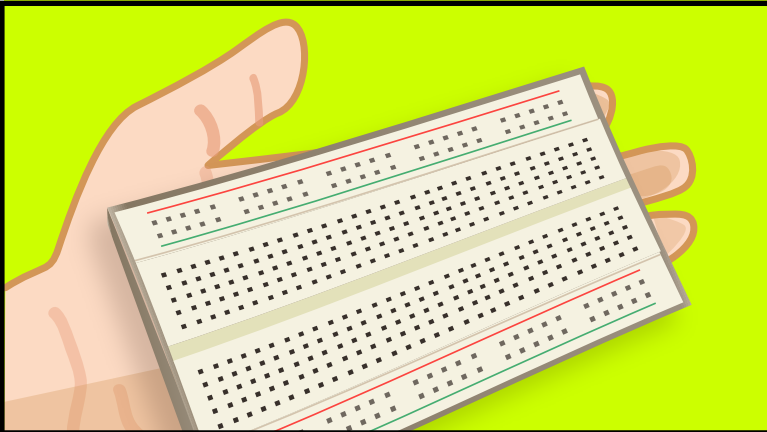
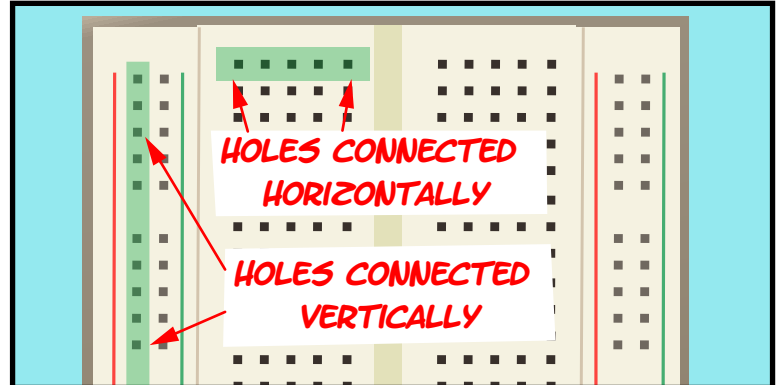
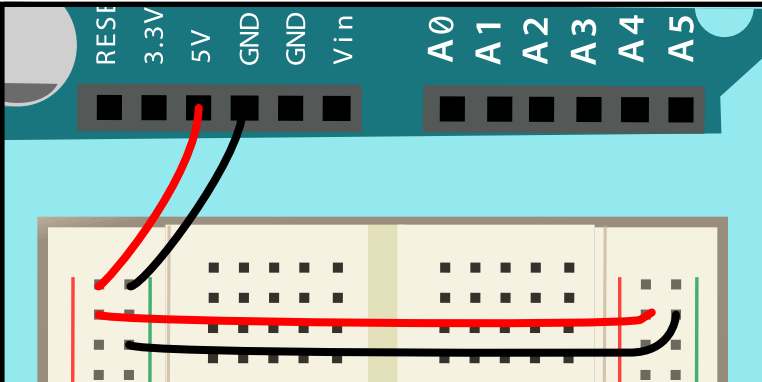




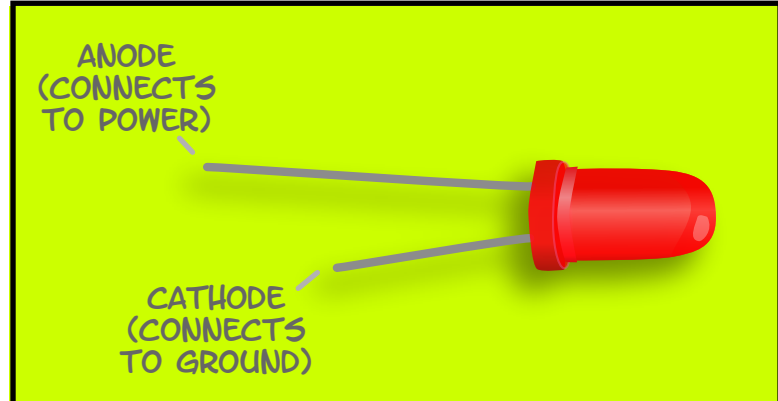
HOW DO WE CONTROL OBJECTS THAT ARE NOT ON THE ARDUINO BOARD? WE WILL CONNECT THE ARDUINO TO A **SOLDERLESS BREADBOARD**. THIS WILL ALLOW US TO QUICKLY SET UP AND TEST CIRCUITS.



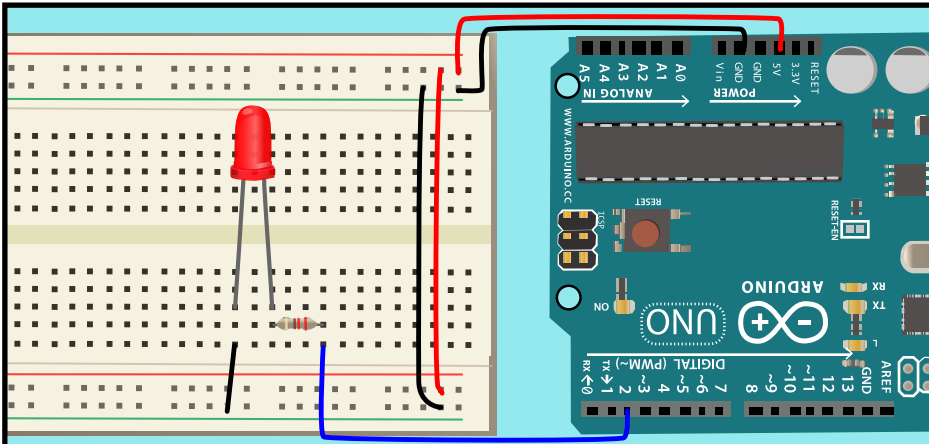
THIS BREADBOARD HAS 2 ROWS OF HOLES RUNNING DOWN THE LEFT AND RIGHT SIDE, AND 5 ROWS OF HOLES ON EITHER SIDE OF A MIDDLE INDENTATION. THE SIDE ROWS ARE CONNECTED **VERTICALLY**, EACH ROW OF 5 HOLES IN THE MIDDLE ARE CONNECTED **HORIZONTALLY**.



WE WILL CONNECT **POWER** AND **GROUND** FROM THE ARDUINO BOARD TO THE VERTICALLY CONNECTED STRIPS ON THE LEFT AND RIGHT WITH 22 GAUGE WIRE. OTHER COMPONENTS CAN BE ATTACHED TO THE HOLES IN THE MIDDLE AND TO POWER AND GROUND AS NEEDED.



WHEN CURRENT FLOWS THROUGH A **LED (LIGHT EMITTING DIODE)** IN THE RIGHT DIRECTION, IT LIGHTS UP. WE'LL ATTACH AN LED TO THE BREADBOARD, THEN TO THE ARDUINO SO WE CAN CONTROL IT WITH CODE.

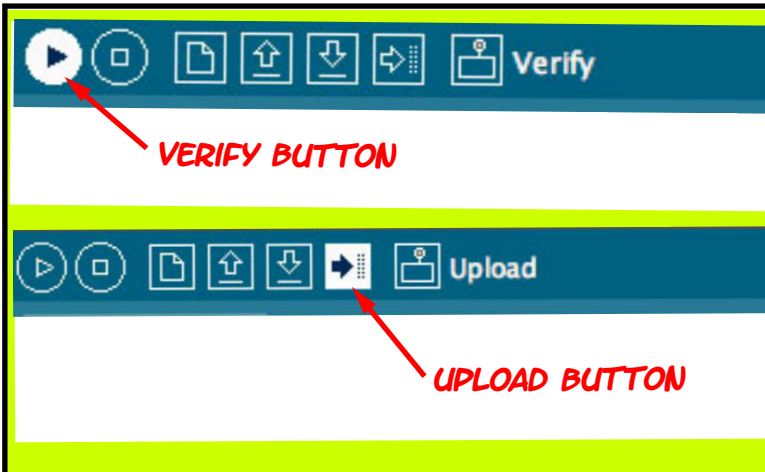


THE **ANODE** IS CONNECTED TO **PIN 2** ON THE ARDUINO THROUGH A **220 OHM RESISTOR**. THE **CATHODE** IS CONNECTED TO **GROUND**. PINS 2 THROUGH 13 CAN BE CONFIGURED AS DIGITAL INPUTS OR OUTPUTS. CLICK **NEW** BUTTON TO START A SKETCH.

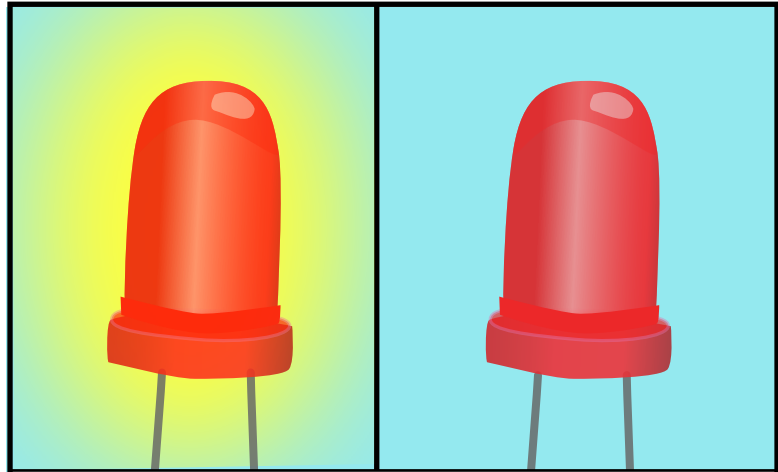
```
void setup() {
  pinMode(2, OUTPUT);
}
```

```
void loop() {
  digitalWrite(2, HIGH);
  delay(500);
  digitalWrite(2, LOW);
  delay(500);
}
```

IN **SETUP**, WE SET PIN 2 TO BE AN OUTPUT. IN **LOOP**, FIRST WE SET PIN 2 HIGH WHICH LIGHTS THE LED. DELAY PAUSES 500 MILLISECONDS, OR HALF A SECOND. WHEN PIN 2 IS SET LOW, THE LED GOES OFF, WE PAUSE ANOTHER HALF SECOND.



CLICK VERIFY ON THE MENU TO CHECK YOUR CODE. IF THERE AREN'T ANY ERRORS, CLICK UPLOAD TO PUT YOUR PROGRAM ON THE ARDUINO.



THE LED BLINKS ON FOR HALF A SECOND, THEN BLINKS OFF FOR HALF A SECOND, OVER AND OVER AGAIN.