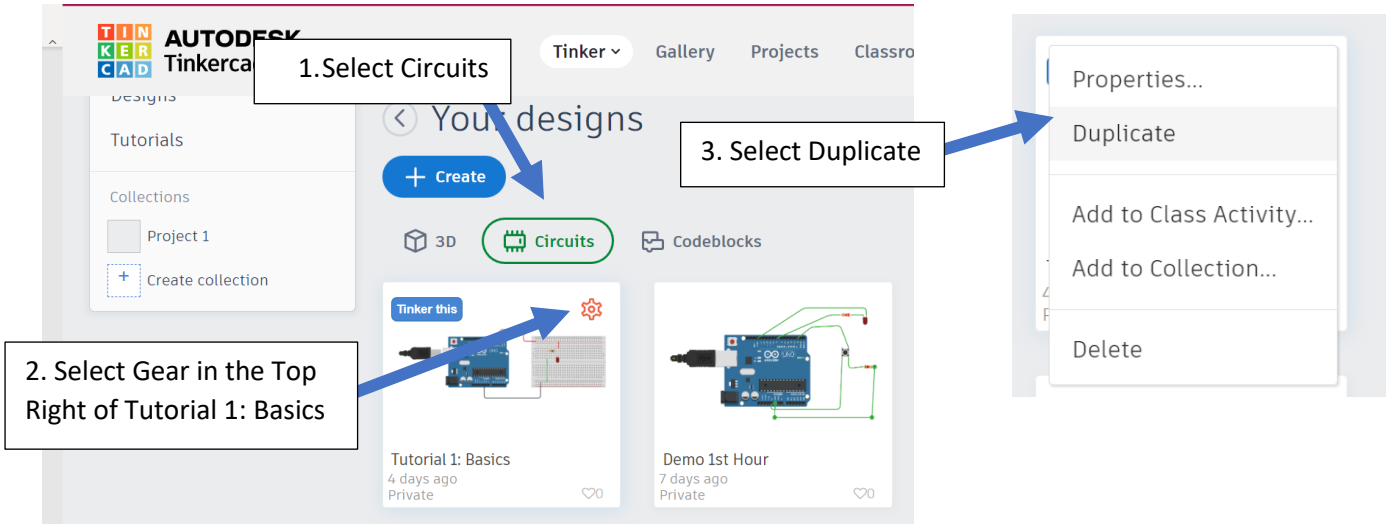
TinkerCAD Blockly Programming and Arduino

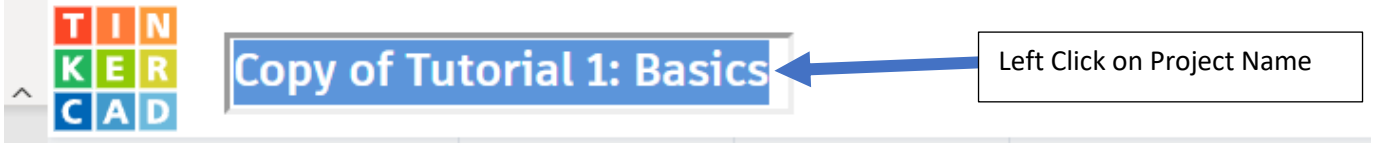
Program: Push Button

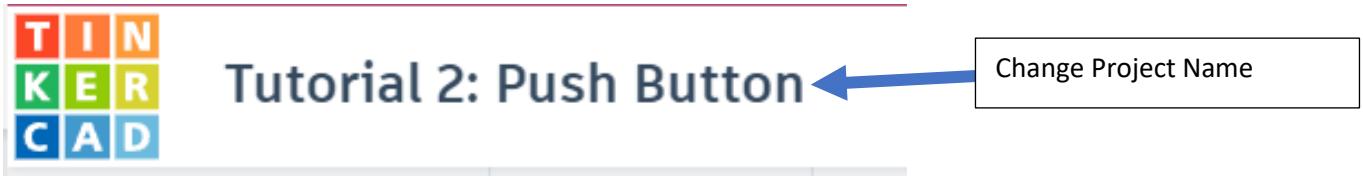
1. Navigate to TinkerCAD.com > Click Sign-In Icon (Top Left Side of Screen > Select Students, Join your Classroom > Classroom CODE: See Teacher for Code > Nickname: Student First Name (all lower case)

2. Select Circuits > Place Cursor on Tutorial 1: Basic File > Select Gear (Settings) Icon in the Top Right Corner > Select Duplicate



3. Copy of Tutorial 1 will open > Select Project Name at the Top > Change the Name to Tutorial 2: Push Button





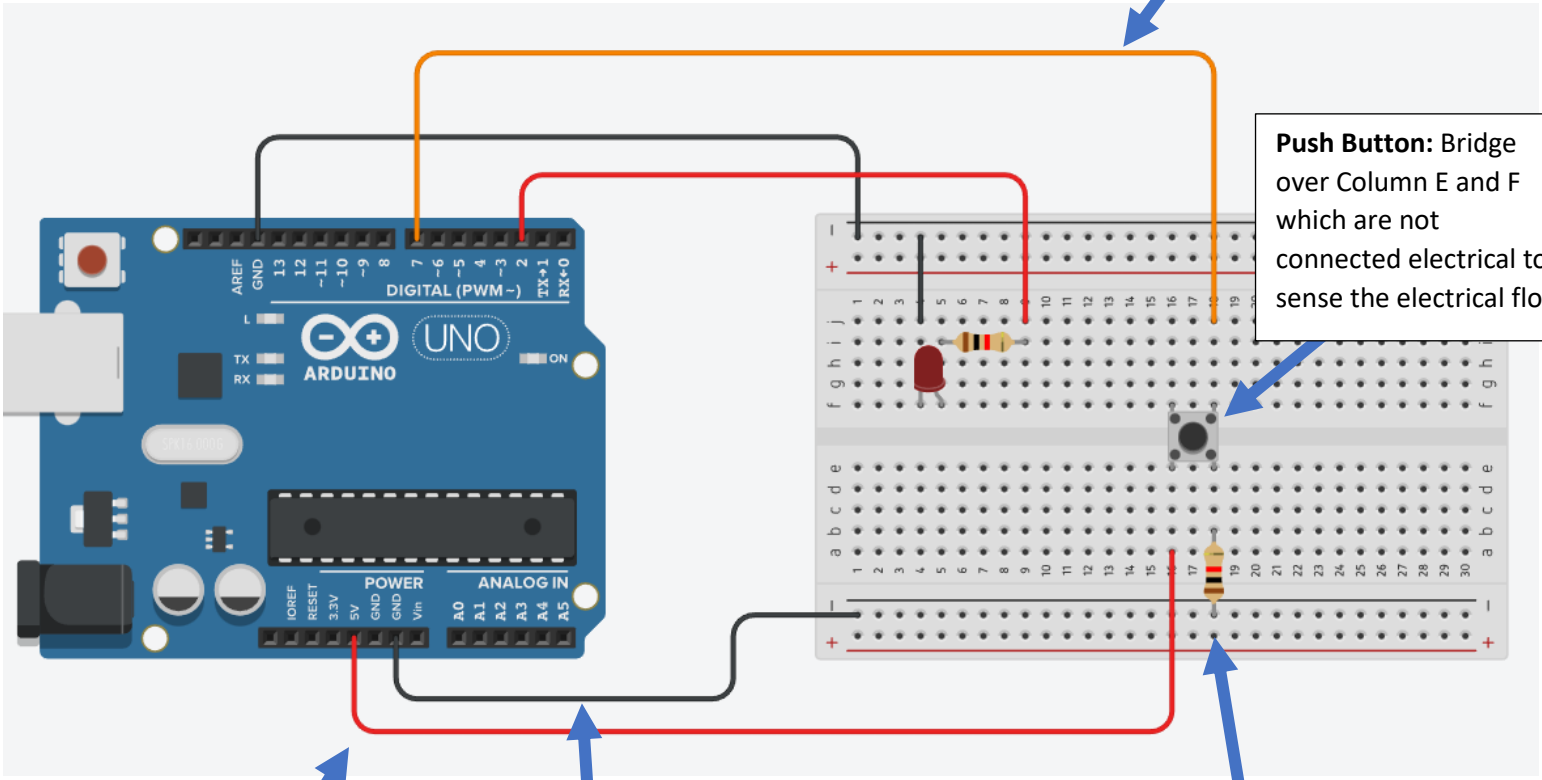
Part 1: Wire Push Button

4. Add the following Wires, Push Button and Resistor
   NOTE: a 1K Ohm Resistor is required to use up all of the Voltage (Electrical Potential) without the resistor the Arduino Board will crash

Signal Wire: Senses electrical flow

Not Pressed: Low Electricity Flow thru the push button

Pressed: High Electricity Flow thru the push button



Push Button: Bridge over Column E and F which are not connected electrical to sense the electrical flow

5V Wire: Passes voltage to the Push Button.

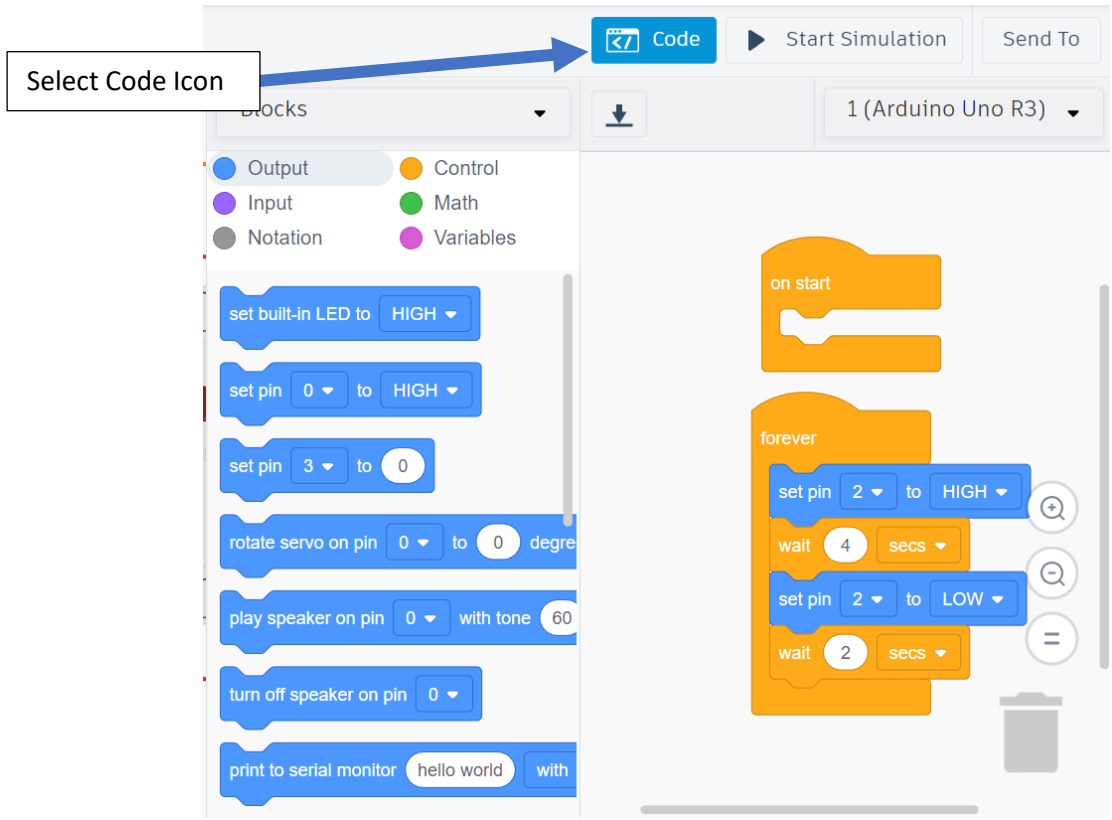
GND (Ground) Wire: Completes the Circuit

1K Ohm Resistor: Reduces the amount of voltage passed to it from the circuit to a manageable level on the Arduino.

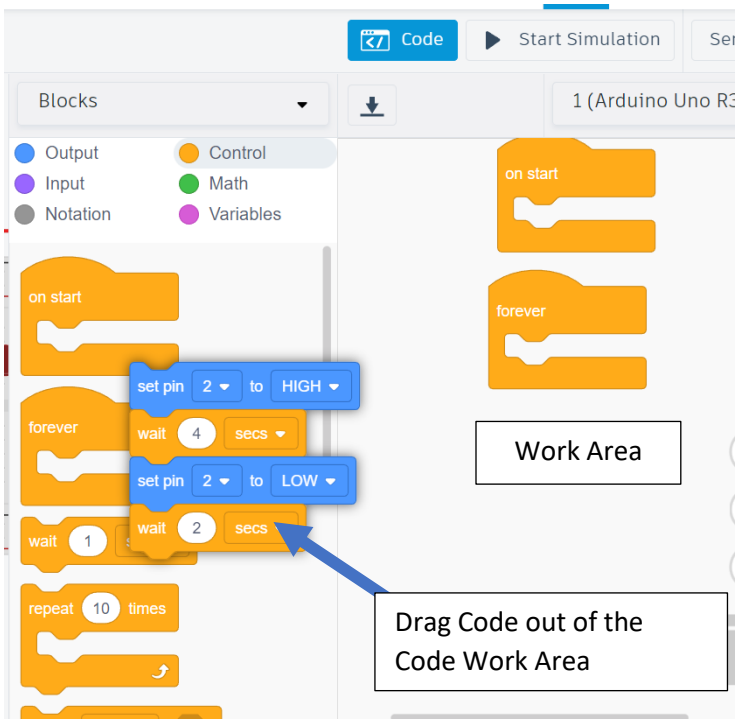
STOP

Part 2: Coding Push Button

5. Select Code Icon

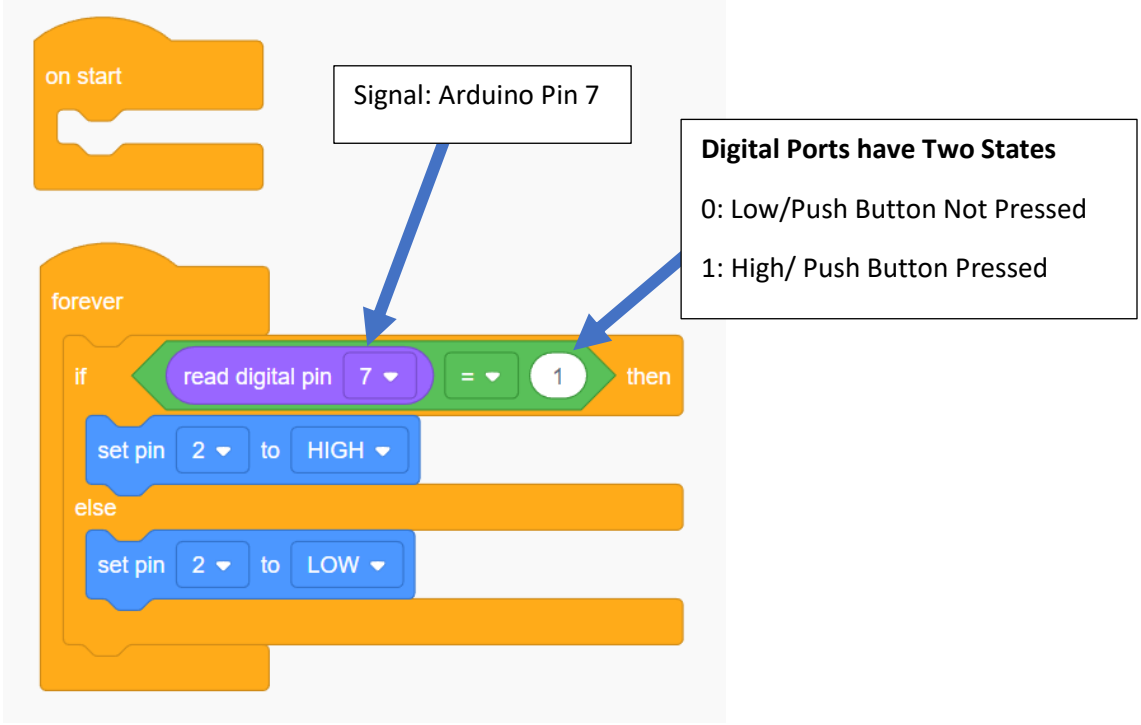


6. Remove Wait Statements from the Code Except for On Start and Forever Function
   a. Hold Left Mouse Button on the Wait Statement > Drag out of the Coding Screen > Let Go of Left Mouse Button

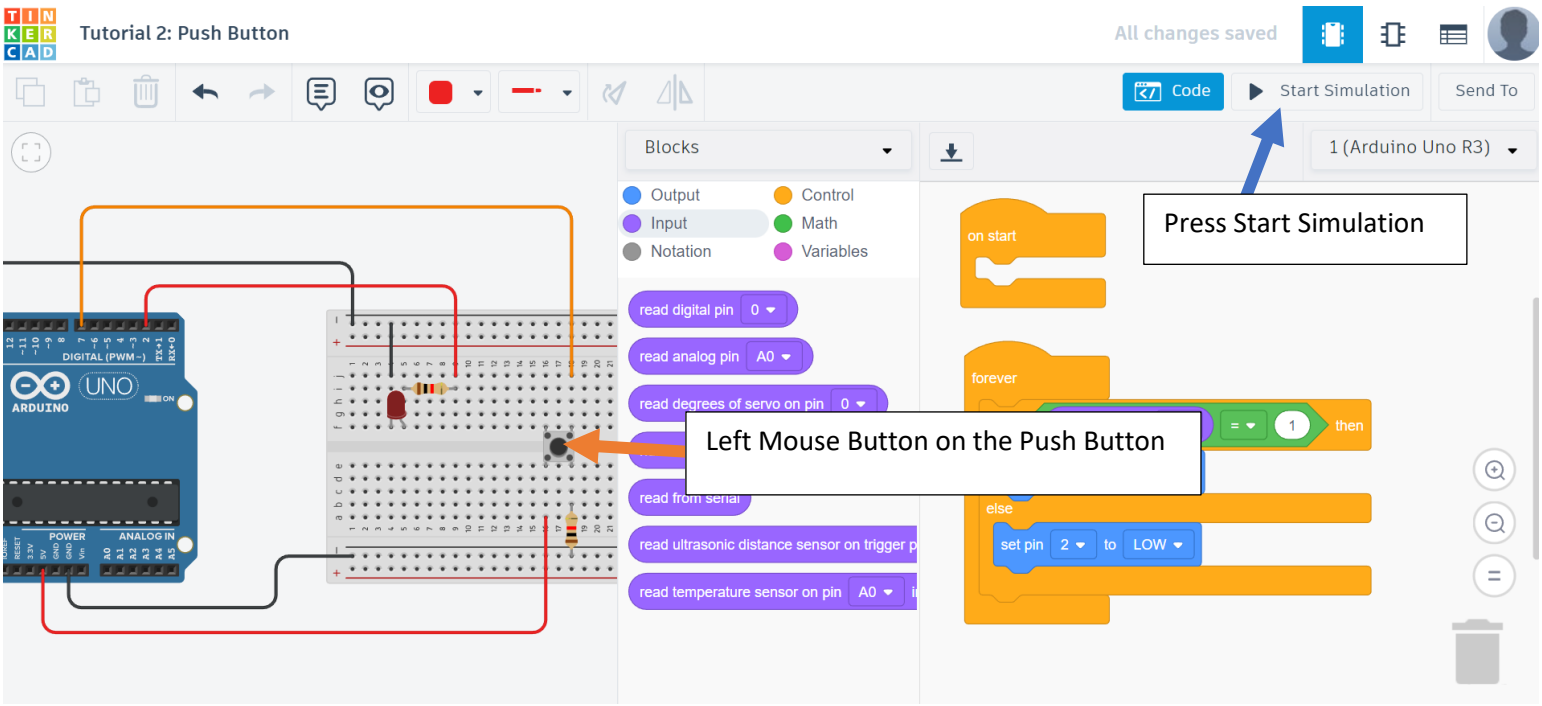


NOTE: Code may have to be moved around to pull individual Code Blocks pieces apart

b. Drag and Drop the Following Code.
NOTE: Code Blocks are Color Coded into groupings
IF Statement allows for code to run when the If Condition is True; Else will run any code when the If Condition is False



c. Test the Code
   i. Press Start Simulation Button > Left Click on the Push Button



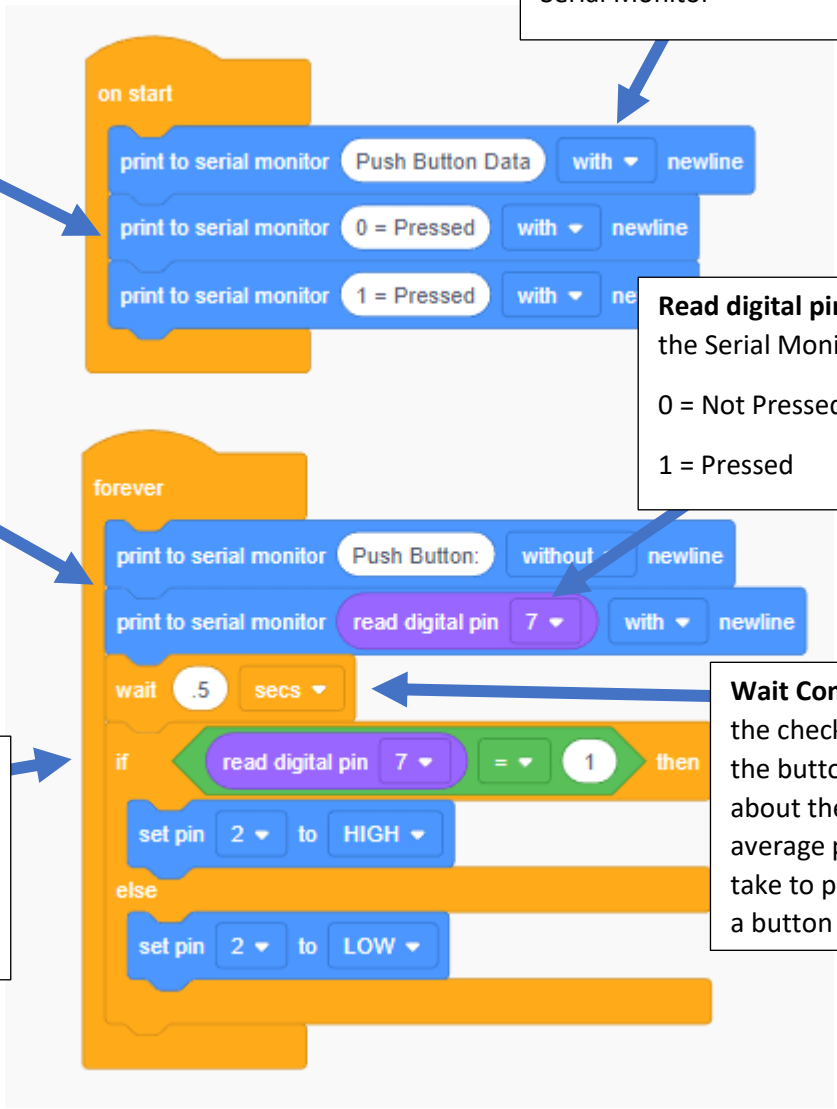
d. When finished press Stop Simulation

Part 4: Reporting Push Button Status on Screen

7. Place the following Code

With/Without Newline: Allows the user to drop text down to a new line or stay on the current line in the Serial Monitor

Print to Serial Monitor: Prints Message in Serial Monitor 1 Time only



Read digital pin 7: Prints out in the Serial Monitor

0 = Not Pressed

1 = Pressed

Print to Serial Monitor: Prints Message in Serial Monitor Infinitely. Data will Change from 0 to 1 when the Pushbutton is pressed or unpressed

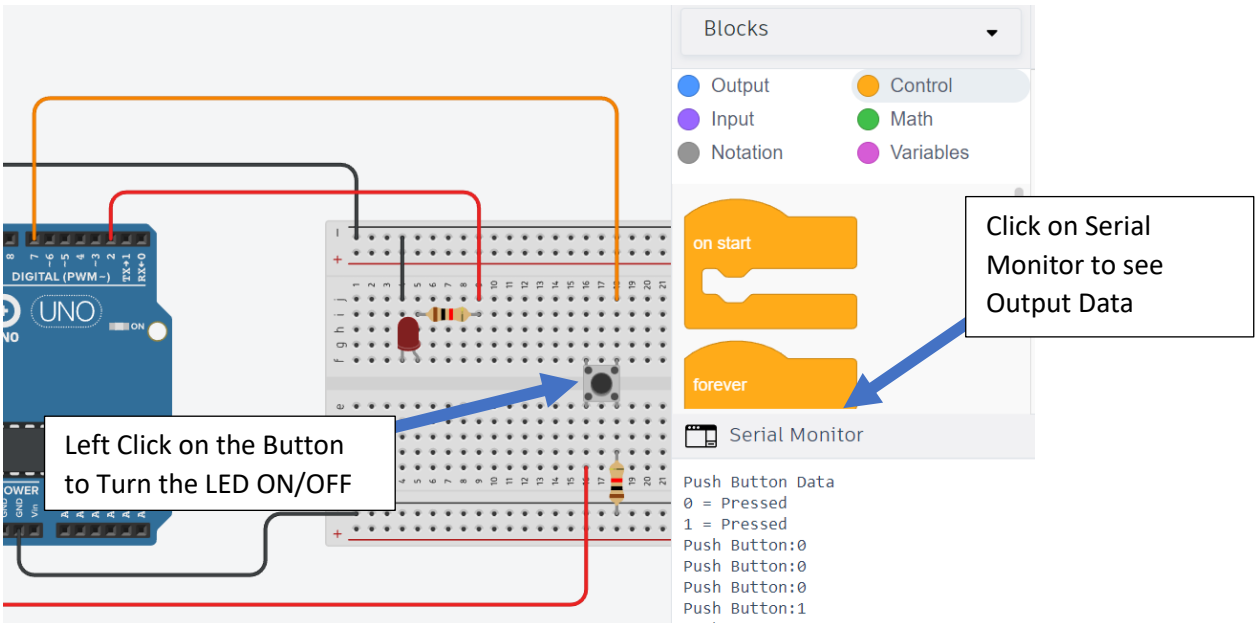
Wait Command: Slows the checking speed of the button. ½ second is about the time an average person would take to press and release a button

If/Else Statement: Checks to see if the Button as been Pressed

If True (Pressed) > LED Turns On

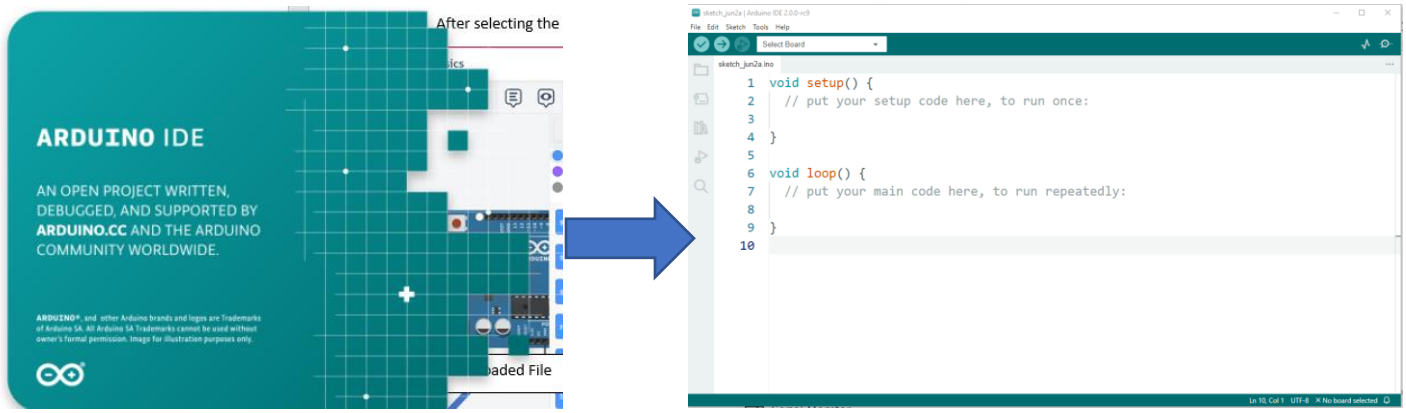
Else (Unpressed/False) > LED Turns Off

8. Run Simulation > Open Serial Monitor at the bottom of the Code Area to See Data Output > Place Cursor on the Push Button + Left Click to simulate a button press > When Finished Select Stop Simulation

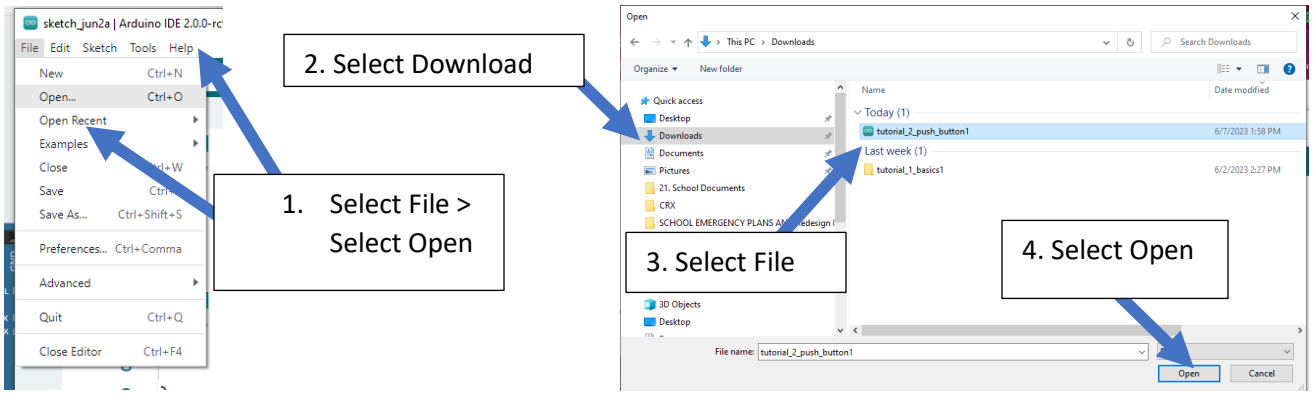


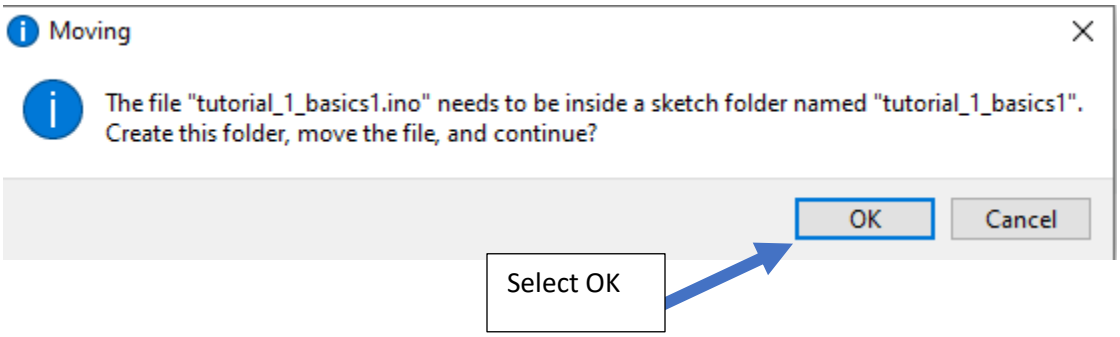
Part 3: Download and Build Circuit

9. Select Download Button in the Top Left Corner of the Programming Screen
10. Open Arduino Software



11. Select File > Open > Navigate to Downloads > Select File > Pop Menu will Appear to ask to create a folder for the file > Select YES > Arduino Software will Open





Program will appear as Structured Text
DO NOT ADJUST any of the code provided
NOTE: Comments were added (Gray Text)

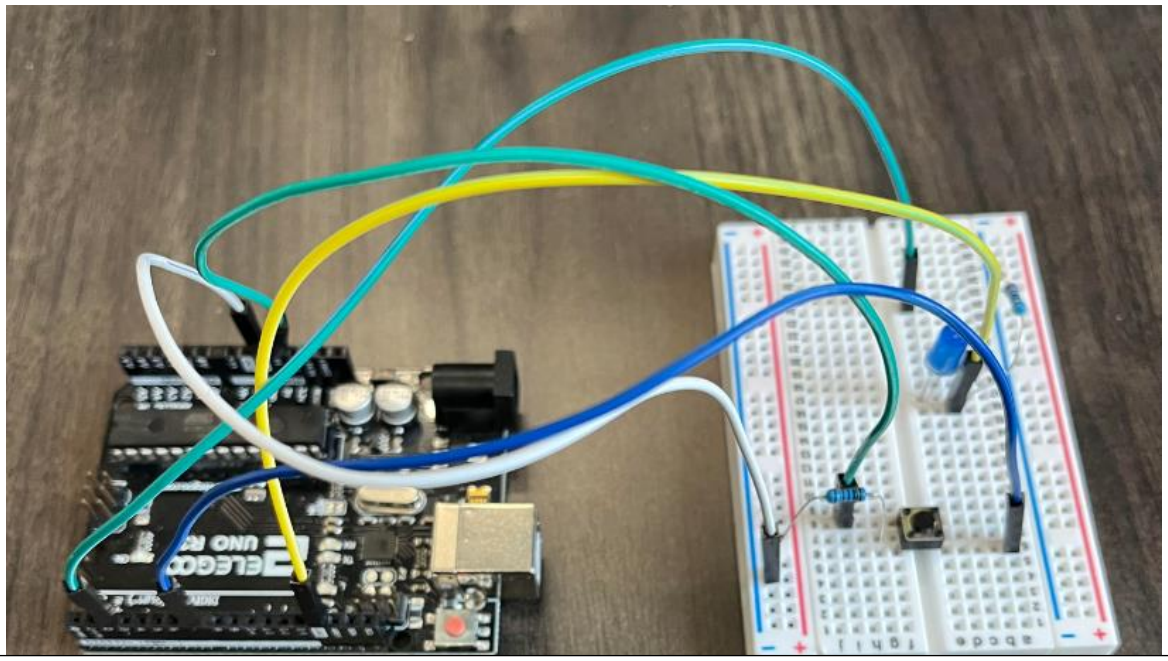
```
// C++ code LED and Push Button
//
int LED = 0;

void setup()
{
  Serial.begin(9600);                   //Serial.begin (9600); connects the Serial Monitor to the Program
  pinMode(7, INPUT);                    //pinMode Declares Arduino Pin 7 can only take data signals in
  pinMode(2, OUTPUT);                   //pinMode Declares Arduino Pin 2 can only send data signals out

  Serial.println("Push Button Data");   //Serial.println: ln is for the newline in the Serial Monitor
  Serial.println("0 = Pressed");
  Serial.println("1 = Pressed");
}

void loop()
{
  Serial.print("Push Button:");
  Serial.println(digitalRead(7));
  delay(500);                           // Wait for 500 millisecond(s)/ 1/2 second
  if (digitalRead(7) == 1) {            //digitalRead is monitoring the electrical signal in Arduino Pin 7
    digitalWrite(2, HIGH);              //HIGH = ON
  } else {
    digitalWrite(2, LOW);               //LOW = OFF
  }
}
```

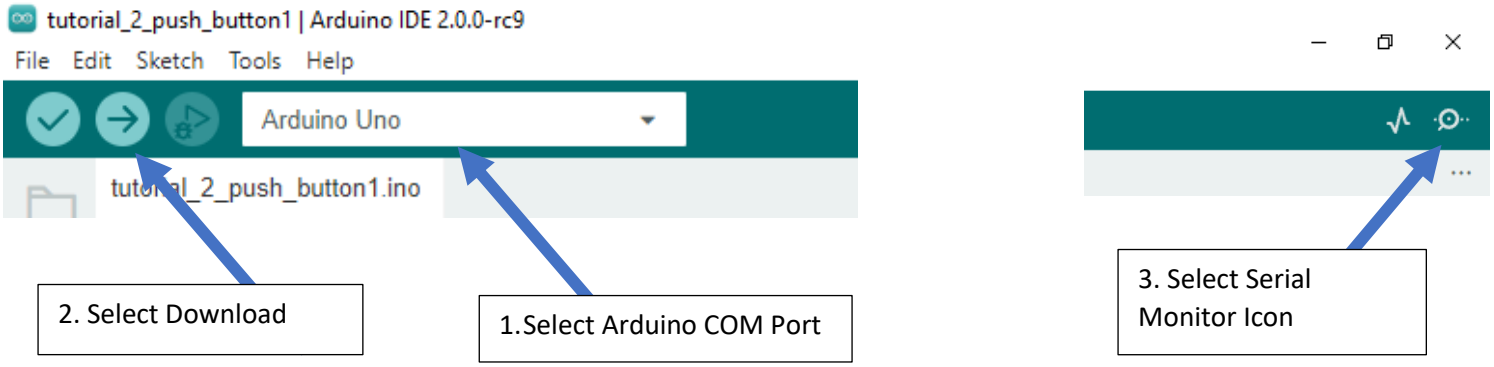
12. Wire the Circuit. Circuit maybe setup excatly like TinkerCADs



STOP

Have a Teacher or Volunteer inspect wiring setup

13. Connect Arduino to the PC with the USB Cord
14. Select Arduino COM Port > Download Program > Open Serial Monitor Top Right Corner > Press the Push Button to see the LED Turn ON/OFF



Serial Monitor will open at the bottom of the Arduino Screen