Introduction to Arduino
## Blink – Your First Program

1) This first lab will have you programming your Nano to blink an LED. This simple program is often used as a test program to make sure everything, both your board and the programming environment are functioning as they should.

   FIRST, go to the Arduino website (http://www.arduino.cc), then click on the "DOCUMENTATION" tab, and then click on "BUILT-IN EXAMPLES" on the drop down menu. On the examples page scroll down to section #1 Basics, then choose, 'Blink'.

   Note the 'Table of Contents' and its organization. It organizes the project into the various sections of importance.

   Work through the various content sections take making extra effort to UNDERSTAND the code as doing so will form the cornerstone for everything that is to follow.

   Built-In Example › Blink

   TABLE OF CONTENTS

   Hardware Required

   Circuit

   Schematic

   Code
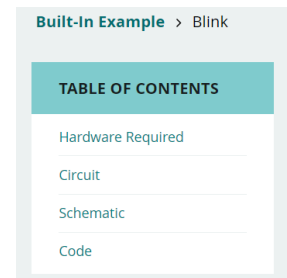
2) Breadboard the LED and 220Ω resistor in the pictorial and schematic below to go along with the lab. NOTE, that the pictorial diagram is provided to get you started, eventually a 'schematic diagram' will only be provided to complete the labs. The 5V pin (VCC on some boards) will go to the top "red" rail on the breadboard and the GND (negative) will go to the bottom "blue" rail on the breadboard. Using a wire from pin D13, bring it out past the NANO and then connect the resistor to it, followed by the LED to ground as shown.
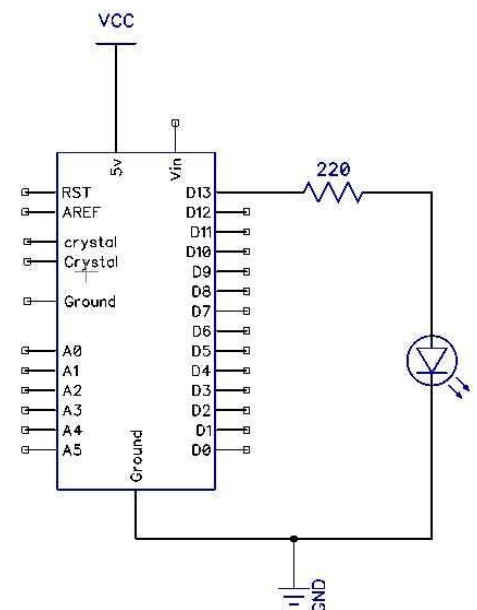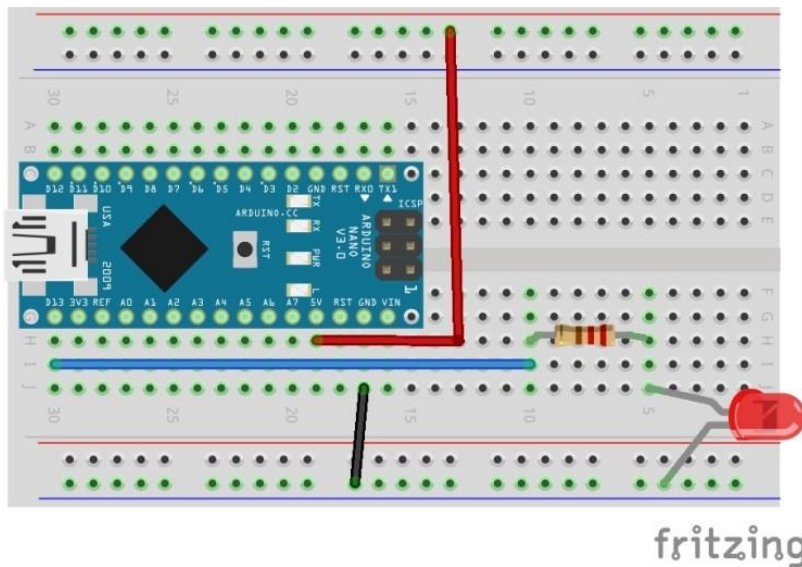
3) Open the Arduino software. Under the "File" drop down menu, click on Examples, 01.Basics, Blink. The 'Sketch' (code) for the blink example tutorial will open.
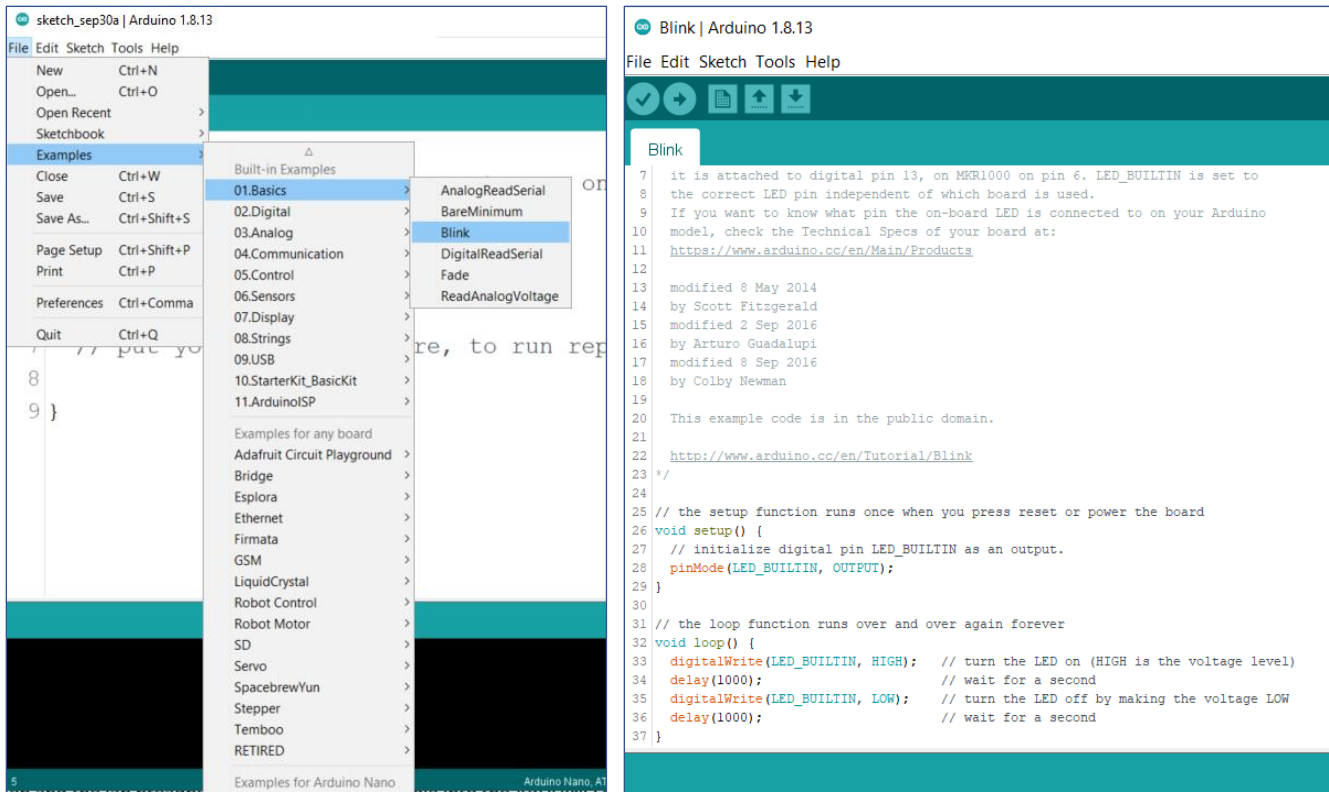
4) Now that you have the code open and the lab breadboarded, insert the USB cable into the ARDUINO NANO and the computer. The lights on the ARDUINO NANO will come on and the software drivers for the ARDUINO NANO need to get installed. You will see this installation in the windows task bar. When it is complete you will have to do the following **THREE** things in the Arduino Software to be able to UPLOAD the program;

   a) Pick the correct board (Arduino NANO)
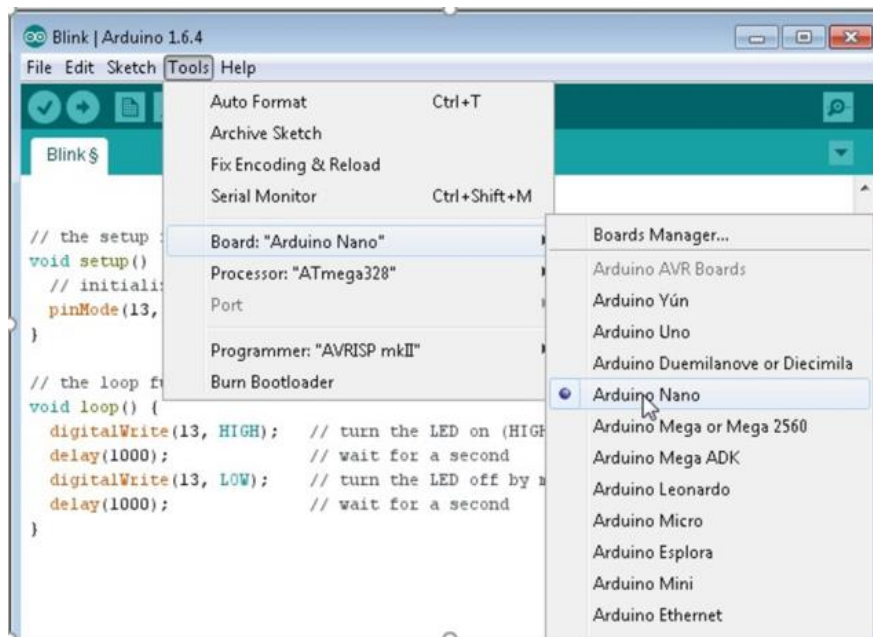
b) Pick the correct processor (ATmega328)
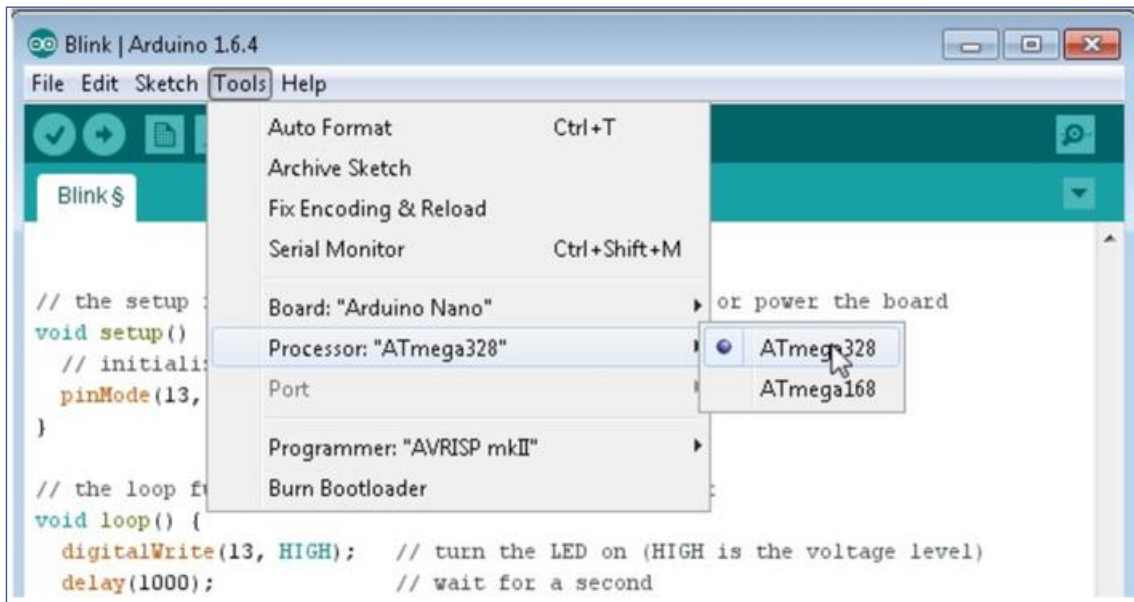
c) Setup the correct Serial COM Port – this may vary from machine to machine and is usually the last one on the list. **IT IS NOT COM1.** There should be a second choice.
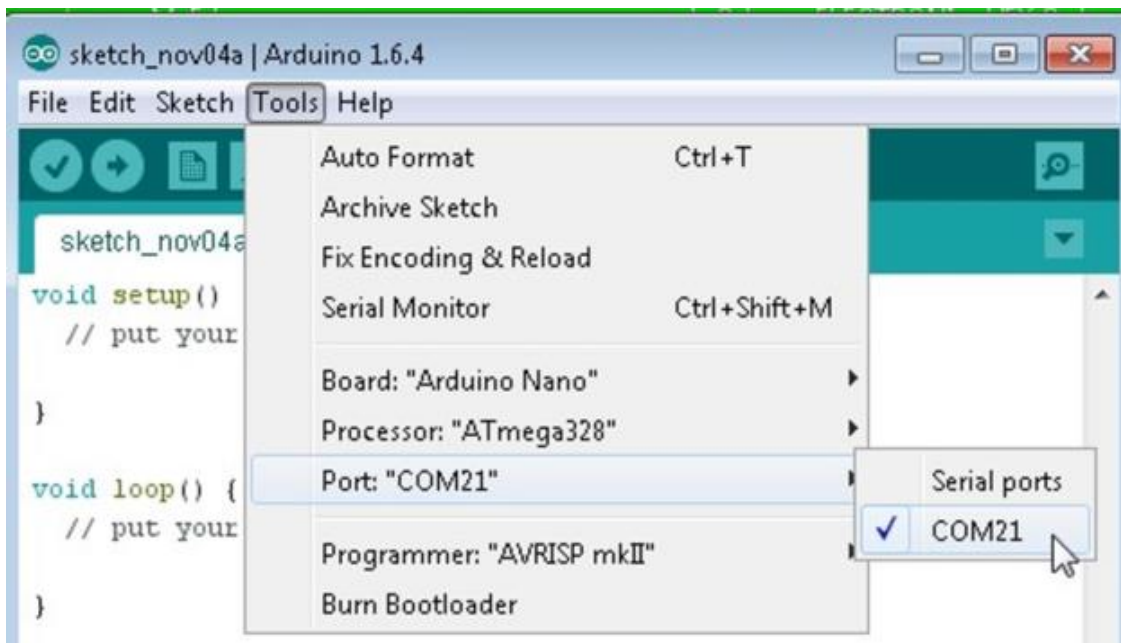
5) Now that you have the settings correct, UPLOAD or, 'compile', the program to the ARDUINO NANO. The upload will only work IF… 1. there are no errors in the code and 2. you have the correct boar / Processor / COM port as per step 4. Once uploaded the LED should blink.

```
Blink | Arduino 1.8.13
File Edit Sketch Tools Help

         Upload

  t is attached to digital pin 13, on MKR1000 on pin 6. LED_BUILTIN is set to
8    the correct LED pin independent of which board is used.
9    If you want to know what pin the on-board LED is connected to on your Arduino
10   model, check the Technical Specs of your board at:
11   https://www.arduino.cc/en/Main/Products
12
13   modified 8 May 2014
14   by Scott Fitzgerald
15   modified 2 Sep 2016
16   by Arturo Guadalupi
17   modified 8 Sep 2016
18   by Colby Newman
19
20   This example code is in the public domain.
21
22   http://www.arduino.cc/en/Tutorial/Blink
23 */
24
25 // the setup function runs once when you press reset or power the board
26 void setup() {
27   // initialize digital pin LED_BUILTIN as an output.
28   pinMode(LED_BUILTIN, OUTPUT);
29 }
30
31 // the loop function runs over and over again forever
32 void loop() {
33   digitalWrite(LED_BUILTIN, HIGH);    // turn the LED on (HIGH is the voltage level)
34   delay(1000);                        // wait for a second
35   digitalWrite(LED_BUILTIN, LOW);     // turn the LED off by making the voltage LOW
36   delay(1000);                        // wait for a second
37 }
```

6) Now using what you have learned, write a simple program that blinks the LED really fast twice (250ms apart), then slow once (1 second). Use the code below and the comments (two forward slashes // mean whatever is behind it is a comment) to figure out what is needed to change the program.

```
// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(led, HIGH);    // turn the LED on (HIGH is the voltage level)
  delay(1000);                // wait for a second
  digitalWrite(led, LOW);     // turn the LED off by making the voltage LOW
  delay(1000);                // wait for a second
}
```

digitalWrite(led, HIGH);	This command sets the output of Pin 13 on the ARDUINO NANO to HIGH or 5V.
digitalWrite(led, LOW);	This command sets the output of Pin 13 on the ARDUINO NANO to LOW or 0V.
delay(1000);	This sets the delay (wait) before going onto the next command line in the program in milliseconds. - 1000milliseconds = 1 second - 250milliseconds = .25 second

7) Replace the LED with an RGB LED (Red, Green, Blue). Connect the LED to pins D5, D6, D7. The longest leg on the LED is the Common Anode and it needs to be connected to the 220Ω resistor. Now, change your code to make the LED blink Red, Green, Blue with a 500ms delay between each. You will have to declare 3 integers at the beginning of your sketch (call them red = 5, green = 6, blue = 7) and have 3 pinMode's in the setup. (HINT: a LOW turns on the LED ☺)
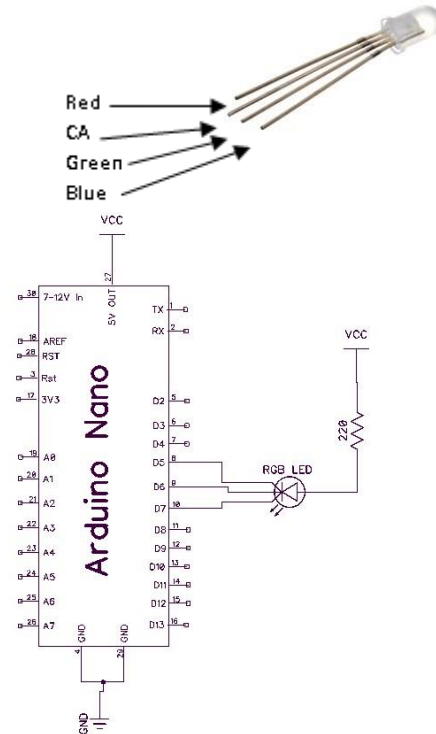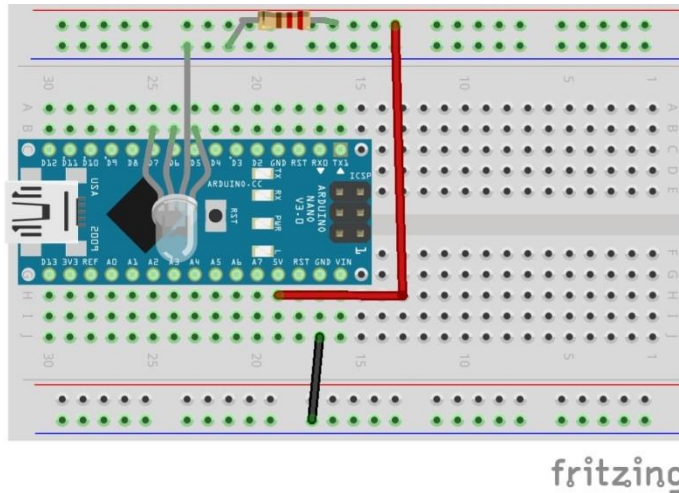
Show the teacher the working breadboard and code.

Marks will be taken off if the wires on the breadboard are not flat like shown above!!!!