

Introduction to Arduino

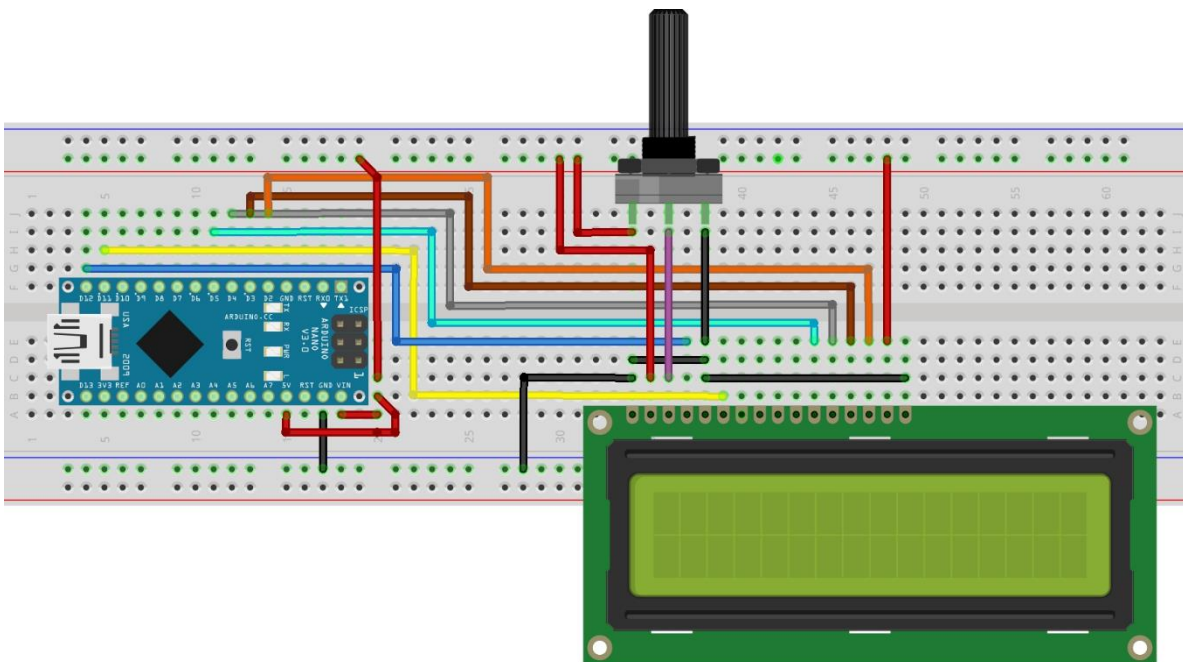
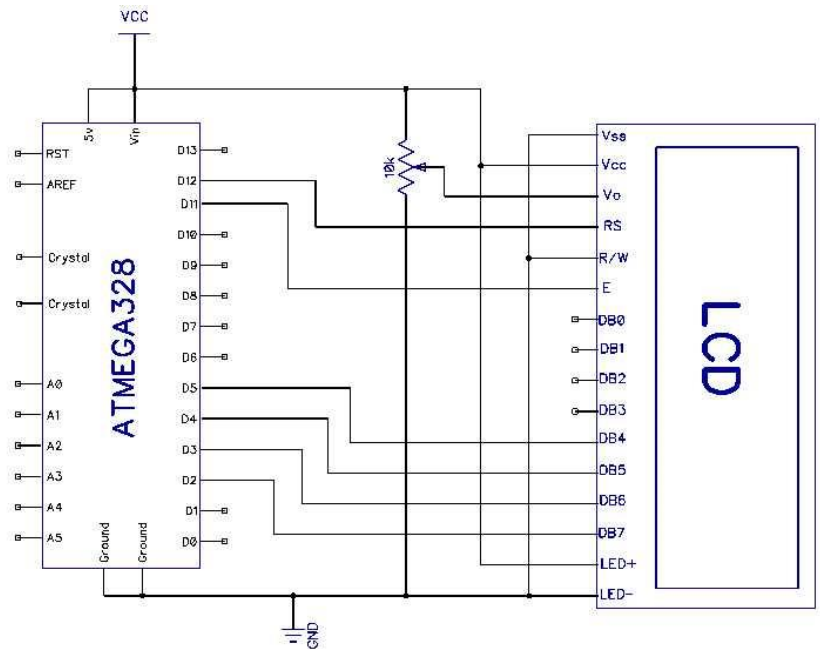
Liquid Crystal Display

Name: _____

Mark /10

Note: Marks will be taken off for incorrect answers or messy breadboarding

1. You are going to connect a Liquid Crystal Display (LCD) to your circuit (see schematic on right) and use it to display data back to you. Using the Arduino website, click on the “Learning” tab, and then scroll down under Examples and “Liquid Crystal Library” to find the “Hello World” tutorial. Read the content and understand the code.



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2. Open the source code in the Arduino software and upload it to the Boarduino.
3. You should now have “Hello World” and the seconds counting on the LCD. You may need to adjust the potentiometer to get the contrast set correctly so you can see the text.

Show the teacher the working lab and code.

4. In this code, there is something new. This time at the very top you will see the following line of code;

```
#include <LiquidCrystal.h>
```

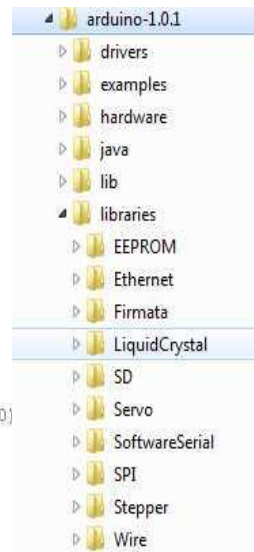
This is a **library** that needs to be **included** in the program for the LCD to work. A library is a set of separate code specifically designed to work with certain devices (LCD, Ultrasonic Module, Transmitter/Receiver, Bluetooth Module, etc). These libraries allow your main program to be a lot easier and they have their own specialized code that you use. The libraries are located within the Arduino Software folder under “libraries” installed on your computer.

```
// include the library code:
#include <LiquidCrystal.h>

// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

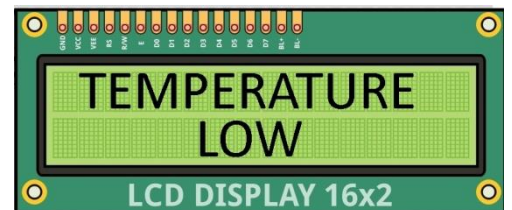
void setup() {
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
  // Print a message to the LCD.
  lcd.print("hello, world!");
}

void loop() {
  // set the cursor to column 0, line 1
  // (note: line 1 is the second row, since counting begins with 0)
  lcd.setCursor(0, 1);
  // print the number of seconds since reset:
  lcd.print(millis()/1000);
}
```



5. The LiquidCrystal library is automatically installed when you install the Arduino Software. However, there are other libraries that will have to be installed, especially if you are using special components (infrared, ultrasonic, transmitter/receiver, etc).

6. **Using what you have learned from Lab #3**, ADD a potentiometer to the Analog input A0 and write a program that will display the word “Temperature” on the top line and then “LOW, MED, HIGH” on the line below based on the following readings of the potentiometer; LOW is anything less than a reading of 250, MED is anything between a reading of 250 and 750, HIGH is anything over 750.



Hints:

- Copy your Lab 3 code into the liquid crystal display code at the bottom and then start to modify it
- Use the “`lcd.setCursor`” command below to place the text in the centre and on the rows you want.
- Use the “`lcd.clear`” command to clear previous words.
- Use the “`lcd.print`” command to print the words you want.

`lcd.setCursor(col, row)` – places the start of the text.

col (0 being the first column)
row (0 being the first row)

`lcd.clear()` – clears the screen

`lcd.print(“words”)` – Prints the words in quotes on the screen

Show the teacher the working lab and code.

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