For Loop

The For Loop is a common function across programming languages, as it lets you go through a loop with minor changes every time and a planned exit from the loop. These are especially common in Arduino Sketches where multiple inputs or outputs need to be set up the same way. Using a for loop makes the code simpler to write and less likely to break (with only a possible slight reduction in readability of the code overall, but: when familiar with for loops, they’re easy).

# Example Sketch 1

Below is an example for loop implemented in a program. You can see that the for loop is implemented in the ‘void setup()’ just so you can see that it is the for loop that is actually looping (and not the ‘void loop()’ function).

**void setup() {** // the setup function runs once

**Serial.begin(9600);** // open serial communication

**for(int i = 1; i < 8; i++){** //this is a complex line

//the for loop is started, with the conditions in ()

//an int variable called ‘i’ is made with a value 1

//the for loop will run until i<8 is not true

//the i++ means i will get bigger by one every loop

**Serial.print("Going through the loop, time #");**

**Serial.println(i);**

**delay(1000);**

**}**

**}**

**void loop() {** //ignore the 'void loop()' for this one...

**delay(1000);** //ignore this...

**}**  //ignore this...

Explain the Serial Monitor behavior of the above sketch with written sentences:

Describe the output of this program on a serial monitor. (what text and time intervals?)

Answer here

How is this output achieved by the program? (Explain the logic of the program)

Answer Here

## 

# Example Sketch 2

Below is an example array implemented in a program. You can see that the array is implemented in the ‘void loop()’ so this code will run forever, while powered.

**int ledPin = 13;**

**void setup() {** // the setup function runs once

**pinMode(ledPin, OUTPUT);**

**}**

//morse code for the letters “A.I.”

**int times[] = {250,80,750,80,250,80,250,2000};**

**Bool ledState = true;**

**void loop() {** // will run forever, while there is power

**for(int x = 0; x < 8; x=x+1){**

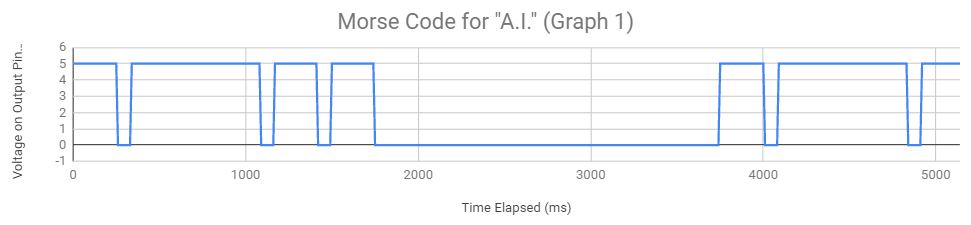
**digitalWrite(ledPin, ledState);** // output on pin 13

**ledState = !ledState;** //change ledState so it will flip

**delay(times[x]);** //wait some time from the array

}

**}**

The example sketch above would output the voltage shown in the graph below: 

Understanding how this voltage relates to the program is an important part of understanding microcontrollers. Please explain in at least one (6 sentence) paragraph how and why the voltage output shown above comes from this program.

Answer here

# 

# Arduino’s Own Explanations

[For Reference Page](https://www.arduino.cc/reference/en/language/structure/control-structure/for/) << a written explanation of for, and how it works on Arduino

[For Example Sketch](https://www.arduino.cc/en/Tutorial/ForLoopIteration) << an example implementation of for, used in a sketch

# Create your own While Sketches

*You don't know if you understand it, until you can create it from nothing...*

Using what you have seen above, in the example sketches and from Arduino’s reference materials. Create your own sketch that implements a while loop in some way. You have plenty of creative license in this goal, but you must make a sketch that successfully uses a while loop. A screenshot of your sketch and output is half of your response to these. A written explanation of the logic is also required to prove that you understand what you are doing with this work. Primary tasks are required for all students. Secondary tasks are required to get a top grade.

* Primary tasks:
  + successfully implement a for loop in the ‘void setup()’ function

Screenshot & Explanation here

* + successfully implement a for loop in the ‘void loop()’ function

Screenshot & Explanation here

* Moderate understanding secondary tasks:
  + Increment the for loop by going up (or down) by more than 1

Screenshot & Explanation here

* + Implement a condition statement that includes a <= “less than or equal to”

Screenshot & Explanation here

* + Implement an array with a for loop (see example: File>examples>control>array)

Screenshot & Explanation here

* Advanced understanding secondary tasks:
  + Use some nested for loops (put one inside another)

Screenshot & Explanation here

# 