While Loop

The While Loop is a common function in many programming languages. In fact, the ‘void loop()’ of a standard arduino sketch is essentially equivalent to a while loop that has an always-true condition, so it never exits the loop....

# Example Sketch 1

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

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

**Serial.begin(9600);**

**while(true){**

**Serial.println("hello world");**  //print text

**delay(1000);**  //wait one second

**}**

**}**

**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

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# Example Sketch 2

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

**int ledPin = 13;**

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

**pinMode(ledPin, OUTPUT);**

**while(true){**

**digitalWrite(ledPin, HIGH);** //5V output on pin 13

**delay(1000);** //wait one second

**digitalWrite(ledPin, LOW);** //0V output on pin 13

**delay(1000);** //wait one second

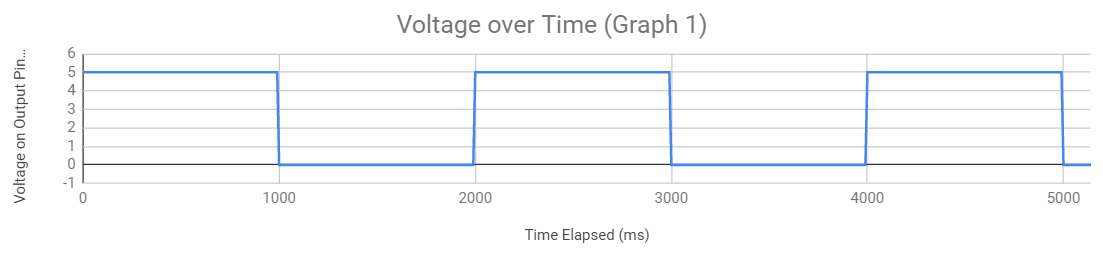
**}**

**}**

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

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

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

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

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

[While Example Sketch](https://www.arduino.cc/en/Tutorial/WhileStatementConditional?from=Tutorial.WhileLoop) << an example implementation of while, 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 while loop in the ‘void setup()’ function

Screenshot & Explanation here

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

Screenshot & Explanation here

* Moderate understanding secondary tasks:
  + if you use ‘break;’ to exit any while loop

Screenshot & Explanation here

* + if your sketch exits the while loop because the condition is no longer met

Screenshot & Explanation here

* Advanced understanding secondary tasks:
  + if your sketch exits the while loop because the condition is no longer met after more than three cycles through the loop

Screenshot & Explanation here

* + If your sketch handles an [analog input](https://www.arduino.cc/en/Tutorial/AnalogInput) to control whether the while loop is met

Screenshot & Explanation here

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