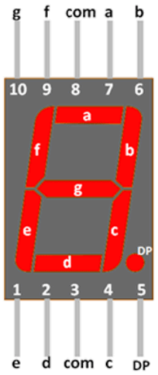
W9B: DE Arduino & Seven Segment Display

Introduction

Programming languages have their own grammar called "syntax". Programs written with the Ardiuno software are called Sketches. A **Sketch** (program written with **Arduino**) will contain: a title, **constants**, **variables**, setup() functions, and loop() functions.

If the syntax of a language is not followed, the program will not compile correctly. This means that no executable code will be produced. Fortunately, the **Arduino** integrated development environment (IDE) will provide error messages that will help you fix your "bad grammar"… called "syntax errors". One of the most common syntax errors that students make is forgetting that lines of code need to end with a semicolon.



Equipment

Computer with Arduino Software
Recall the Common Cathode Seven Segment Display:

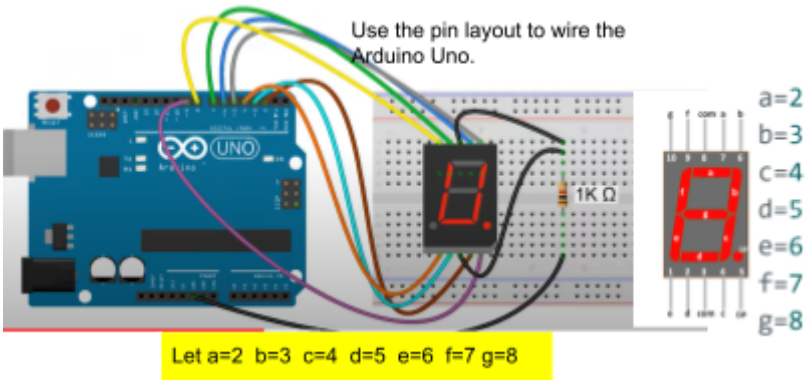
Aeries Screenshot

Grade	11
Age	17
Birthdate	12/12/2007

Procedure

PLTW Engineering **Digital Electronics Manufacturing**

Jeide, Matthew 3/4/2025 Period 2



STEP 1: Define the pins and save the file with your name as shown below. The forward slash allows you to // type a comment on the code. Semicolons are lines of code.

File Edit Sketch Tools Help

Arduino Uno

W10B_Guzman_Arduino_Seven_Segment.ino

```
// C++ code
//Guzman DOB Seven Segment Display
int a=2;
int b=3;
int c=4;
int d=5;
int e=6;
int f=7;
int g=8;

void setup()
{
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(8, OUTPUT);
}

void loop()
{
  //Code for "0"
  digitalWrite(2, HIGH);
  digitalWrite(3, HIGH);
  digitalWrite(4, HIGH);
  digitalWrite(5, HIGH);
  digitalWrite(6, HIGH);
  digitalWrite(7, HIGH);
  digitalWrite(8, LOW);
  delay (1000);

}
```

Use the starter code to write your date of birth 03-15-06.

Attach your C++ text code below. To earn full credit make sure your code has comments.

```
// Seven Segment Display Control cycling through 12/12/2007
// Pins 2-8 connected to segments A-G respectively
// Common cathode seven segment display

// Segment patterns for digits 0-9
const byte digitPatterns[10] = {
  // Patterns for digits 0-9 (A,B,C,D,E,F,G)
  0b1111110, // 0
  0b0110000, // 1
  0b1101101, // 2
  0b1111001, // 3
  0b0110011, // 4
  0b1011011, // 5
  0b1011111, // 6
  0b1110000, // 7
  0b1111111, // 8
  0b1111011  // 9
};

const byte hypenPattern = 0b0000001;

int numbers[] = {1, 2, 1, 2, 0, 7}; // Your list of integers
int hypens[] = {1, 3};

// Current digit to display

void setup() {
  // Set pins 2-8 as outputs for segments A-G
  Serial.begin(9600);
  for (int pin = 2; pin <= 8; pin++) {
    pinMode(pin, OUTPUT);
  }

  // Initially display 0
  displayDigit(0);
}


void displayPattern(byte digitPattern) {
  for (int seg = 0; seg < 7; seg++) {
    // Segments are on pins 2-8
    // Check each bit in the pattern
    digitalWrite(seg + 2, (digitPattern & (1 << (6 - seg))) ? HIGH : LOW);
  }
```

```
}


void displayDigit(int digit) {
  // Validate digit is between 0-9
  if (digit < 0 || digit > 9) return;

  // Get the bit pattern for the digit
  byte pattern = digitPatterns[digit];

  // Display the digit by setting each segment
  displayPattern(pattern);
}

bool isElementInArray(int element, int arr[], int size) {
  for (int i = 0; i < size; i++) {
    if (arr[i] == element) {
      return true; // Element found
    }
  }
  return false; // Element not found
}


void loop() {
  // Read the button state
  int numElements = sizeof(numbers) / sizeof(numbers[0]); // Calculate array size
  for (int i = 0; i < numElements; i++) {
    displayDigit(numbers[i]);
    delay(1000); // Pause for one second (1000 milliseconds)
    if (isElementInArray(i, hypens, 2)) {
      displayPattern(hypenPattern);
      delay(1000);
    }
  }
}
```

E-Portfolio video with updated code.

E-Portfolio Published link with video file. Upload the file to your Google Drive to upload on your Portfolio. YouTube Videos preferred
https://sites.google.com/riversideunified.org/matthewjeide/notes/copy-of-w9b-de-counting-up-and-down-arduino-variables-t

Conclusion Answer in complete sentences each of the questions below.

1. How does this program compare to building the circuit using chips?

It's much easier to write some code rather than using 15 gates for the same effect. It's cleaner, more efficient in terms of building, and more fun.