

Section A

Unit #5

3 LEDs



Section A Unit #5 Three LEDs

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Introduction to Unit #5 Three LEDs

Making use of the green and yellow (amber) LEDs on the traffic light.
Introducing the concept of having more than one output.



Sketch A5.1 three LEDs

Make sure they all work OK

```
void setup()
{
  pinMode(11, OUTPUT);
  pinMode(10, OUTPUT);
  pinMode(9, OUTPUT);
}

void loop()
{
  digitalWrite(11, HIGH);
  digitalWrite(10, HIGH);
  digitalWrite(9, HIGH);
}
```

Notes

This is a simple sketch to get each LED to turn on. You may find that the green isn't as bright as the other two colours.



Sketch A5.2 three LED blink

Blinking them in turn

```
void setup()
{
  pinMode(11, OUTPUT);
  pinMode(10, OUTPUT);
  pinMode(9, OUTPUT);
}

void loop()
{
  digitalWrite(11, HIGH);
  delay(1000);
  digitalWrite(11, LOW);
  digitalWrite(10, HIGH);
  delay(1000);
  digitalWrite(10, LOW);
  digitalWrite(9, HIGH);
  delay(1000);
  digitalWrite(9, LOW);
}
```

Notes

This is a simple sketch to get each LED to blink for one second in turn.

Challenge

1. Although this is nothing more than an extension of the basic blink sketch make the pattern change to one LED, then two LEDs and then three LEDs on in sequence.
2. Make the pattern go backwards and forwards



Sketch A5.3 for() loop blink

Suggest starting a new sketch. Using a `for()` loop to cycle through them starting with the green on pin 9

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}

void loop()
{
  for (int i = 9; i <= 11; i++)
  {
    digitalWrite(i, HIGH);
    delay(1000);
    digitalWrite(i, LOW);
  }
}
```

Notes

This is an improvement on the previous sketch. It uses a `for()` statement to create a simple loop. That cycles through each LED in turn. Starting with the green first.

Challenge

The operation `i++` adds one each time. Conversely `i--` takes one off each time. Could you rewrite the sketch so that it starts at red, then yellow and then green.



Sketch A5.4 cycle backwards

Adjusting the for loop() so that we start with pin 11 (red LED), then yellow (amber) etc

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}

void loop()
{
  for (int i = 11; i >= 9; i--)
  {
    digitalWrite(i, HIGH);
    delay(1000);
    digitalWrite(i, LOW);
  }
}
```

Notes

Notice that we sort of swap over some of the for `loop()` and count backwards `i--`

Challenge

How would you randomly select each one



Sketch A5.5 random selection

Now it will select an LED at random

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}

void loop()
{
  int i = random(9, 12);
  digitalWrite(i, HIGH);
  delay(1000);
  digitalWrite(i, LOW);
}
```

Notes

It will select the same one more than once. Notice that it is random between 9 and 12, that is it is inclusive of 9 but up to 12 but not including 12

Challenge

1. For a pleasing effect make the delay much smaller e.g. 100
2. Could you make your traffic light work as it would in real life?



Sketch A5.6 traffic lights

A traffic light behaving itself. In the UK it is red, red/amber, green, amber, back to red

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}

void loop()
{
  digitalWrite(11, HIGH);
  delay(1000);
  digitalWrite(10, HIGH);
  delay(1000);
  digitalWrite(11, LOW);
  digitalWrite(10, LOW);
  digitalWrite(9, HIGH);
  delay(1000);
  digitalWrite(9, LOW);
  digitalWrite(10, HIGH);
  delay(1000);
  digitalWrite(10, LOW);
}
```

Notes

This the traffic system used in the UK, if you are from another country (or planet) then your traffic lights may/will be different.

Challenge

If you are from another planet/country, make your traffic lights behave according to your locality!