

# Glow Your Own – Session 2

For a reminder of how to access Tinkercad and get started, see the ‘How To’ sheet for Session 1:

<https://if-oxford.com/event/glow-your-own-weekly-coding-workshops-1-of-6/>

There are instructions for how to upload your code to a physical Arduino later in this How To sheet.

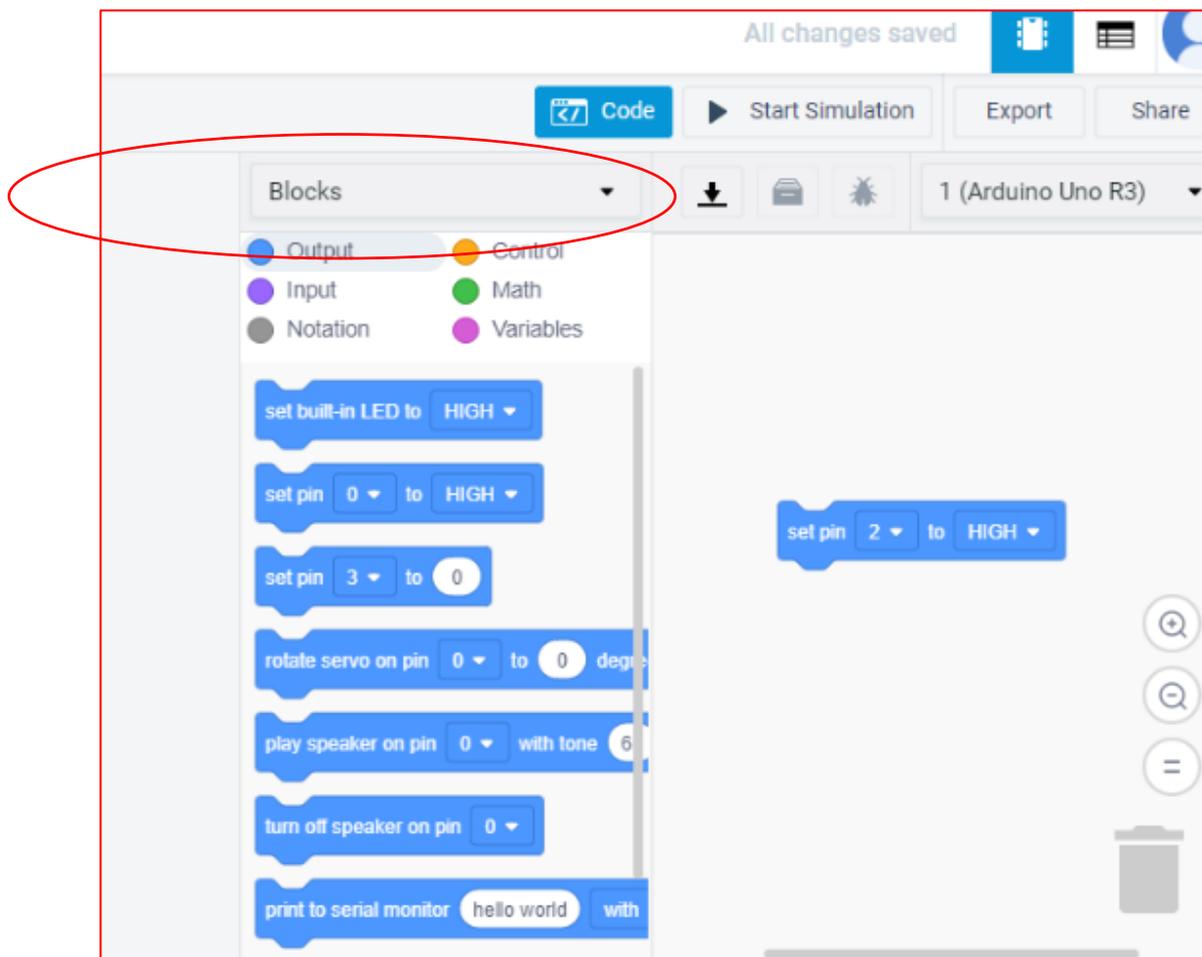
**Remember**, if you’re using building physical circuits with your real Arduino:

- Always remember to unplug your Arduino when you’re changing components.
- Make sure all of the small components are kept out of reach of young children.
- Make sure that all components are tidied up at the end of the session, and none are left on the floor or table.

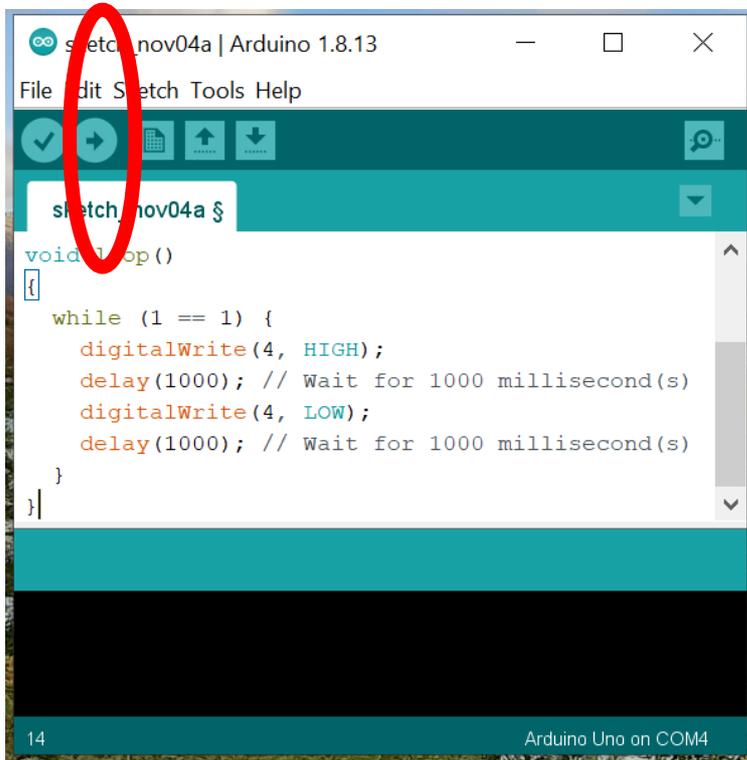
## Sending your code to the physical Arduino

To send (or “upload”) your code to your physical Arduino, the easiest option is to install the Arduino program on your computer. You can install it from here: <https://www.arduino.cc/en/software>

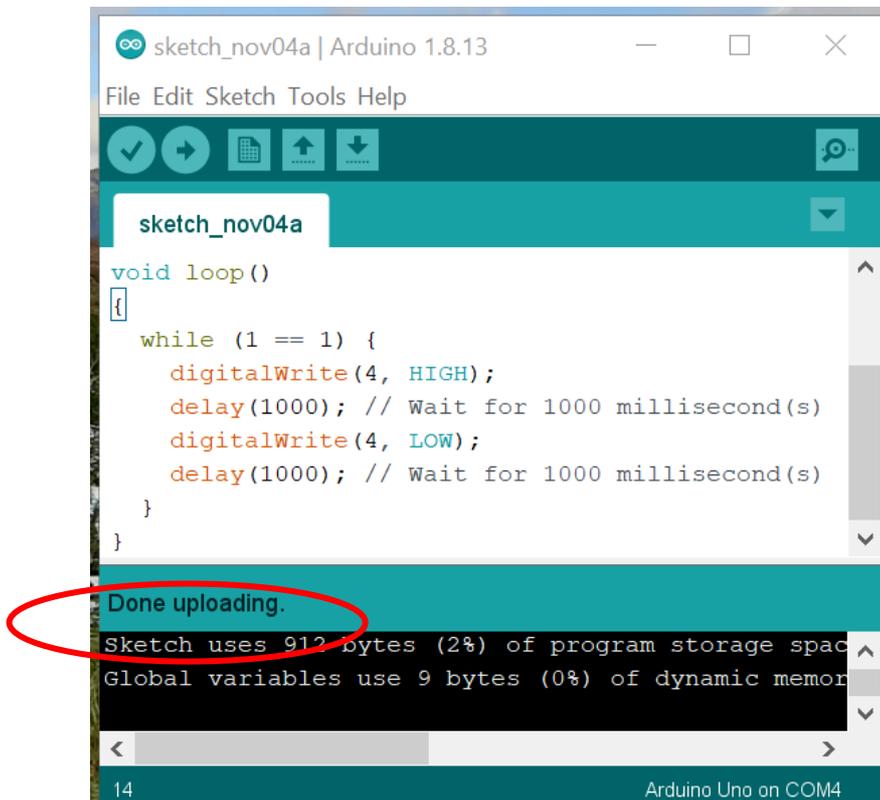
Once you’ve built your circuit, use the USB cable to connect your Arduino to your computer. If you need to change your electrical components, always remember to unplug your Arduino from your computer first! Then in Tinkercad, in the Code section, change “Blocks” to “Blocks + Text”



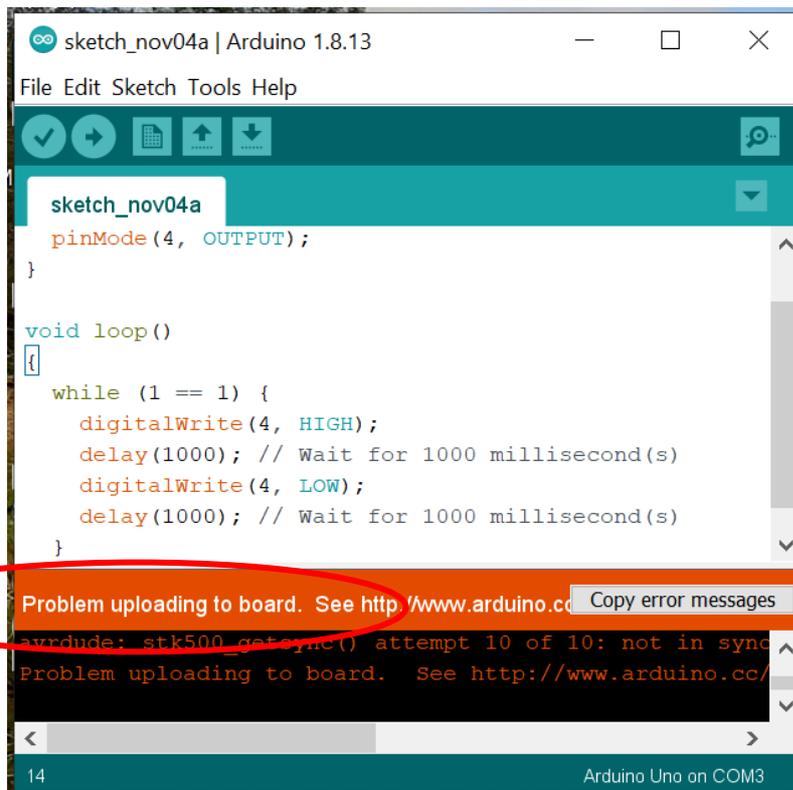
Copy and paste from the Text section of Tinkercad into the Arduino program, save your code and then click the right-pointing arrow to send (or “upload”) your code to your Arduino.



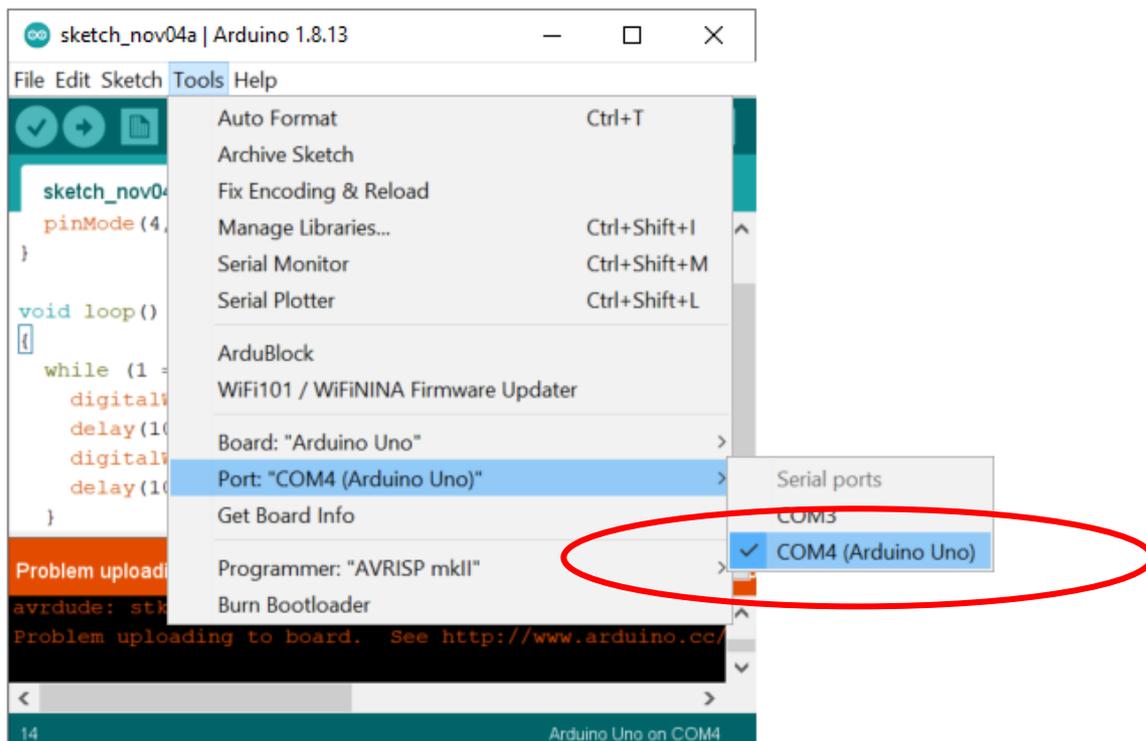
If the code uploads correctly, it should say “Done uploading” at the bottom of the screen:



One common error to watch out for is when the computer doesn't know which USB port the Arduino is connected to – if this happens you will see an error message at the bottom of the window:



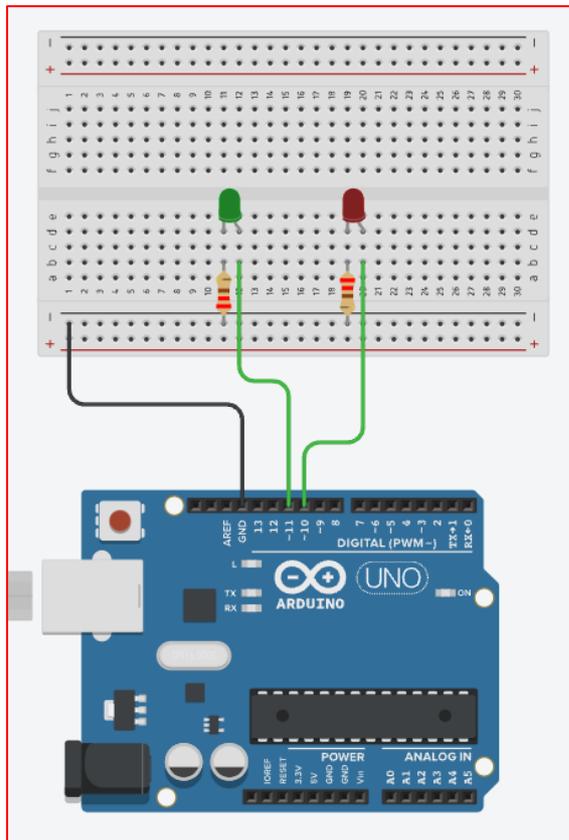
To fix this problem, open the “Tools” menu, and check that the “Port” option has (Arduino Uno) in brackets, as below.



## Circuits to build and code

### Flashing, alternating lights

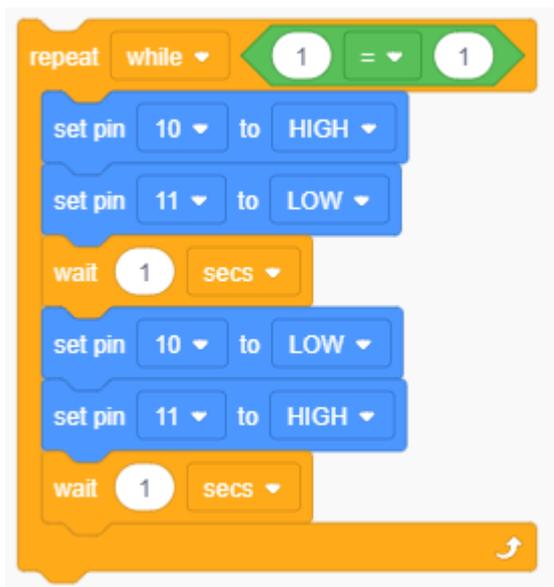
We can create our own Christmas flashing lights using two LEDs and 220Ω resistors:



#### Components needed:

- Arduino + USB Cable (and UNO R3 software download)
- Breadboard
- LEDs (approx. 3-5)
- Jumper/Dupont wires (3x black wires for ground and 2x wires in a colour of your choice)
- Resistors (2x 220Ω)

We can code the LEDs to flash on and off alternately using the same blocks we used in Lesson 2.



Remember to make sure that the pin numbers in the code match the pins in the Arduino!

If you are using a physical Arduino, once you've built your circuit, use the USB cable to connect your Arduino to your computer. If you need to change your electrical components, always remember to

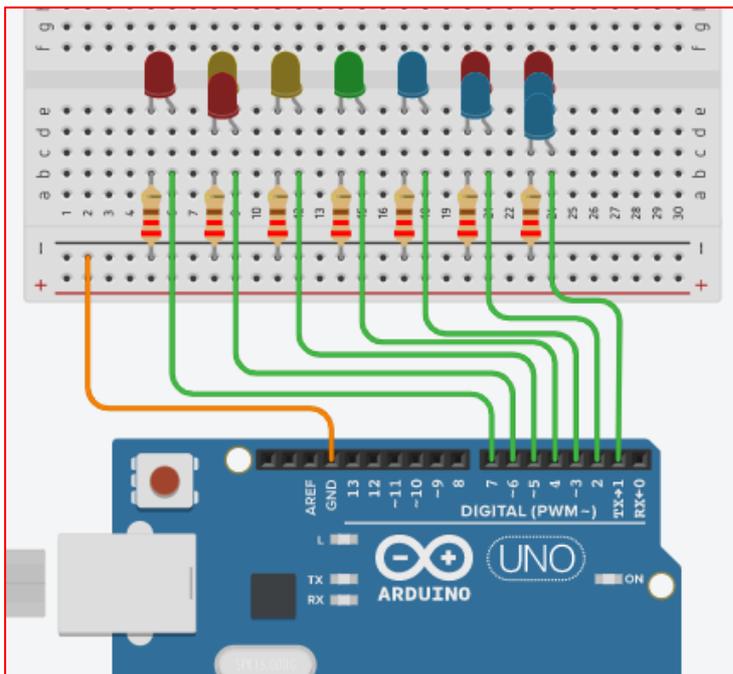
unplug your Arduino from your computer first! Then in Tinkercad, in the Code section, change “Blocks” to “Blocks + Text”.

Alternatively, you can copy and paste the below code into your UNO R3 Software and export it to your Arduino. *[Make sure the lines of code are displayed as below, by either copying and pasting one line at a time or copying the whole code and adjusting the line spacing using your Enter key whilst in the UNO R3 Software]*

```
const int LED colour1 = 10;  
const int LED colour2 = 11;  
  
void setup() {  
  pinMode (LED colour1, OUTPUT);  
  pinMode (LED colour2, OUTPUT);  
}  
  
void loop() {  
  digitalWrite (LED colour1, HIGH);  
  digitalWrite (LED colour2, LOW);  
  delay (1000);  
  digitalWrite (LED colour1, LOW);  
  digitalWrite (LED colour2, HIGH);  
  delay (1000);  
}
```

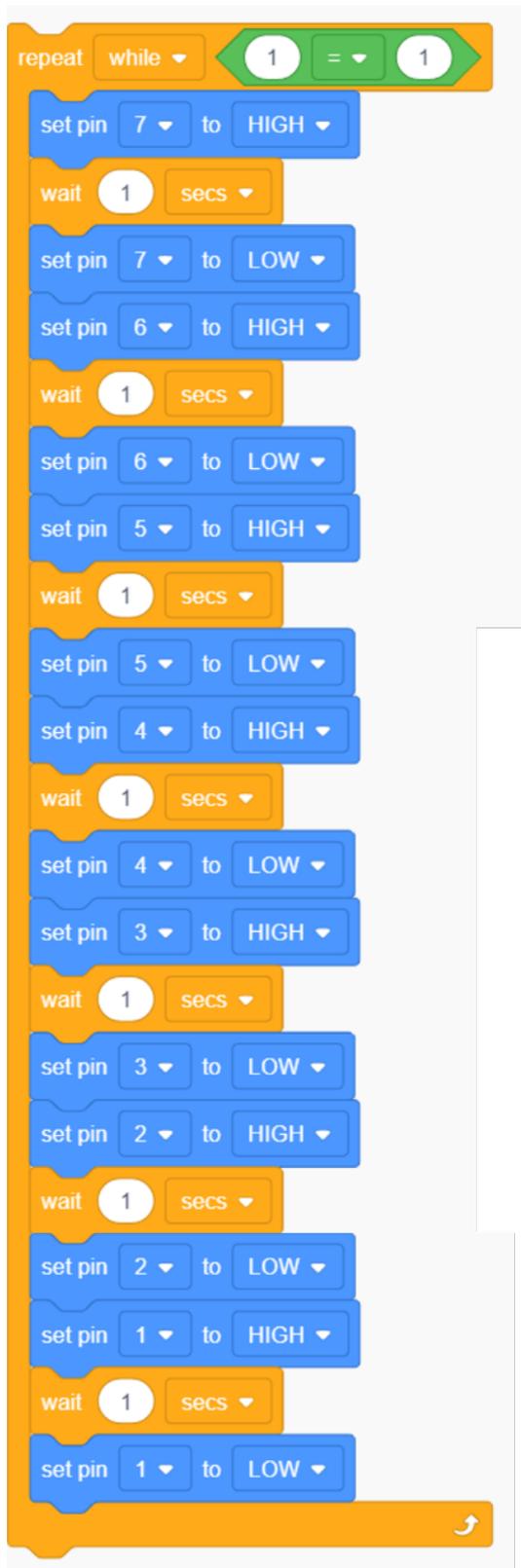
## Making a rainbow

You can add to your first circuit to make a beautiful rainbow!



(Use resistors of 220  $\Omega$  or less with your LEDs.)

To turn your LEDs on in a sequence, according to the colours of the rainbow, you can use the following code:



```
repeat while 1 = 1
  set pin 7 to HIGH
  wait 1 secs
  set pin 7 to LOW
  set pin 6 to HIGH
  wait 1 secs
  set pin 6 to LOW
  set pin 5 to HIGH
  wait 1 secs
  set pin 5 to LOW
  set pin 4 to HIGH
  wait 1 secs
  set pin 4 to LOW
  set pin 3 to HIGH
  wait 1 secs
  set pin 3 to LOW
  set pin 2 to HIGH
  wait 1 secs
  set pin 2 to LOW
  set pin 1 to HIGH
  wait 1 secs
  set pin 1 to LOW
```

The image shows a Scratch code block for controlling LEDs. It starts with a 'repeat while' loop where the condition is '1 = 1', which is always true, effectively creating an infinite loop. Inside the loop, the code performs a sequence of operations for each LED (pins 7 through 1):

- Set the pin to HIGH (turns the LED on).
- Wait for 1 second.
- Set the pin to LOW (turns the LED off).
- Set the next pin to HIGH (turns the next LED on).
- Wait for 1 second.
- Set the pin to LOW (turns the LED off).

This sequence repeats for all seven LEDs, from pin 7 down to pin 1, creating a rainbow effect. The code ends with a 'set pin 1 to LOW' block, which turns the last LED off before the loop repeats.