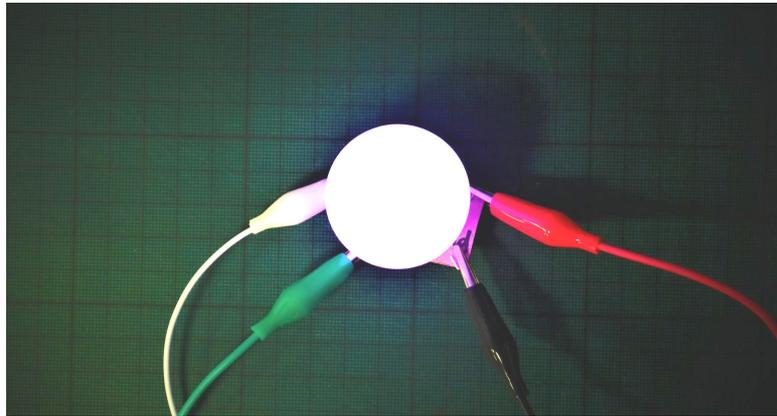


# How to change the colours using a micro:bit

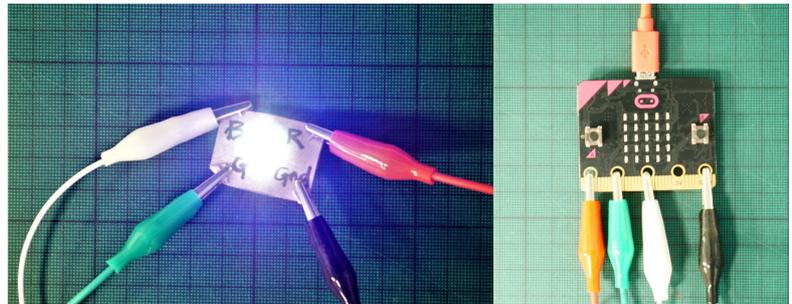


**You will learn:** how to mix colours of light using a single LED board and a micro:bit.

**You will need:** A home-made chameleon board, a micro:bit, four crocodile clips, a USB cable and laptop/device for programming, a bit of white paper or a ping pong ball with a hole in it.

## Make your connections

Connect up the LED board and your micro:bit as in the photos. Ground to Ground, Red to Pin 0, Green to Pin 1, Blue to Pin 2.



## How this is going to work

The micro:bit can't vary the voltage on the pin, it can only send 3.3v, or 0v. This means we can send the red part of the LED 3.3v, or 0v - on or off. To mix colours we need to be able to send a little bit of red, some more red, lots of red, etc. The way to get around this is to do PWM (Pulse Width Modulation), which is a fancy way of saying turn it off and on again really quickly. How long you leave it on for is the "pulse width", and so if you do long pulses with little gaps it's like sending a lot of red. Short pulses with big gaps is like sending a little bit of red. It happens so fast your eye is tricked into thinking you're turning the voltage up and down instead of on and off. If you have sensitive vision you may be able to see the flicker. Handily PWM is built in to the block code library - you just need to use analog blocks.

# Writing the code

## Writing the code

Using the block coding on [makecode.com](https://makecode.com), or the makecode app, **start a new micro:bit project**.



We need three bits of code to run at the same time - one to control each colour. **You will find the red blocks in the "Pins" part of the menu, and the blue blocks in "Basic".**

We have shown you the first block above. **Make a new set for each pin.**

Once you have your three bits of code, you will find that if you **click on the value in the white box, you can change it by typing**, or by dragging the slider left and right. In this example, we have set Pin 1 (the green light) to zero.



# Using the code

## Remember to download your code!

If you are not sure how to do this, there is a guide at [microbit.org/guide/quick/](https://microbit.org/guide/quick/)

If you **click on the value in the white box, you can change it by typing**, or by dragging the slider left and right.

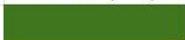
Try choosing new colours and downloading the code.



## Tasks:

1. What happens when all of the pins are set to full power?
2. What happens when all of the pins are turned off?
3. Using just on (1023) and off (0) - can you find the secondary colours of light? The secondary colours of light are magenta (pinkish purple), yellow, and cyan (light blue).
4. Once you have found magenta, try making violet (a bluey purple).
5. Try different values for the red, green and blue, and see what your bulb shows.

Here are some colours from the internet, with their names and numbers to show how much of each colour light to mix in.

name	shade (ish)	pin 0	pin 1	pin 2
evening sea		173	377	297
carrot orange		951	465	92
dark violet		465	64	662
ruby		899	88	357
prim		899	818	842
pacific blue		0	542	838
lime		56	846	0

