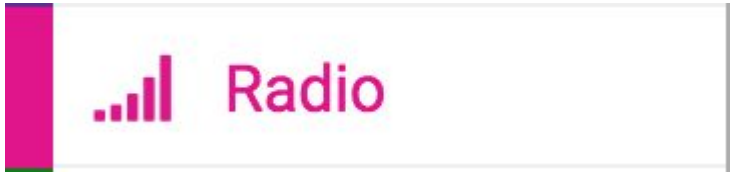
Micro:bit

Radio, Sensors, & Lights

Grab a Computer, a Microbit and a Cable then go to

makecode.microbit.org

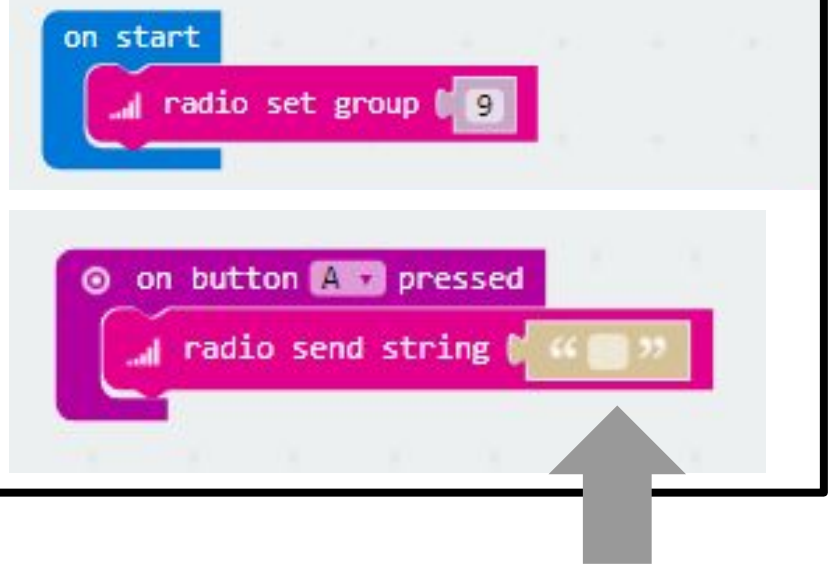
Day 1



https://makecode.microbit.org/_XcCdj8iP66Jb

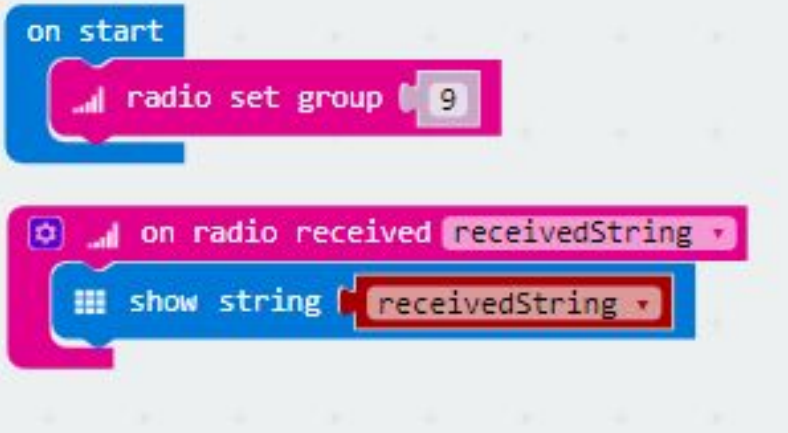
Radio: Challenge #1

My Code



Secret word here

Your Code

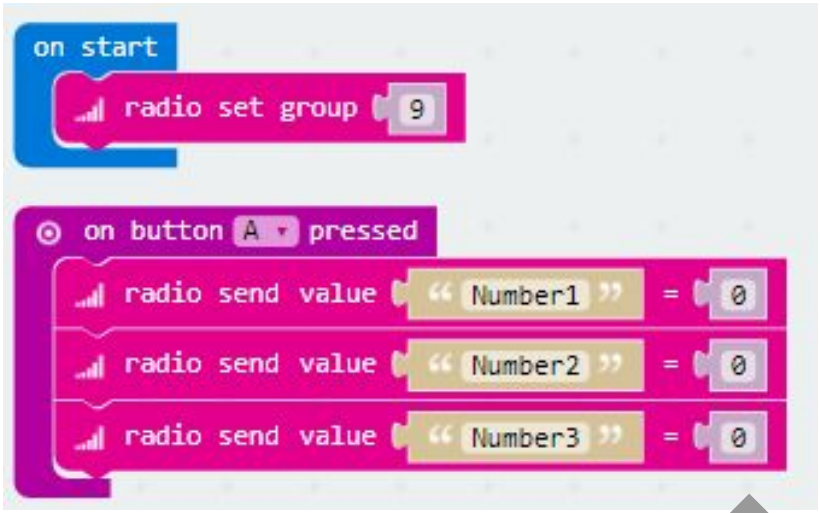


Don’t forget to flash the micro:bit after downloading your code!

https://makecode.microbit.org/_9X35hyUxDM5X

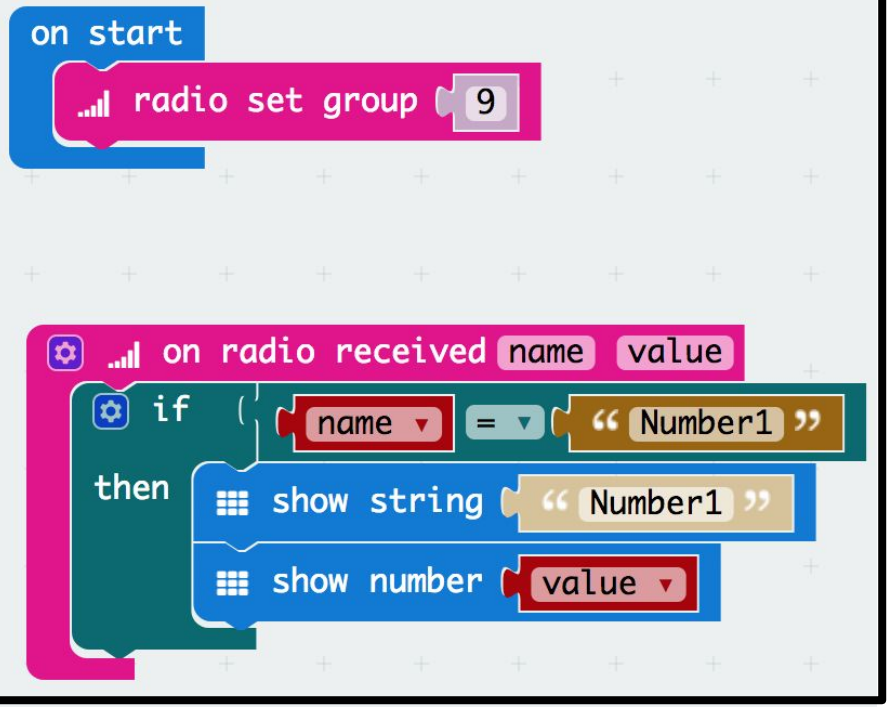
Radio Challenge #2 - unlock the combination

My Code

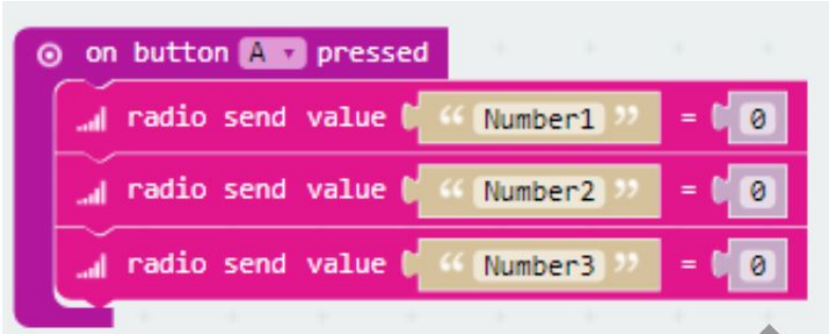


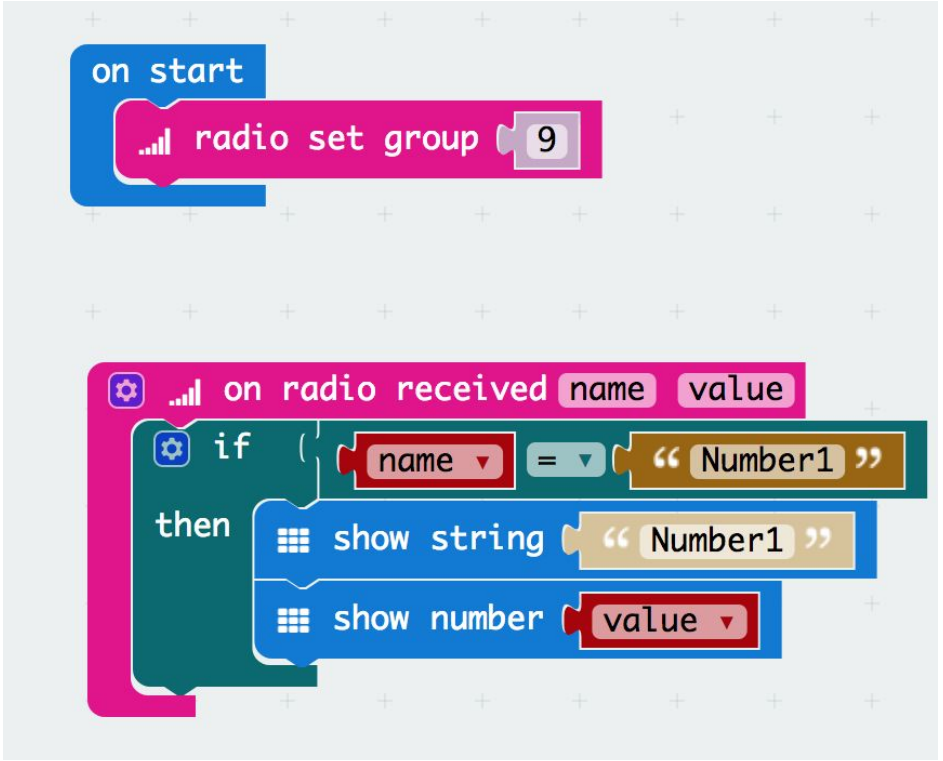
Secret numbers here

Your Code



Change your code to find out what the 2nd and 3rd numbers are

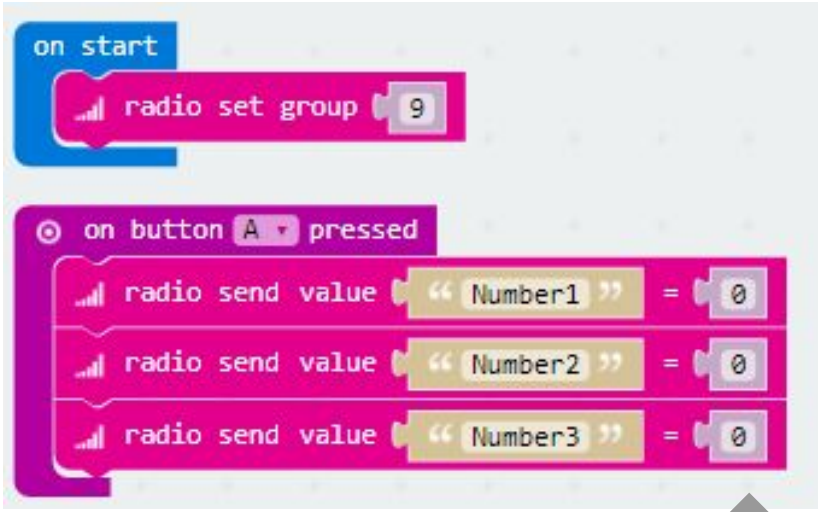




https://makecode.microbit.org/_9X35hyUxDM5X

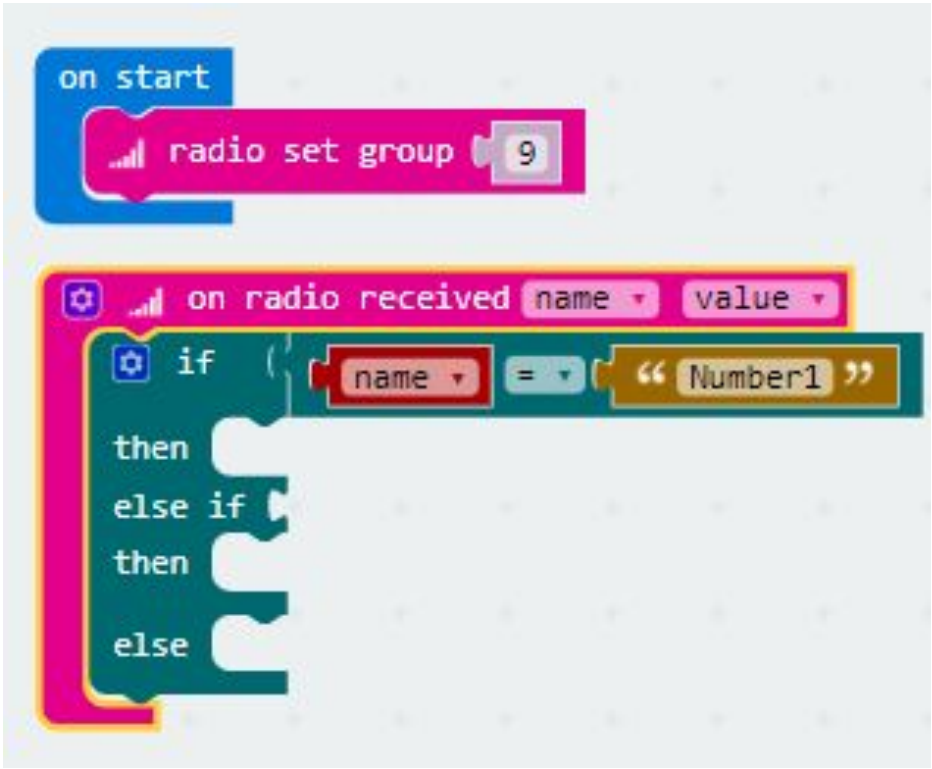
Find all three numbers at once

My Code



Secret numbers here

Your Code



Partner Radio Challenge

1) Set up a radio group with a partner.

2) When you send a message to your partner, their micro:bit should show the message.

3) When your partner presses A on their micro:bit, your microbit should make a smiley face.

Share your code on google doc/assignment

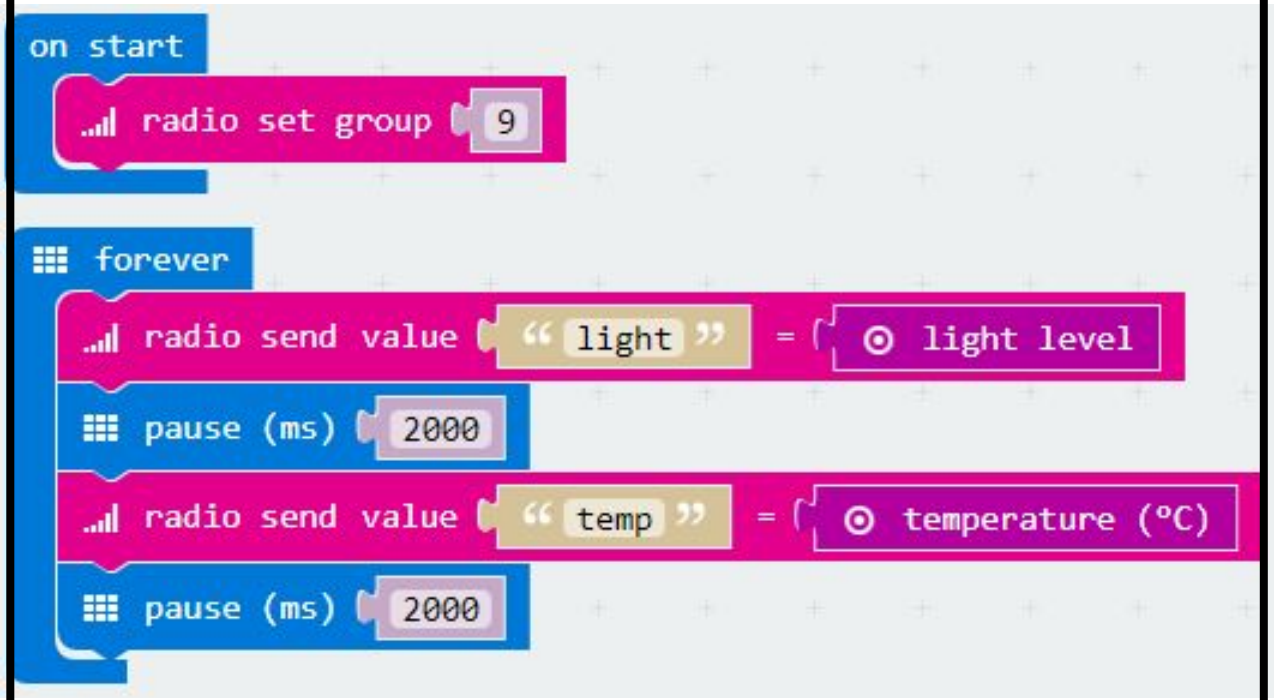
Make a table in your document

Date	Code link	Short description

SHARE your code link on your google doc/assignment with the date and a description.

https://makecode.microbit.org/_1egg409fA2WT

My Code:



Your Challenge:

Choose to show either a light reading or a temperature reading.

For light, show “LIGHT” and then the light level.

For temperature, show “TEMP” and then the temperature.

Show a teacher when completed.

Day 2

Each lantern group needs: a Computer, a light strand
Each ecosystem group needs: a Weather:bit, Micro:bit, and a Cable;
then go to

makecode.microbit.org

and

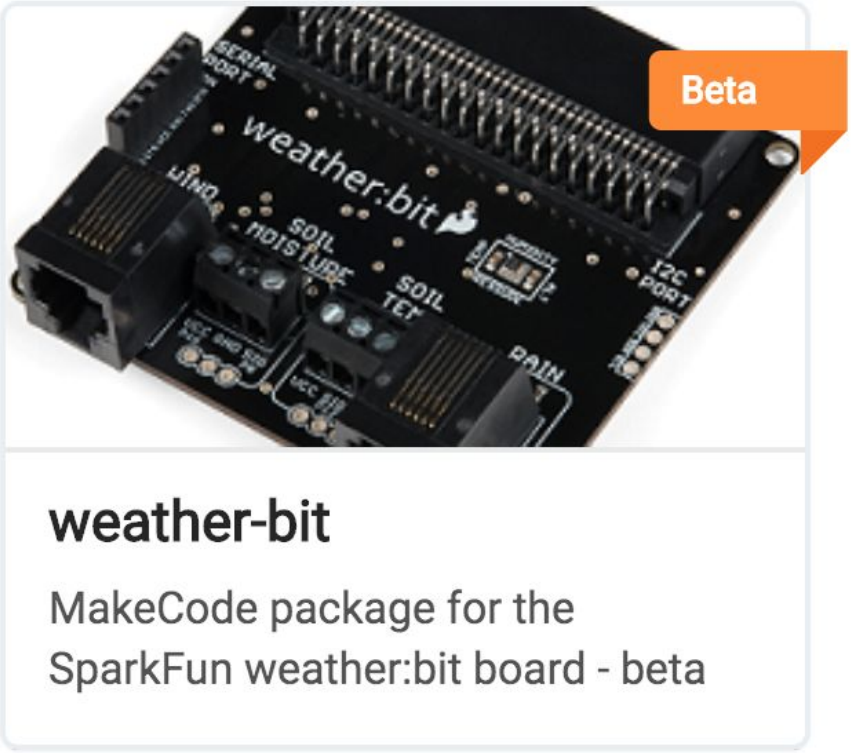
Open your code storage document

Weather:bit

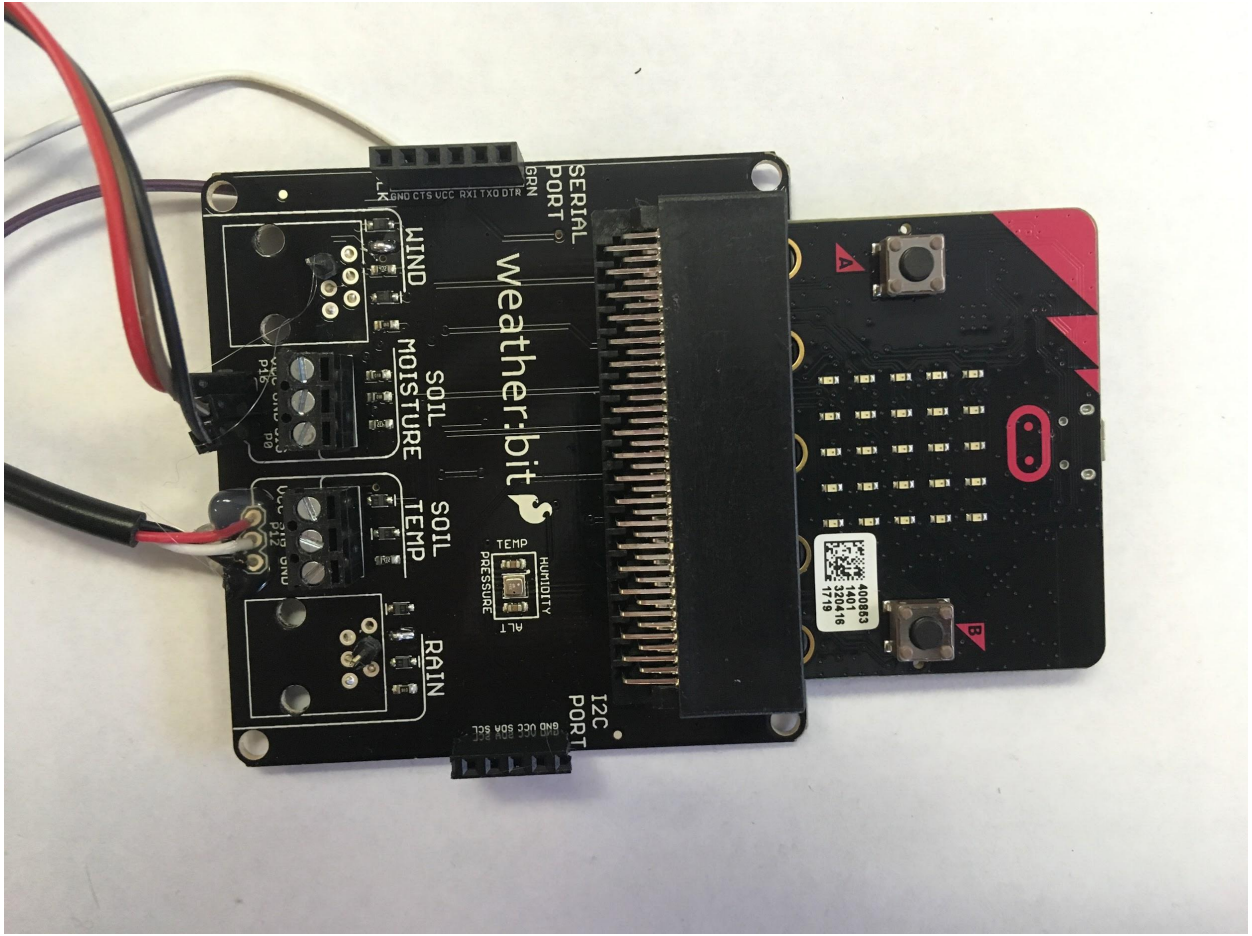
For the project you will get one per ecosystem.

You will need to share in your lantern groups if you have 2 lanterns per ecosystem.

Can program separately but we will show you how to combine the code together later.



Slide the micro:bit into the weather:bit



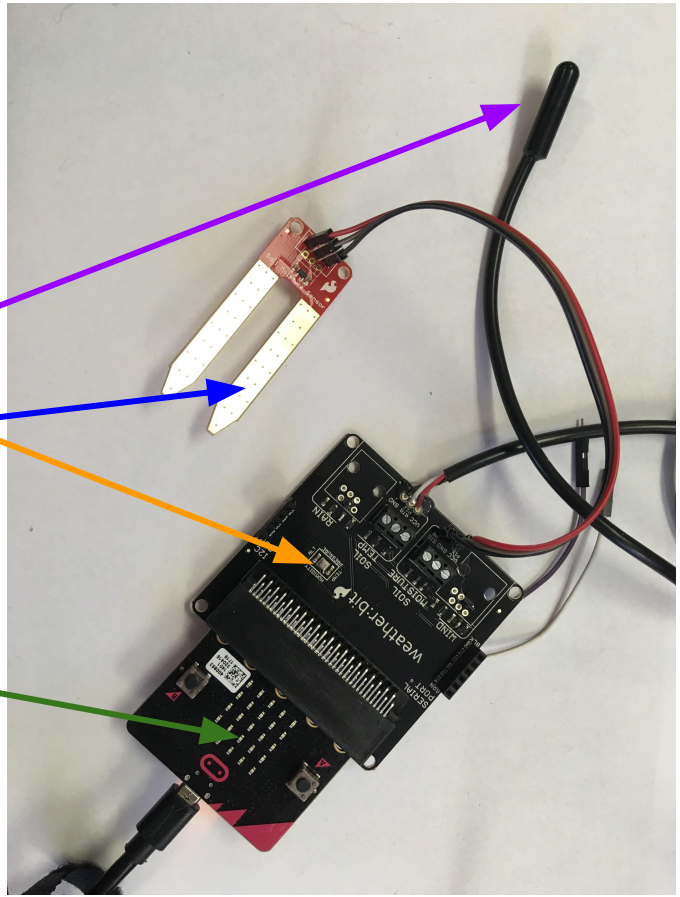
Find the following sensors

- Air temperature
- Humidity
- Pressure
- Soil OR water temperature
- Soil moisture
- Light?

<u> This setup is NOT waterproof!</u>**

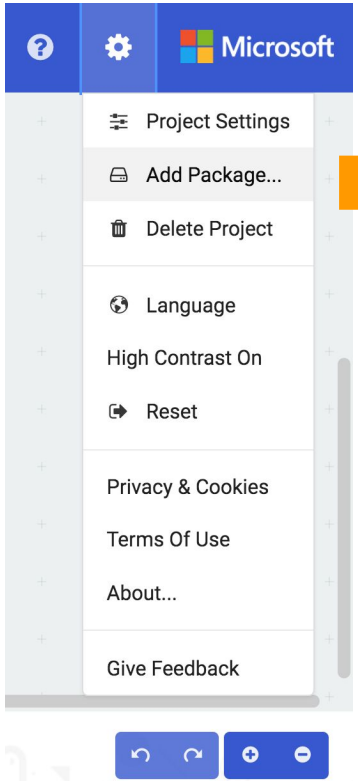
Find the following sensors

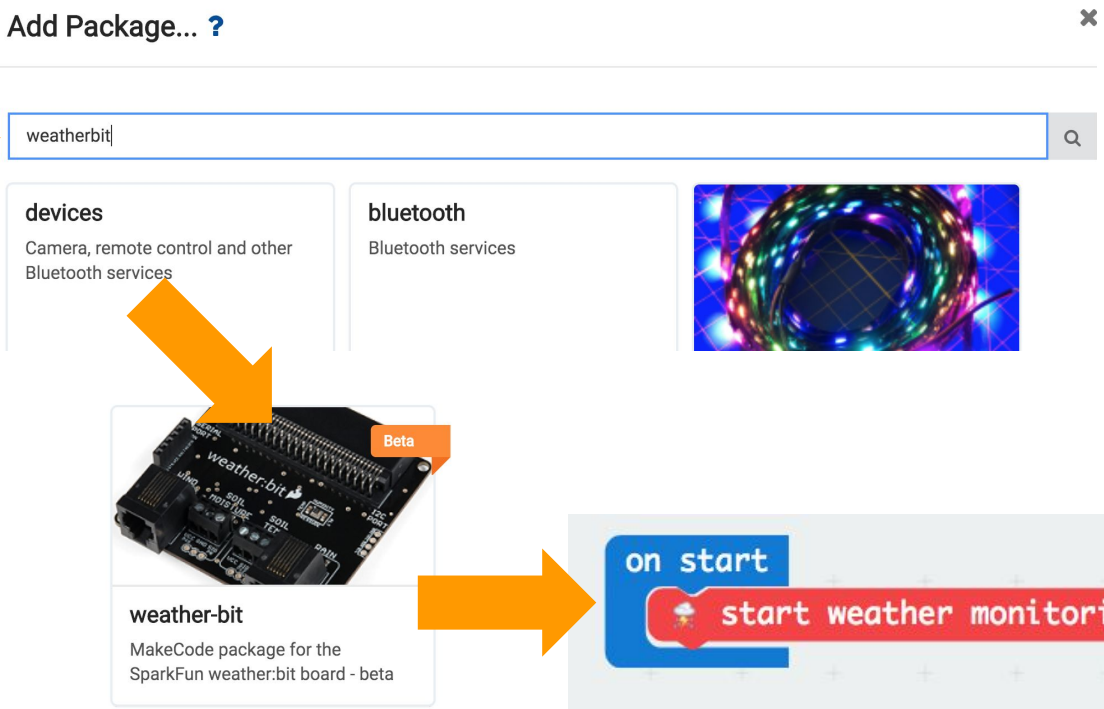
- Air temperature
- Humidity
- Pressure
- Soil OR water temperature
- Soil moisture
- Light



<u> This setup is NOT waterproof!</u>**

The weather:bit on makecode





Weather:bit challenge

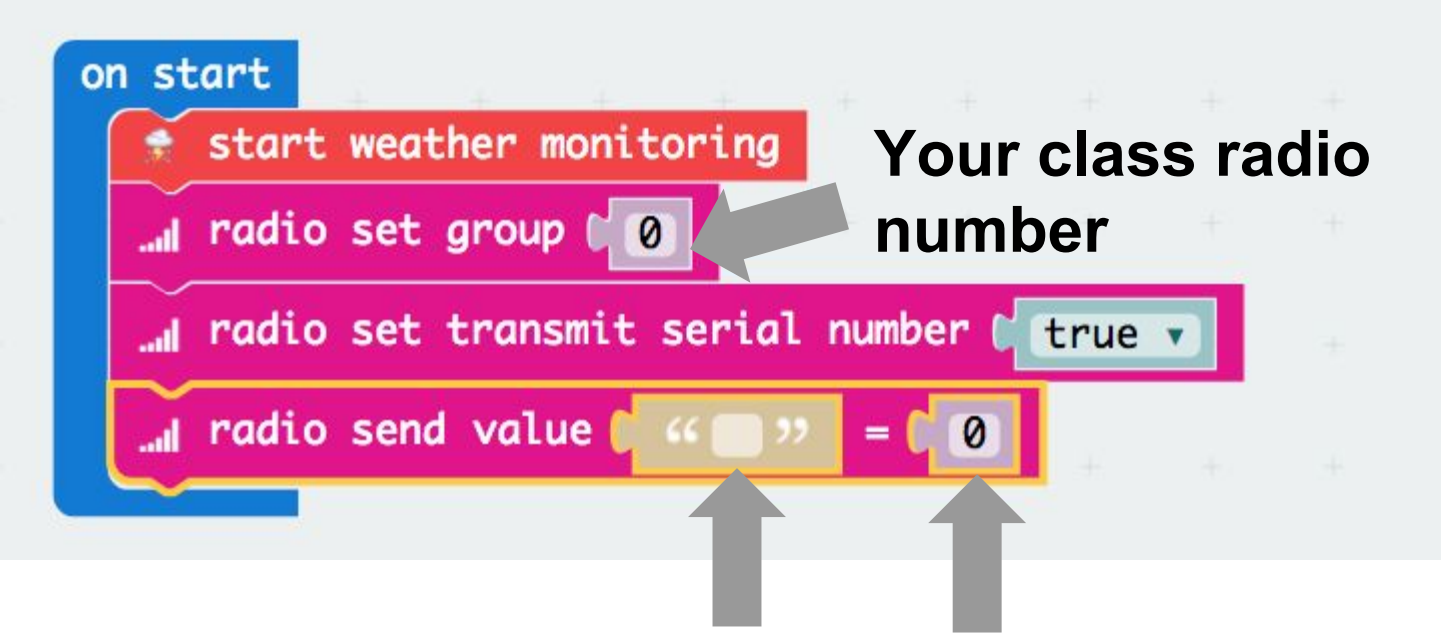
Show the two data values on your micro:bit screen for your lantern.

Be sure to indicate which is which value.

Challenge: Can you find a way to change the value of this data?

Hint: Think about the environment the sensor is in.

Weather:bit hourly readings for ecosystems

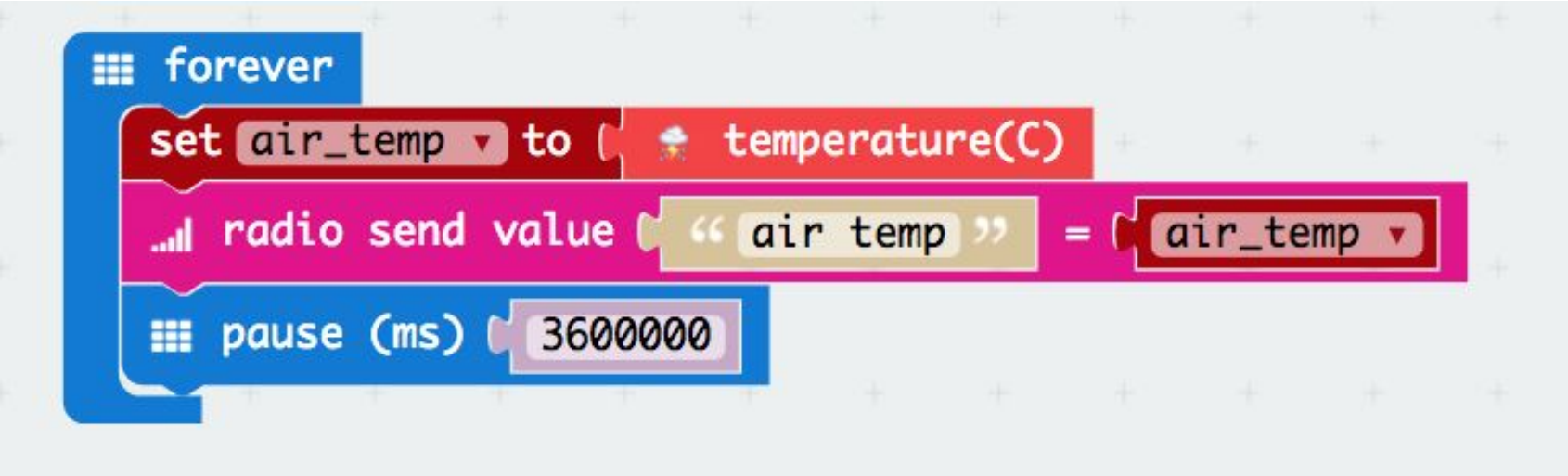


Make this code

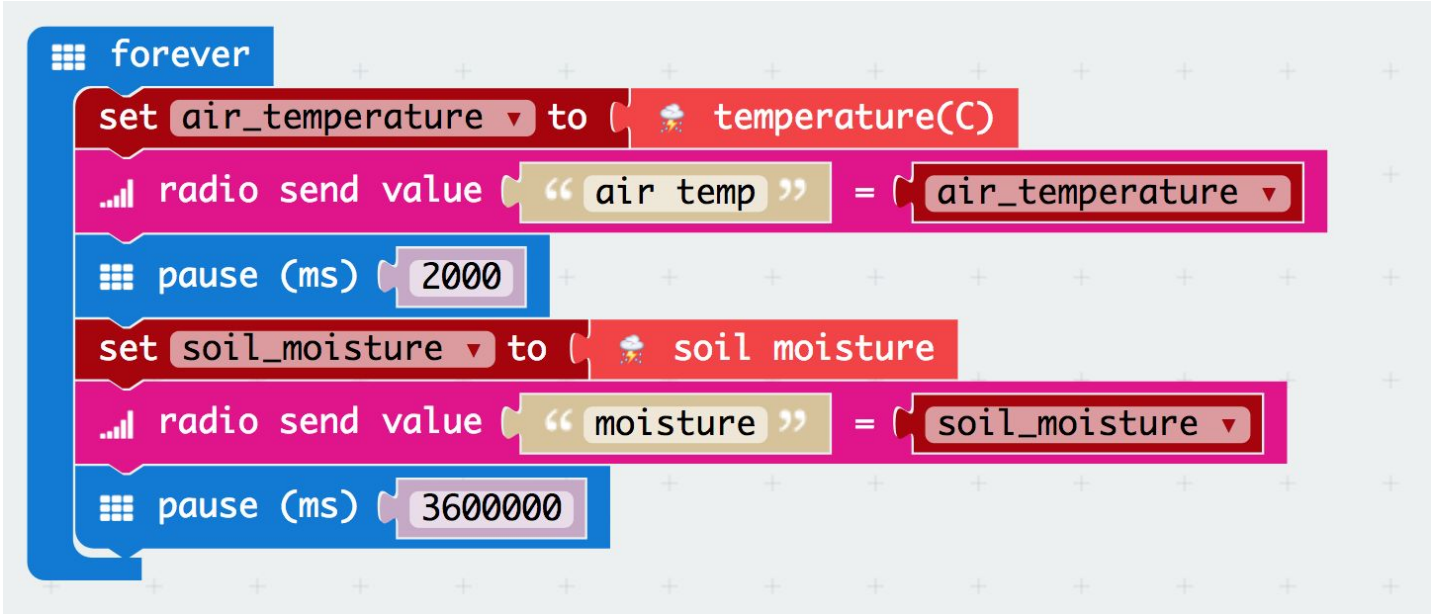
Download the program and flash the micro:bit.

Check in with the teacher.

Weather:bit hourly readings for ecosystems



https://makecode.microbit.org/_ED98AvgXzbeF



Repeat the first two lines for all other data with 2 sec pauses:

- Humidity
- Pressure
- Soil (or water) temperature
- Soil moisture
- Light

Share your code on google doc/assignment

Choose one person to be the recorder for your lantern group.

That person should SHARE the code link in thier doc/assignment with the date, a description of what the code does AND includes who is in the group.

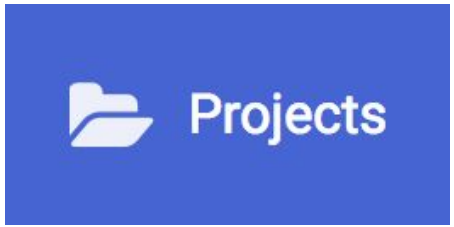
Date	Code link	Short description

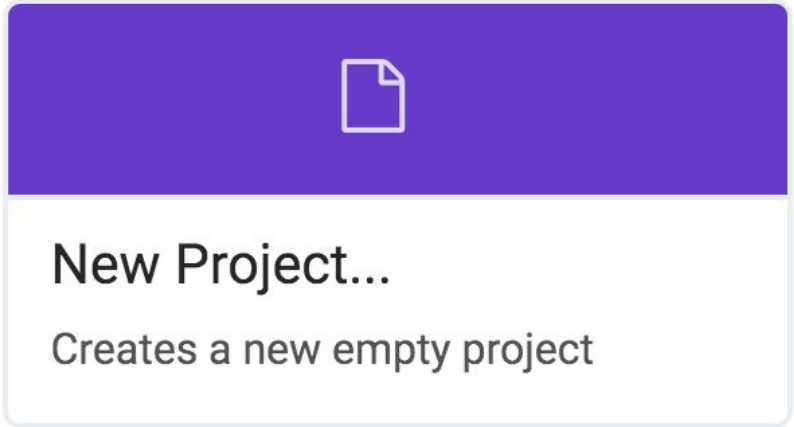
Day 3

Grab a Computer per Lantern, a Microbit and a Cable then go to

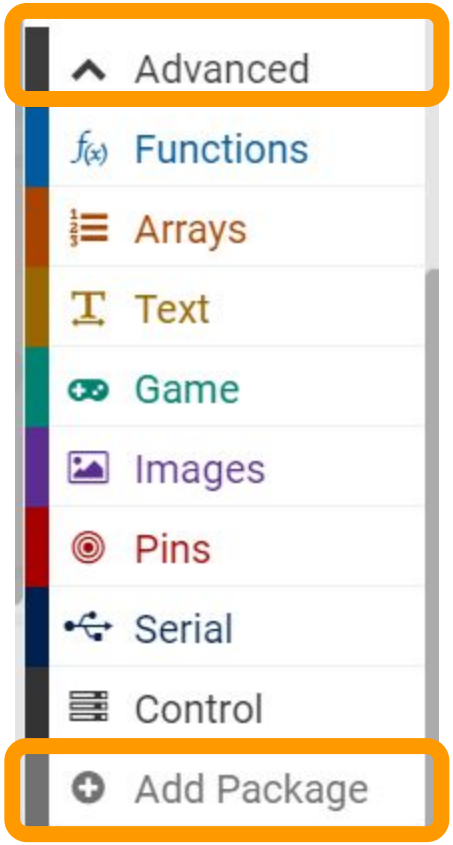
makecode.microbit.org

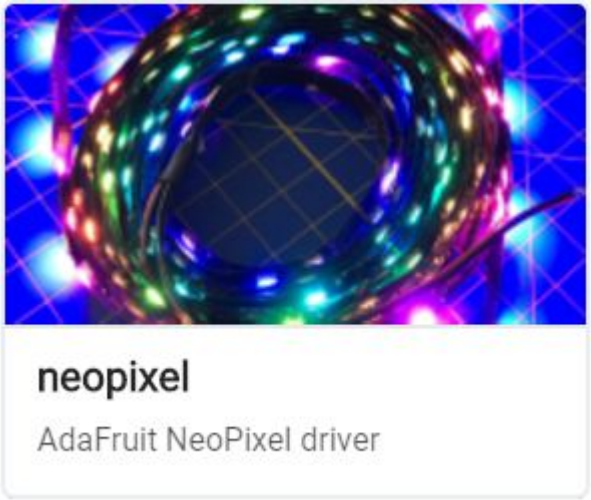
Make a new project





Download the neopixel package





To setup the neopixels

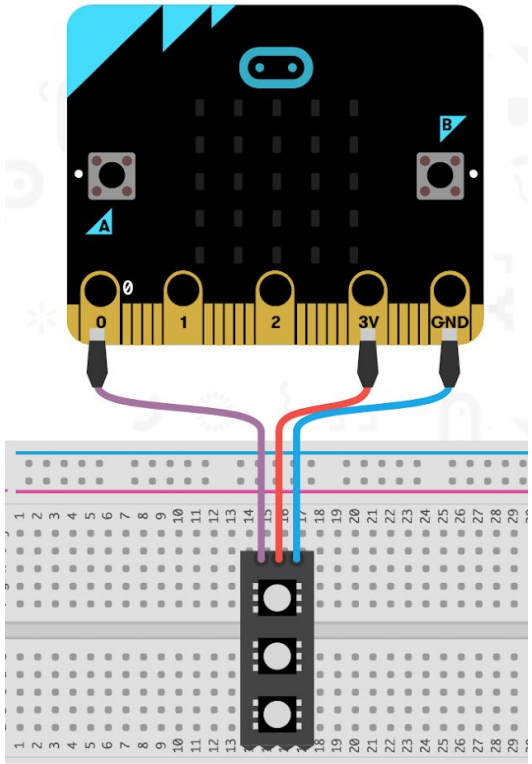
What does this do to the simulator?

What do you think P0 is?

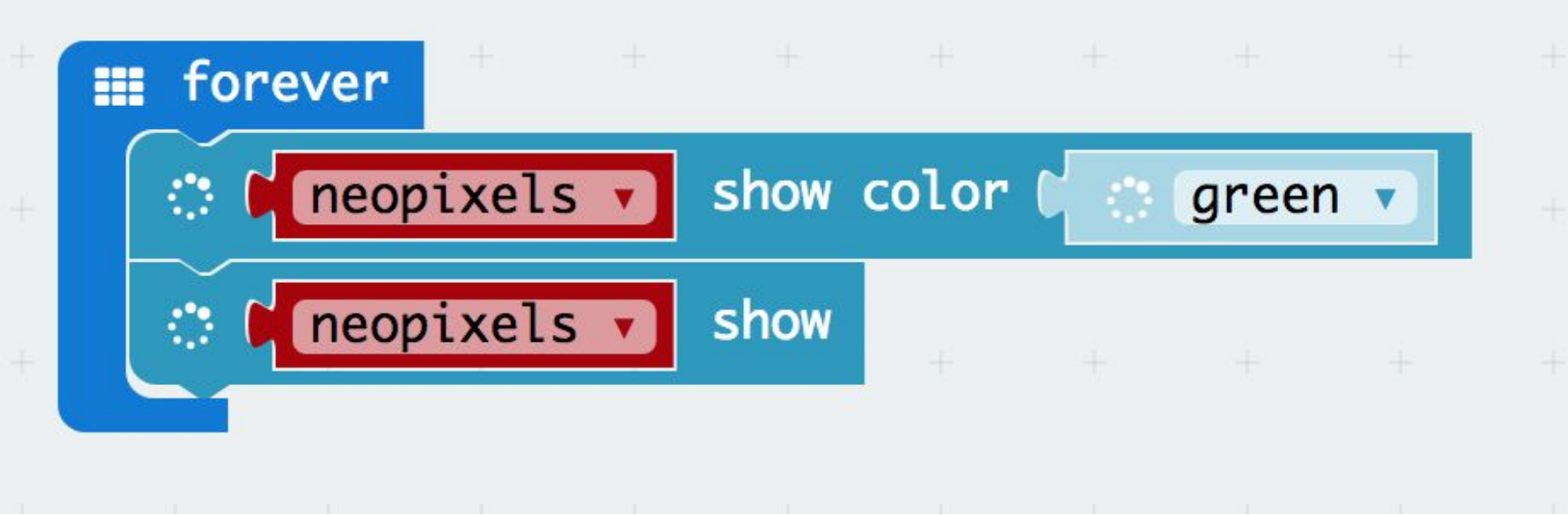
What does the 8 mean in this code?

What is “neopixels” in this code?


on start
set neopixels to
NeoPixel at pin P0 with 8 leds as RGB (GRB format)


B
A
0
1
2
3V
GND

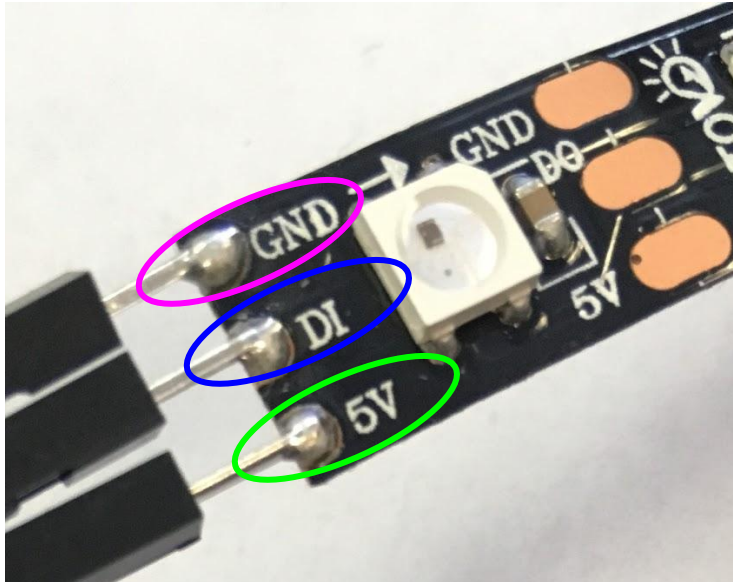
Example:



5 minutes: play with coding the micro:bit simulator using the neopixel package. See what you can learn!

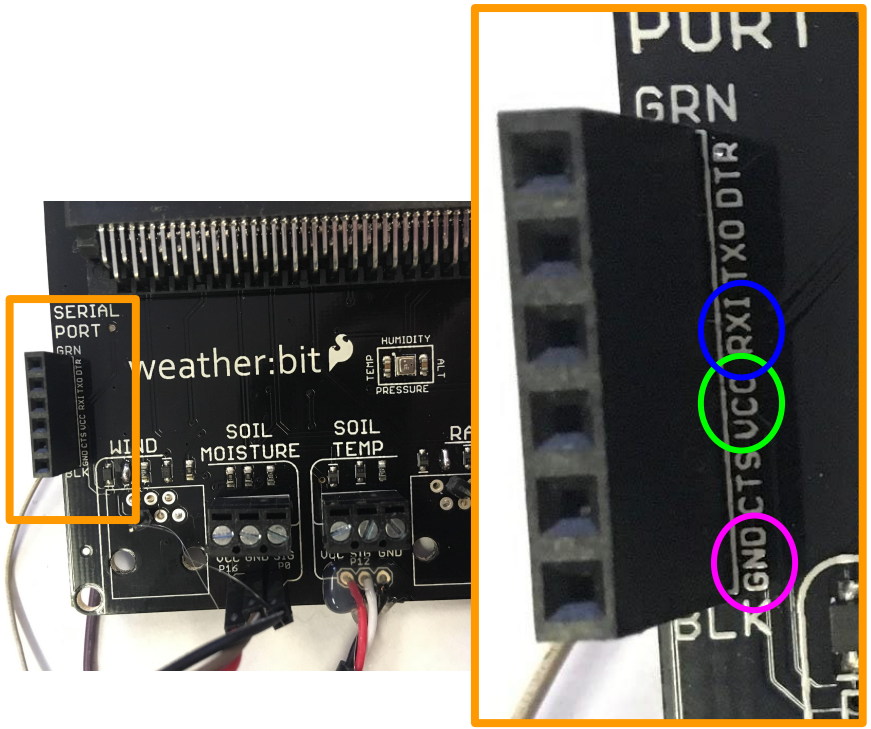
Unplug the micro:bit from your computer

How to setup w:b, m:b, and neopixels



DI (LEDs) → signal
GND (LEDs) → ground
5V (LEDs) → power

How to setup w:b, m:b, and neopixels



RX1 (w:b) → signal

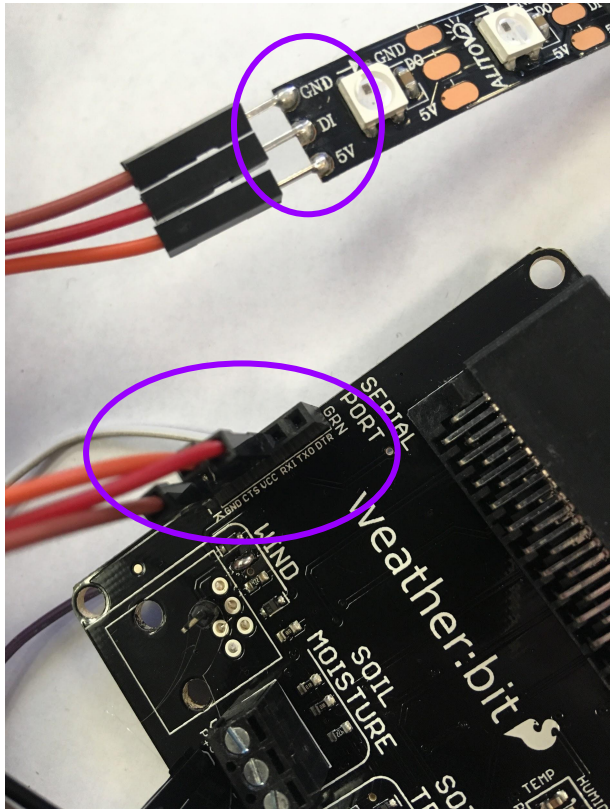
GND (w:b) → ground

VCC (w:b) → power

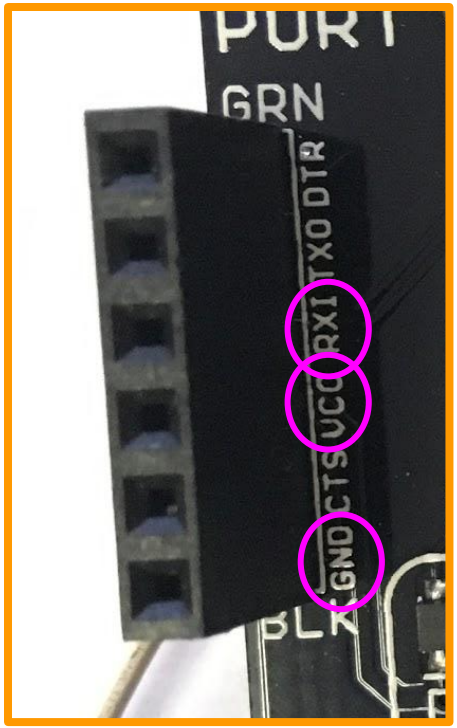
How to setup w:b, m:b, and neopixels - 1st set of lights

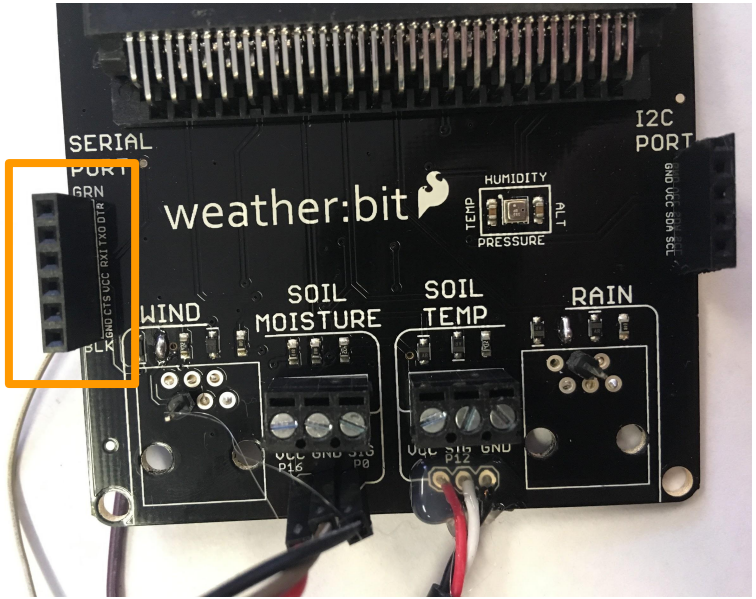
LEDs → w:b

DI (LEDs) → RX1 (w:b)
GND (LEDs) → GND (w:b)
5V (LEDs) → VCC (w:b)

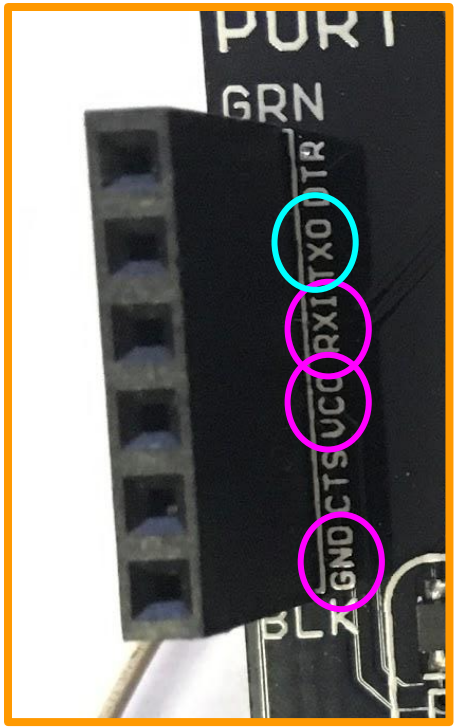


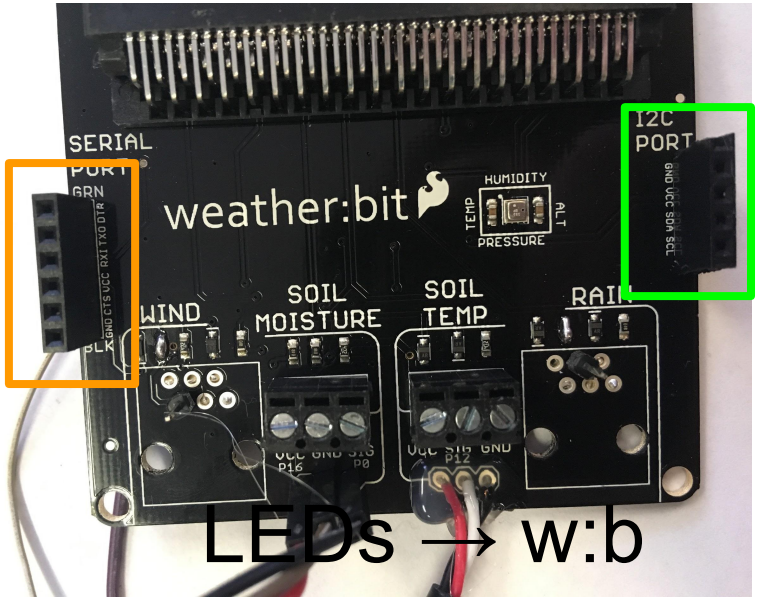
Two lanterns per weather:bit?





2nd set of lights





DI (LEDs) → TXO (w:b)

GND (LEDs) → GND (w:b)

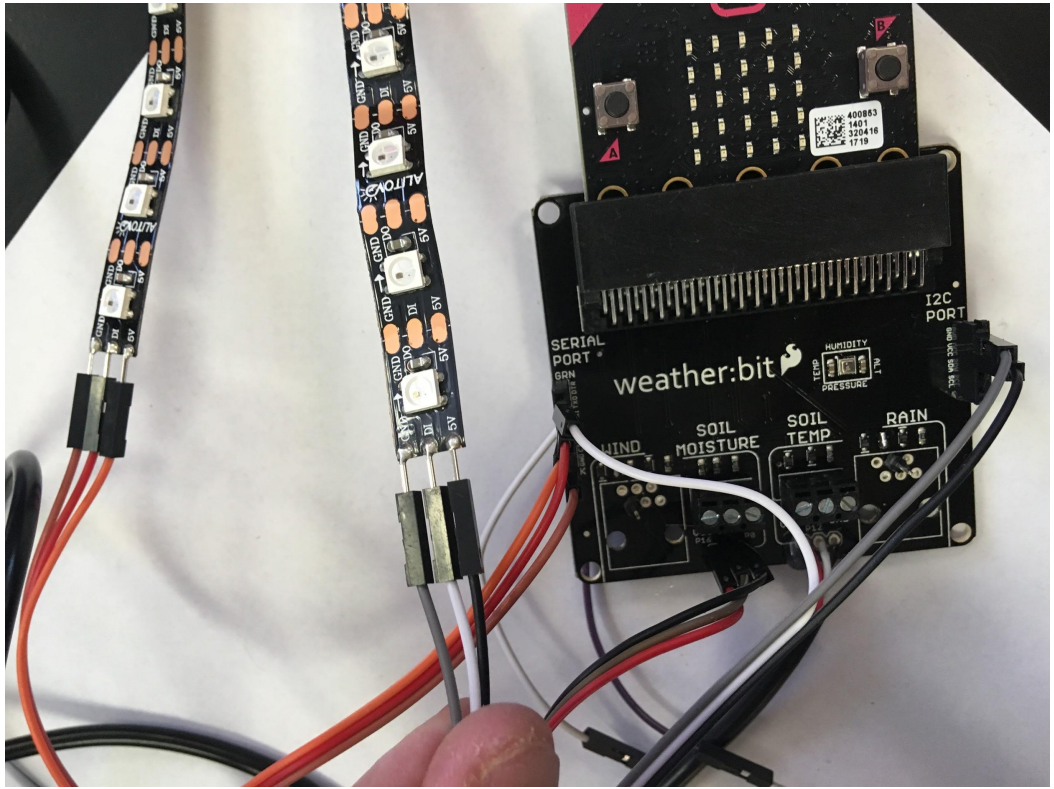
5V (LEDs) → VCC (w:b)

Two lanterns per weather:bit?

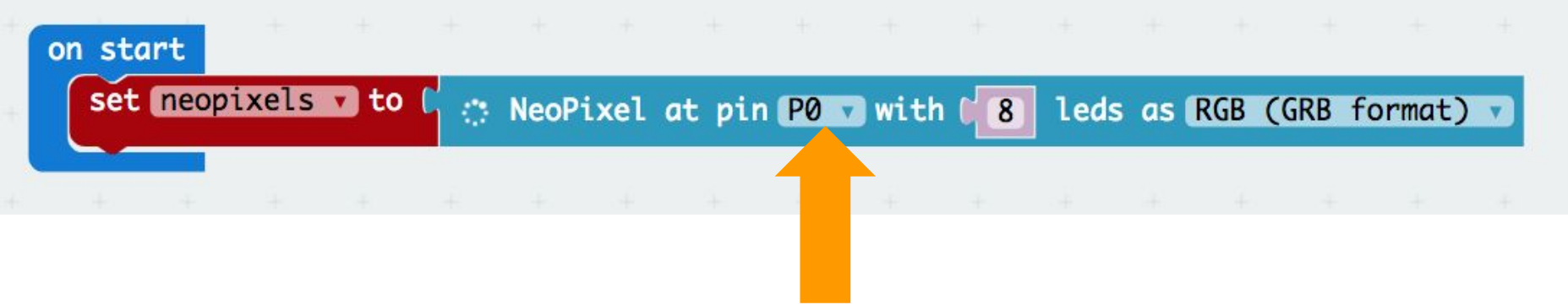
RX1 is Pin P14

TXO is Pin P15

Choose which half of the group will use Pin P14 (RXI) and which will use Pin P15 (TXO)



Make sure the signal pin is correct



RXI on weather:bit is Pin P14 on micro:bit

TXO on weather:bit is Pin P15 on micro:bit

Test your LEDs with your code!

Click Download and flash your micro:bit.

Share the weather:bit in your group.

If you didn’t get a code to work you can use this one to test:

http://bit.ly/2CDVKh3

Rename your program

Then SHARE the link in your google assignment/doc (don’t forget to add who is in your group)

To combine your neopixel codes

You should have 2 neopixel codes - one for each half of your group (P14 and P15).

- Choose one person to be the overall recorder for your ecosystem group.
- Share the links for both codes with that person.
- The recorder should open both codes in separate tabs on their computer (click the link and then click edit).

**IF you are making only a single lantern then open the w:b code and neopixel code in two different tabs.

Combine your codes into one program

Click 

on both programs.

Copy any different lines on the Pin 14 neopixel code.

Paste them into the Pin 15 code.

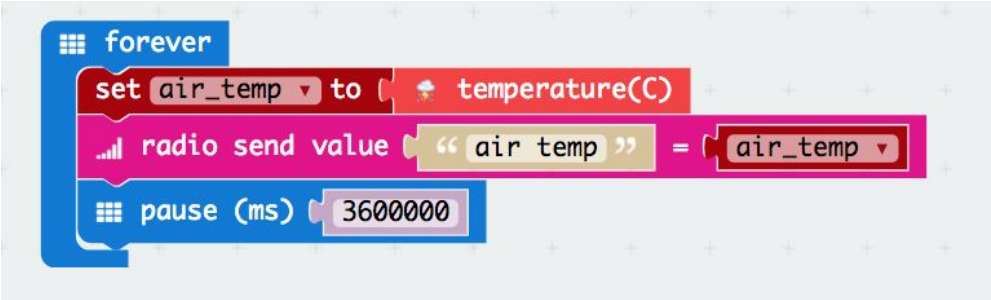
Click 

and make sure everything looks right.

Rename, test and share this code.

Combine your w:b and neopixel codes into one program

Tuesday you made a weather:bit code. Open that (use your link). Looks something like this program.



Tuesday you also made a neopixel code - combined P14 and P15 codes. Open that in a different tab. It started like this.

Combine your codes into one program

Click 

on both programs.

Copy any different lines on the w:b code.

Paste them into the neopixel code.

Click 

and make sure everything looks right.

Goal: To have the w:b sending code with your 2 neopixel codes.

If your program includes the following:

- Hourly readings for all data
- A program for lights using Pin 14 (RXI)
- A program for lights using Pin 15 (TXO)

Then:

- Download your code
- Flash your micro:bit with the new code
- Share this code in the recorder’s document - be sure to include names of the rest of the team.

Try some new programs with your neopixels

http://www.playfulcomputation.group/luminous-science-programs-for-lanterns.html

1) Each group choose a different example on this site.
2) Download the program, flash the m:b (in your ecosystem) and see what it does. Try to understand the code.
3) Edit the program. Change the program in two ways at least.
4) Redownload the program, flash the m:b, and see how the changes you made affected the lights.
5) Share your program on your google assignment/doc. In your document, describe what you changed in the program.

Show and tell?

Program your lights using data from the ecosystem

You should already have a plan for how your lantern will react to different data. But you can still redesign the lights plan!

Keep in mind the following when thinking about how the lights will react to the data:

- What is important for your ecosystem?
- What are you curious about when you aren't around for your ecosystem?
- How often you want to check the data?
- How often do you want to update the lights?
- Do you want to show only live data or past data as well? (see this example for past data)
- Could you use the lantern to predict when your ecosystem might start to be unhealthy?

Day 4

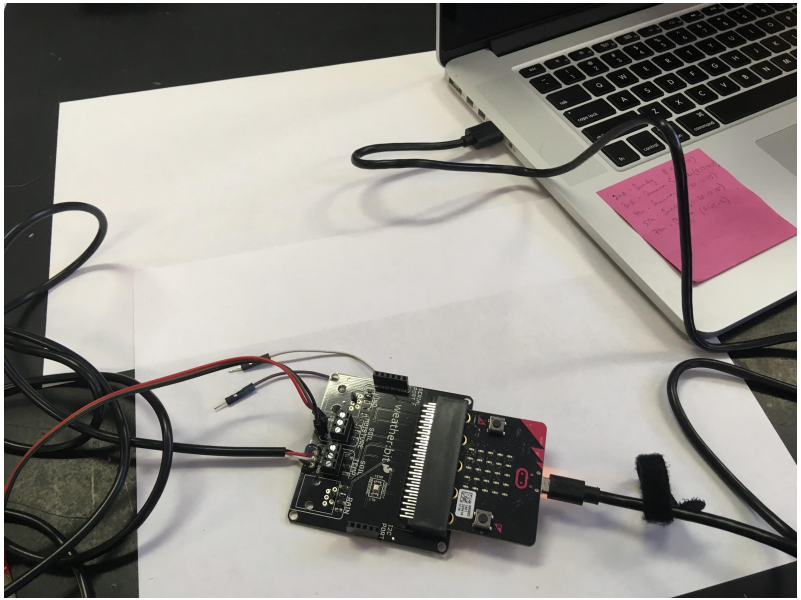
Keep programing your lights to respond to data in the ecosystem

Keep in mind the following:

- What is important for your ecosystem?
- What are you curious about when you aren’t around for your ecosystem?
- How often you want to check the data?
- How often do you want to update the lights?
- Do you want to show only live data or past data as well? (see this example for past data)
- Could you use the lantern to predict when your ecosystem might start to be unhealthy?

How to setup weather:bit and micro:bit with ecosystem

1) Place the sensors into non-invasive areas of your ecosystem.**
2) Tape your weather:bit to the wall of the ecosystem.
3) Make sure you can access the usb cable outside of the ecosystem and it can reach power.
4) Add jumper cable extensions so lights can be attached outside of the ecosystem.



**Note: If you have a large animal (turtle) that might eat the wires protect them!

Be sure your micro:bit has power. Use a usb port

Even through your micro:bit is in the ecosystem you can still program it since you have access to the usb.

We will check the data on Monday!

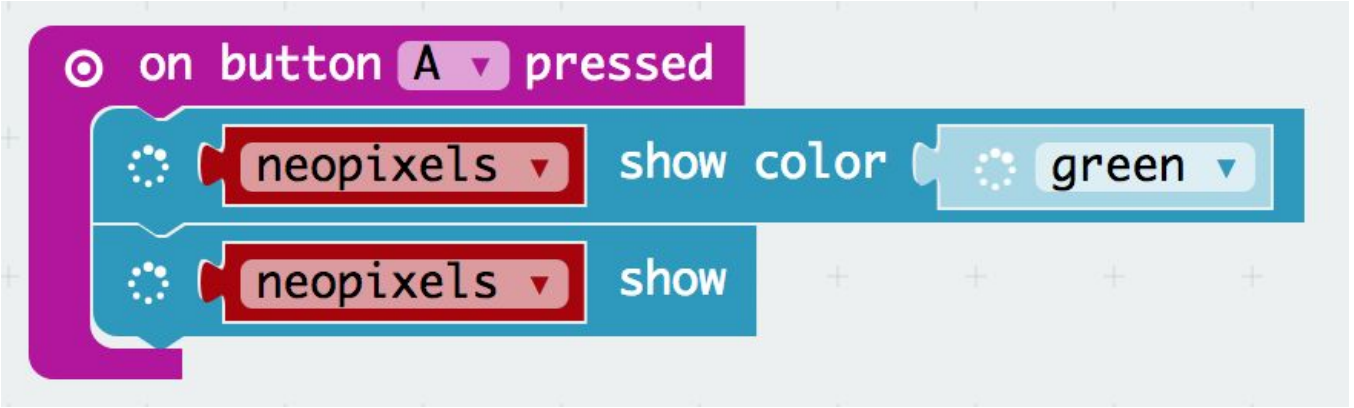
Try some new programs with your neopixels

- Program in your lantern pairs.
- If you are the recorder, share the w:b/m:b setup that is in your ecosystem with the other lantern pair in your group.

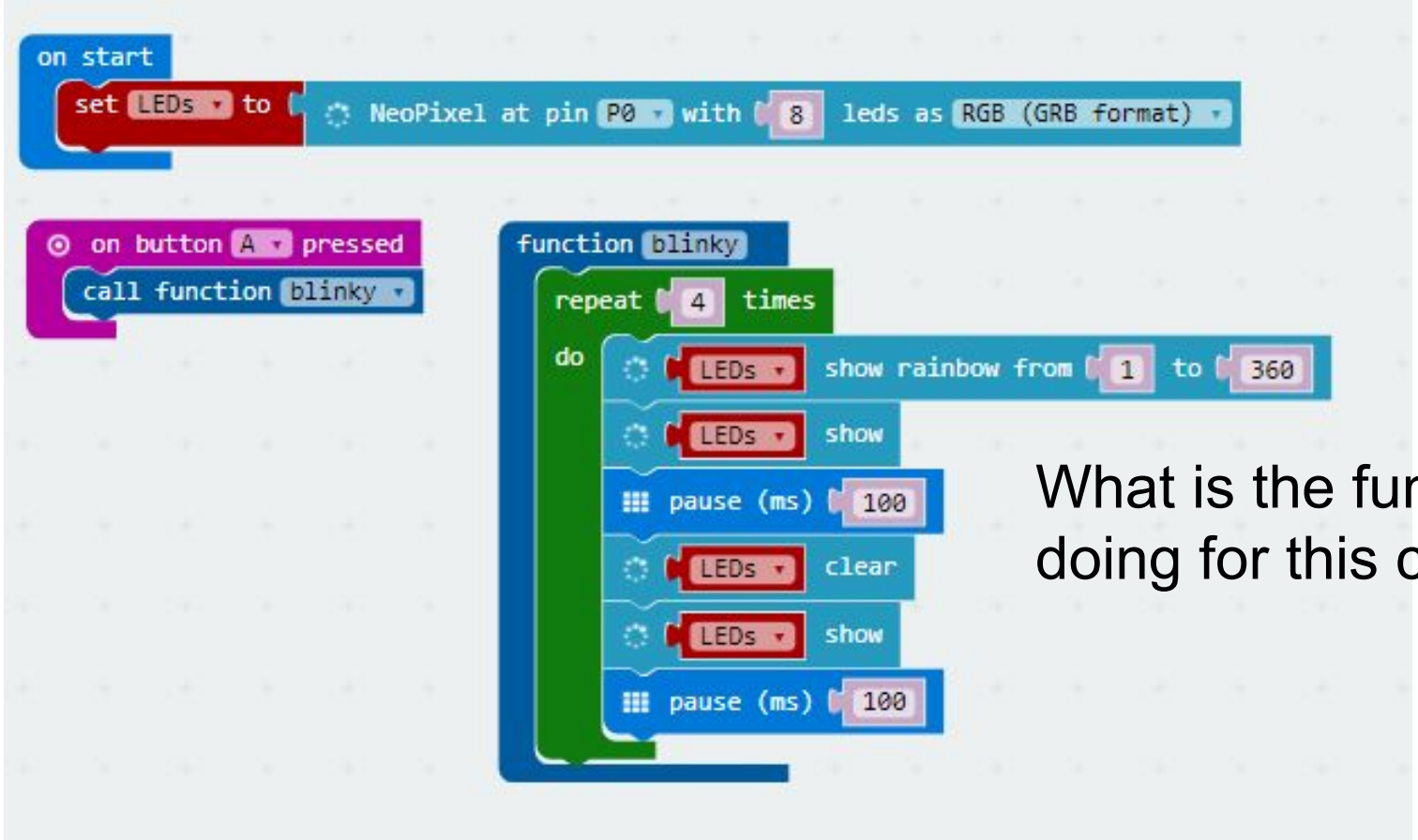
- You can program at your desk. Only plug in the micro:bit when you are ready to try out a program and download (flash) it to the micro:bit.
- At the end you can combine your two codes to make them both work on a single micro:bit.

Extras

Make a program where the neopixels respond to a button press



Do something more exciting than this example!!

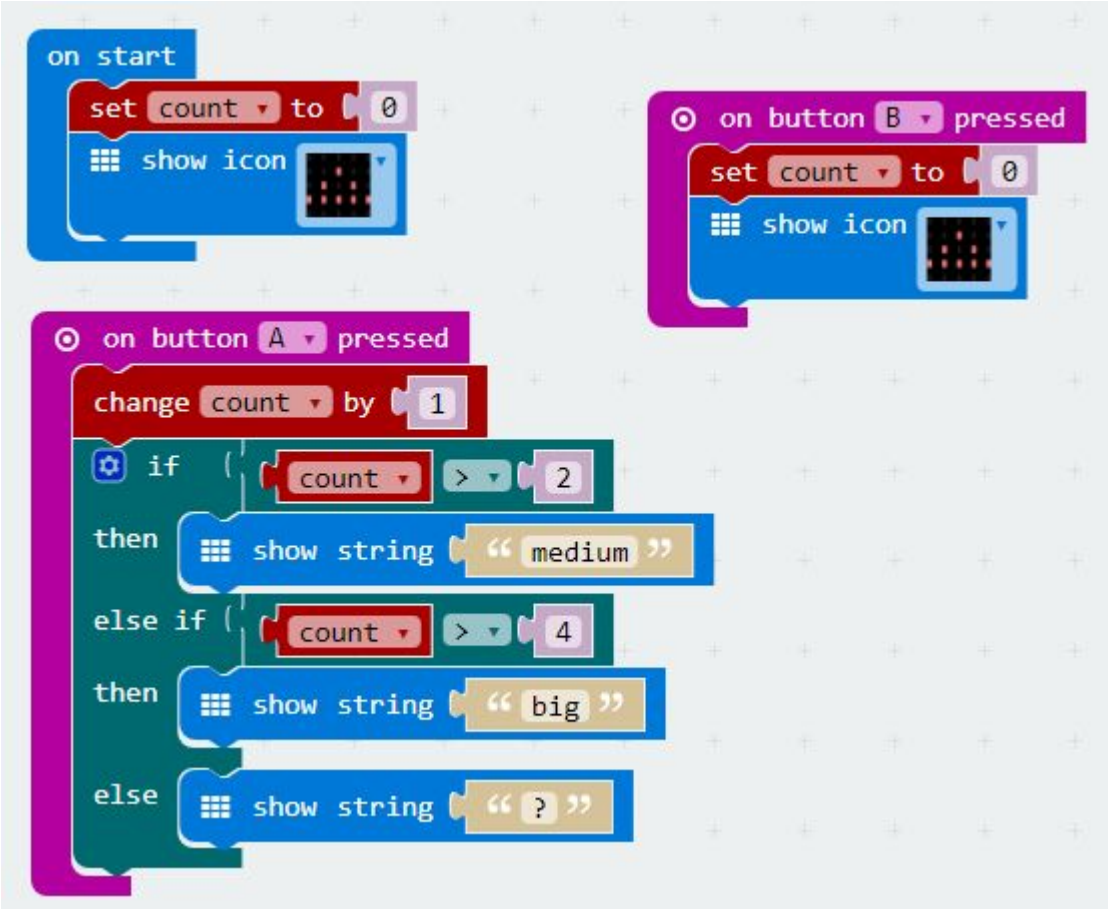


What is the function doing for this code?

Modify your neopixel code to use a function!

Re-SHARE the link in your google assignment/doc

Answer the following questions

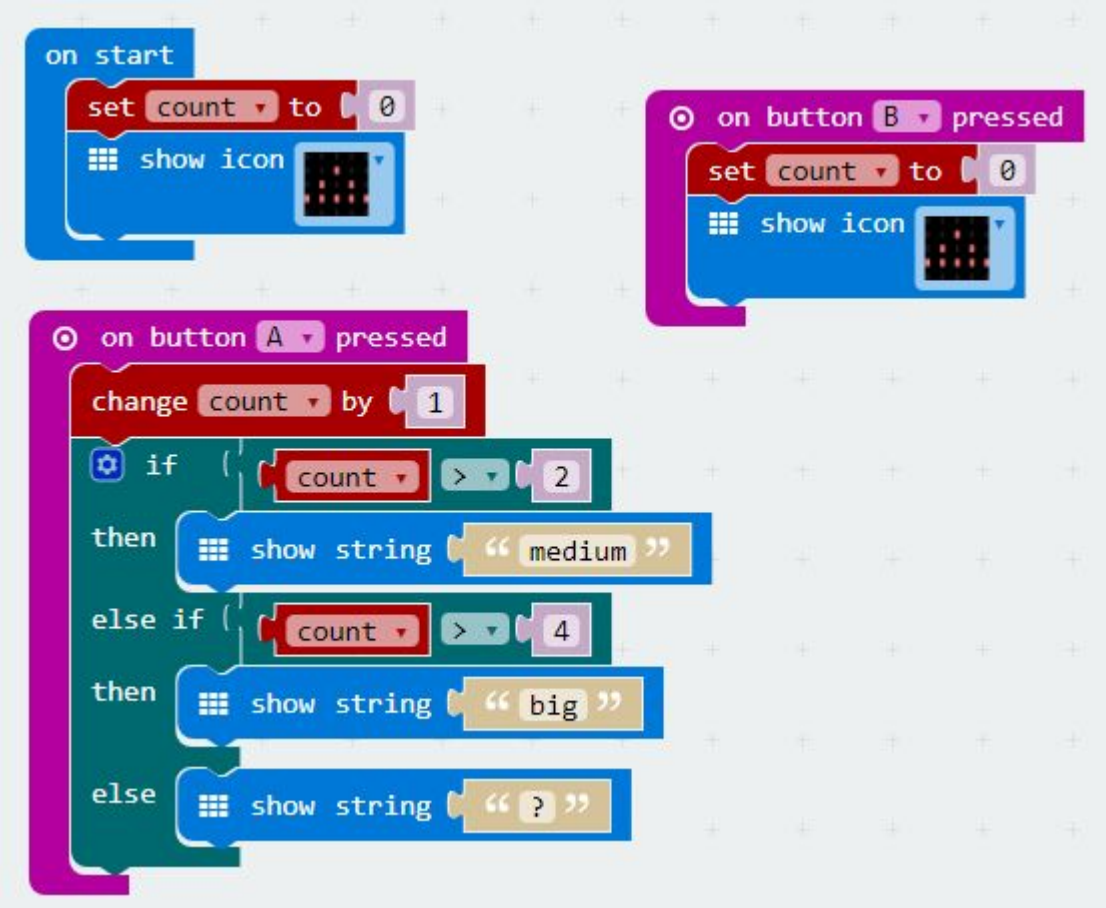


When will the microbit say medium?

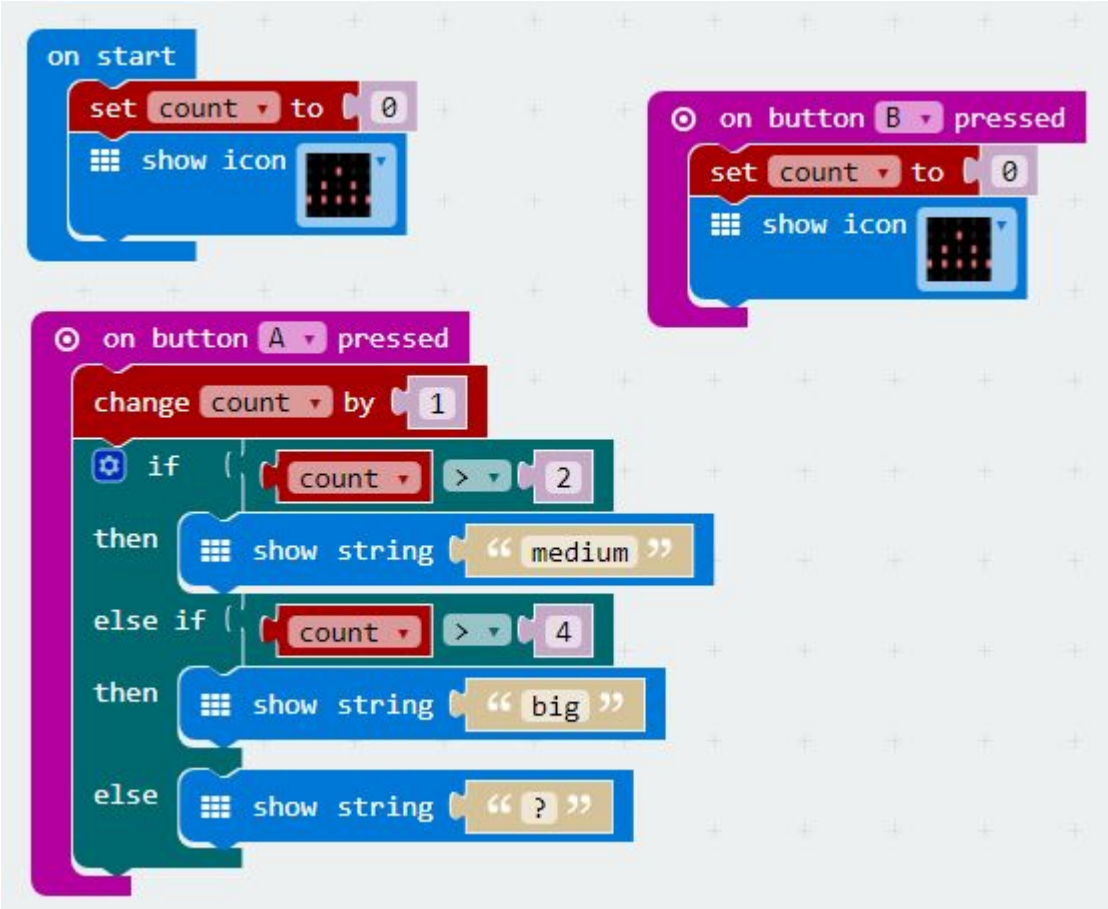
When will the microbit say big?

When will the microbit say “?”

Make this code & download it to a micro:bit



Does it behave like you expected? Why or why not?



DEBUG: This code will never say “big”. Fix the code so that it says big when count is more than 4.

Vernier sensor and light pins

Pins for vernier sensors:

- P1 - wind
- P2 - rain
- P3 - back wire on end of the row
- P4 - back wire on bottom row

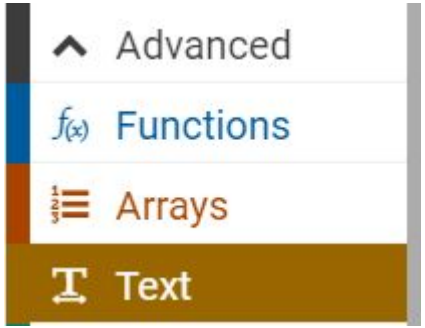
Pins for lights:

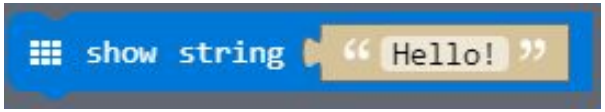
- P14 - RXI (lights)
- P15 - TXO (lights)

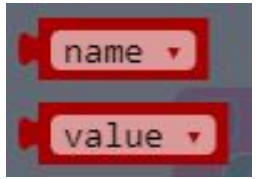
Random Other Activities

Next level - Hints

Blocks you will need:







Partner Challenge - Complete and share out.

Set up a radio group with a partner.

When you send a message to your partner, their micro:bit should show the message.

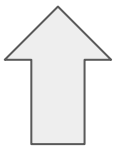
When your partner presses A on their micro:bit, your microbit should make a smiley face.

Get creative and take the challenge to the next level. Also trade off whose micro:bit is sending and whose is receiving.

One step further

- Set your microbit to radio channel 1
- Check for the message that is named “light”
- Have your microbit show

LIGHT = _____



Here is the number of the light level you receive.

Get creative with your neopixels (in pairs)

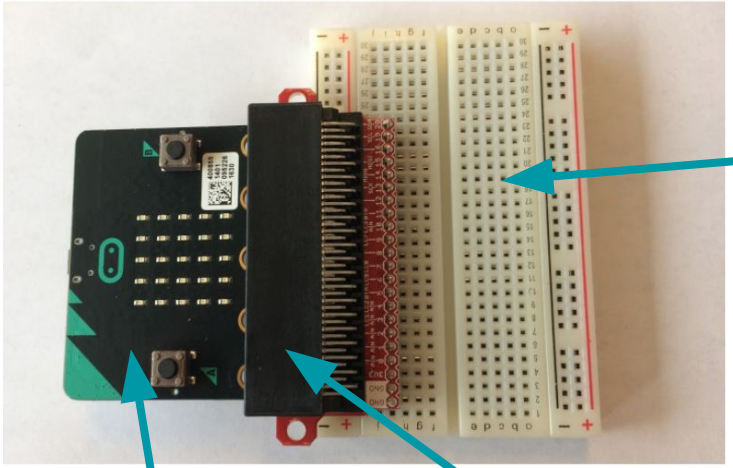
Option A:

1) Set up a radio group with a partner (2 micro:bits).
2) When you send different messages to your partner, their neopixels show something different.

Option B:

1) Learn to change the brightness of the neopixels and/or customize your own colors.
2) Make some pattern of lights/brightness change, repeat, or rotate based on some kind of input (e.g. light level, button presses).

Attaching breakout board with neopixel LEDs with bread board

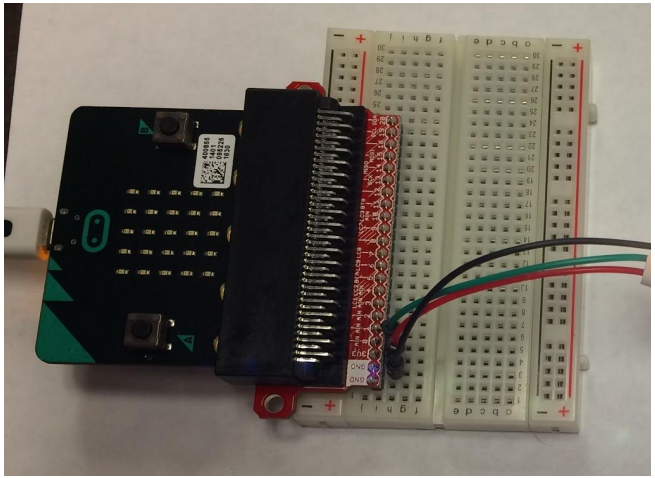


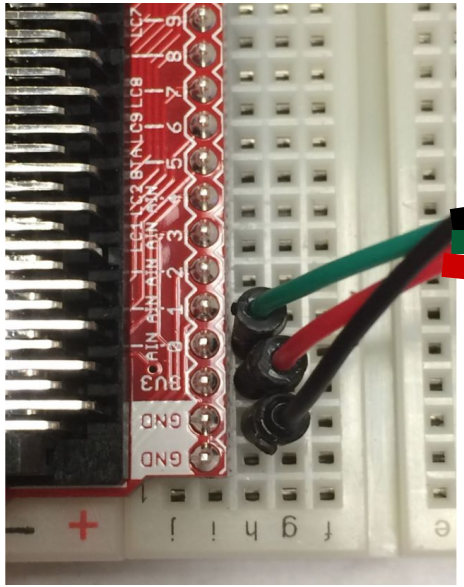
Bread board

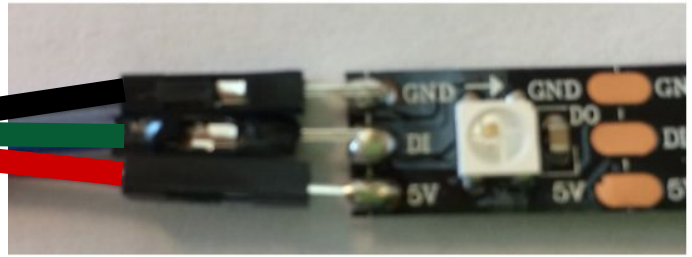
Micro:bit

Breakout board

Wire your LEDs







PIN X (m:b) → DI (LEDs),
GND (m:b) → GND (LEDs)
3V3 (m:b) → 5V (LEDs)

RX1 (w:b) → signal
GND (w:b) → ground
VCC (w:b) → power