



Plastic Pollution Counter Guide

Welcome to the Plastic Pollution Counter guide. Today we are going to use our micro:bits and the makecode editor to code our own fishing plastic pollution counter allowing you to capture important scientific data while you are on a beach clean. You will then be able to share this data with the world by logging it into the TECgirls Beach Clean Plastic Counter. <https://beachclean.tecgirls.co.uk/>

Don't worry if you don't have a micro:bit device, you can still take part in this activity coding on your computer or on a phone or tablet. There is a free mobile app for both iOS and Android phones. Just search "micro:bit".

Cleaning Up and measuring Plastic Pollution

Doing a beach clean is a great way to help clean up fishing plastics and other rubbish. The Cornish Plastic Pollution Coalition (CPPC) have created a great guide to fishing plastic that was included in today's Day 3 Pack.

Because fishing plastic is such a big problem globally, the Cornish Plastic Pollution Coalition is interested in knowing how much of the plastic you collect is fishing related. While you can count up what you find at a beach cleans just using a paper and pencil, we thought using some cool tech would be a lot more fun! So let's get coding.

If you are a beginner:

Welcome! We will be using a type of coding called block code, which means you use colourful blocks to build your code up just like instructions. While it can seem a bit strange when you first get started, we're sure you will pick it up quickly! You will want to start at the very beginning of this guide and do be sure to use our video tutorial, too.

And please don't worry if you make a mistake. Did you know professional software engineers make mistakes every 10 lines of code they write? It's perfectly normal and all a part of exploring and learning.

At the very end of this tutorial we've included instructions on how to connect your micro:bit device.

If you are an experienced coder:

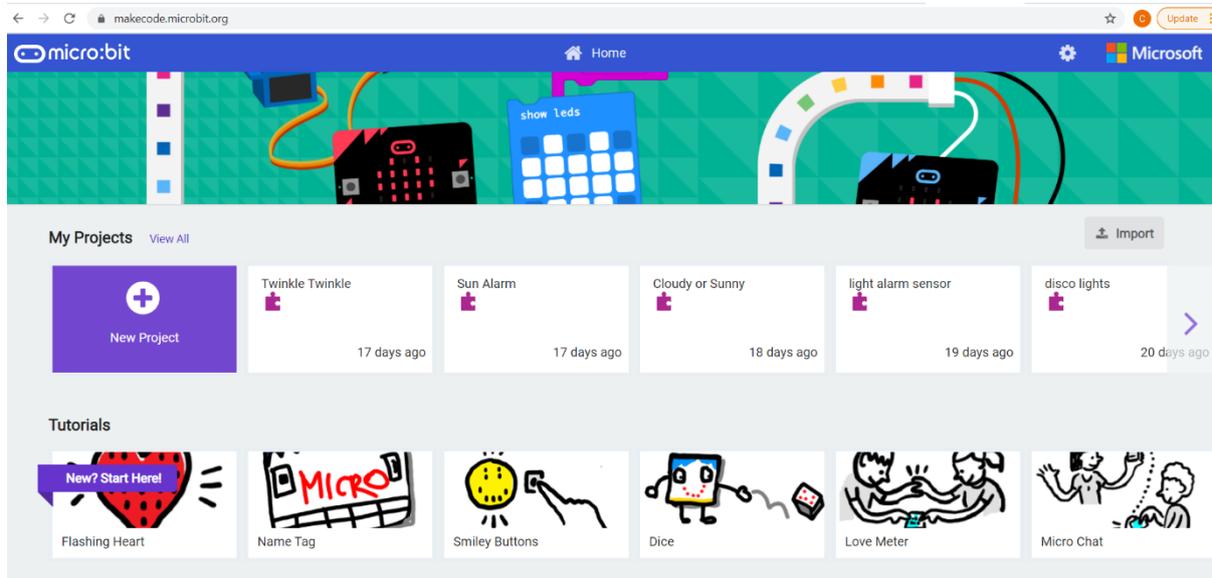
You can use this guide and our video tutorial to move at a faster pace. If you want to you can skip to the end of this guide to see the final code and have a go at building it from there. If you want an even bigger challenge, take a look at the JavaScript option and see if you can have a go at editing the counter in there. Here is the micro:bit code for you to look at if you like. <https://makecode.microbit.org/899ecadFhPhJ>

If you need any help while you are doing this please email help@microbit.org. You can also direct message us on Facebook or Twitter or email us at help@tecgirls.co.uk.

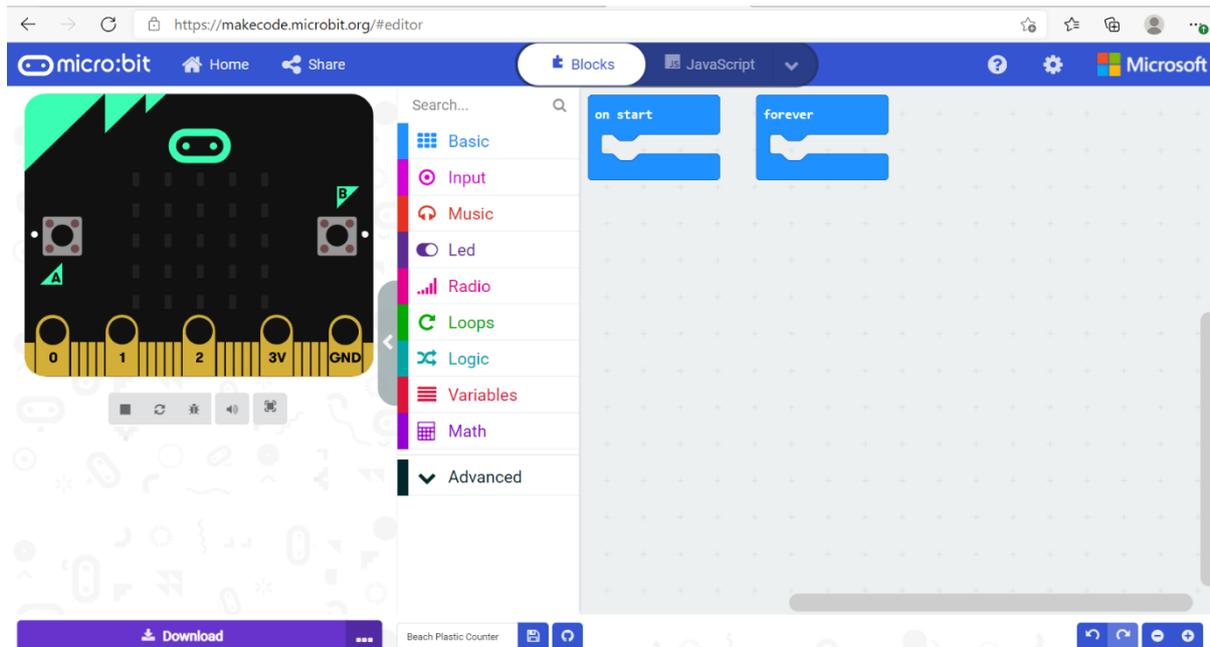
HAVE FUN!

Getting Started/Set Up:

To get started, go to <https://makecode.microbit.org/> or open up the micro:bit app on your phone. You should see a home screen where you can click on the New Project option. Our guide shows the version done on a computer, but the app is very similar.



You will need to give your project a name. You can name it anything you want, but we've called ours Plastic Beach Counter. Enter this name in and you should now be within the Make Code Editor main page.

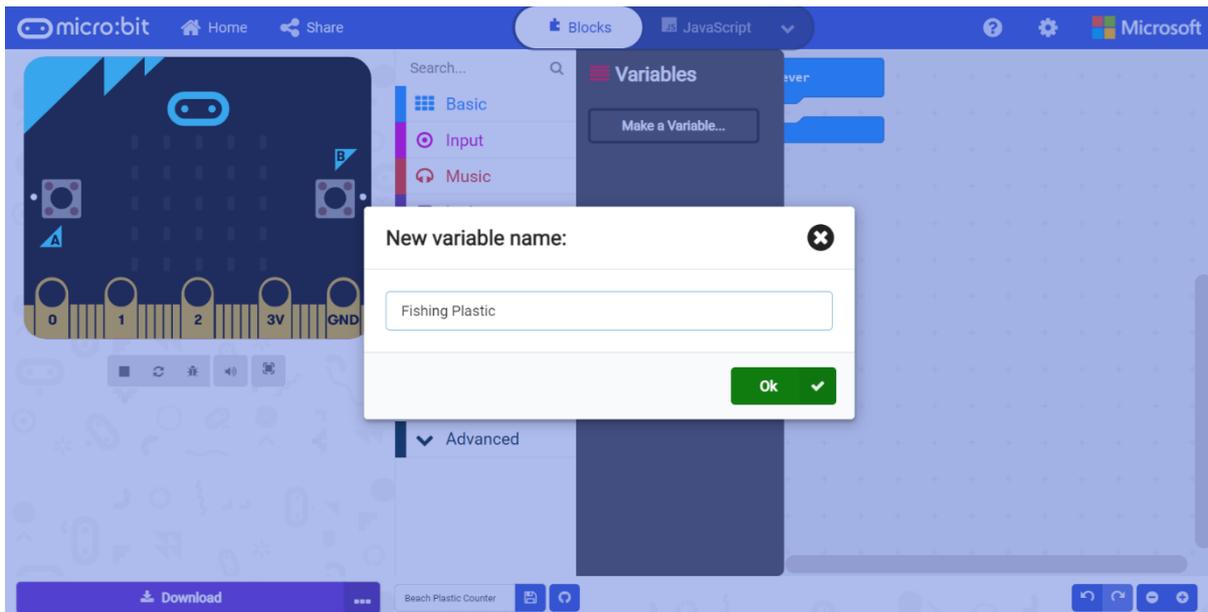


NOTE: If you do not have a micro:bit, don't worry you can still do all of the project. You can use the emulator – which is the picture of the micro:bit device you can see on the screen. This is an interactive tool that will allow you to see how the micro:bit behaves once you've coded it. There is also an emulator on the mobile app.

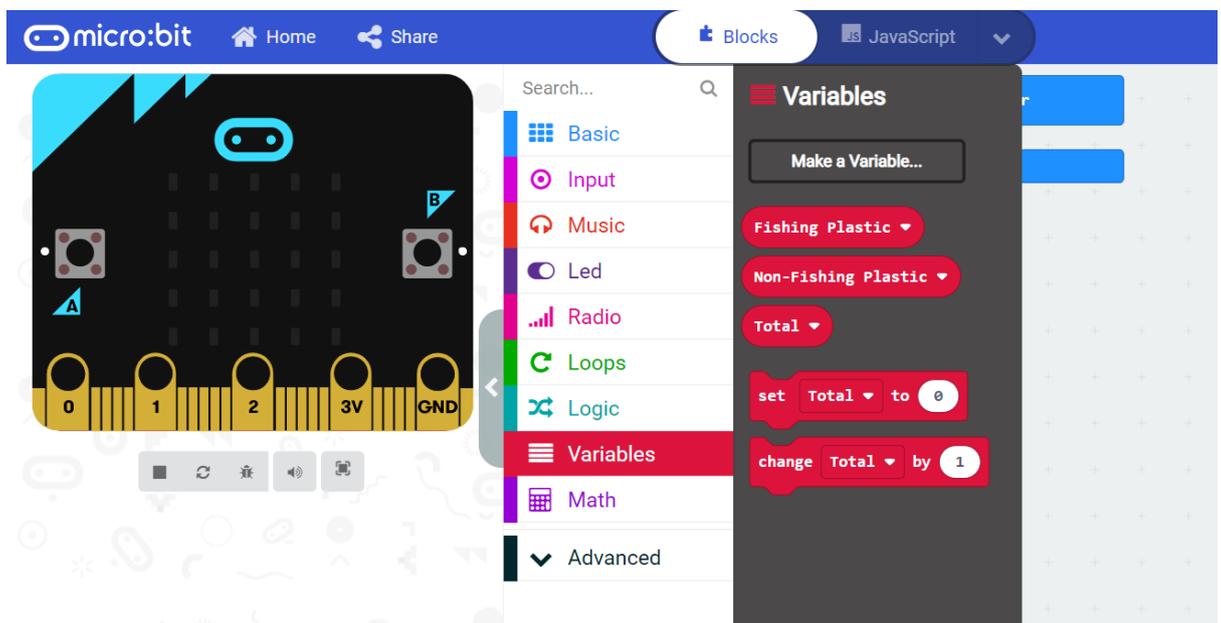
Along the left side of the editor you will see a menu of different options. This is where you will find the blocks to build out your code. When you want to get the micro:bit to do something, go into these different function options and select the right one.

Writing your code:

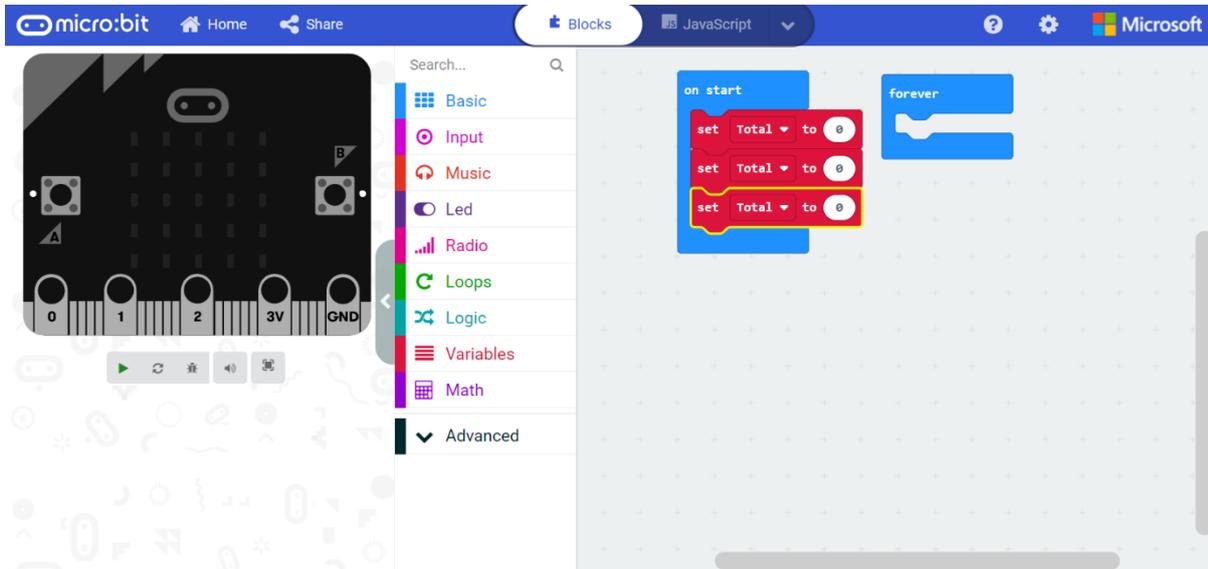
1. We are going to be doing a lot with the red Variables section. Start by clicking on Variables and click on the "make a variable" button.
2. Name your variable "Fishing Plastic" and click OK.



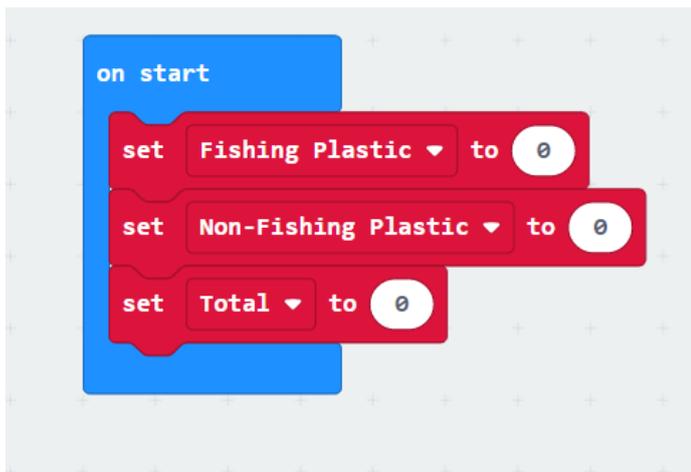
3. You should now see a number of different variable options related to Fishing Plastic. We want to create two more Variable blocks. "Non-Fishing Plastic" and "Total". Create them the same way you created the first variable block. You should now have options that look like this.



- Now we have the right blocks, we want to start building our code. Click on the Variable block that says “set Total to 0” and drag it over to the grey box on your right. You should now see the code on your editor. You then need to drag it into place into the gap in the blue “on start block”. Do this 3 times so you have 3 red blocks inside the blue one.

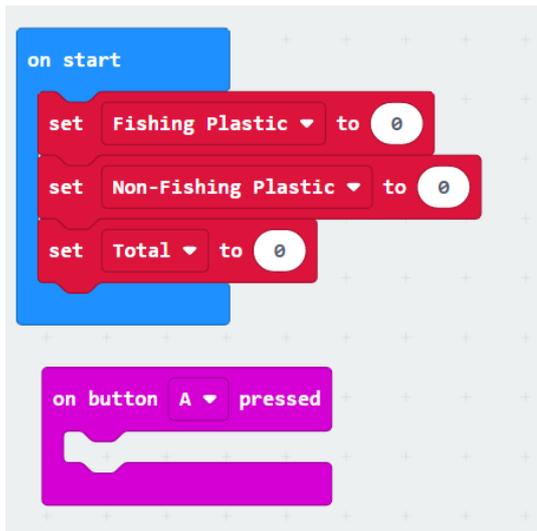


- Click on the bit within the red block that says “total” in the first red block and change it to “Fishing Plastic”. Change the second total option to “Non-Fishing plastic”. Keep the last one on “Total”. Leave all the numbers at 0. This means the counter will always start from 0 when you re-set the micro:bit.



YOU'RE DOING GREAT!

- Now it is time to program the A and B buttons on your micro:bit, so you can use them to count what plastics you find when you are out on the beach.
- Click on the pink Input menu option and select on "button A pressed" and drag this onto your editor board. It should stand on its own - don't connect it to the other blue or red boxes for now.



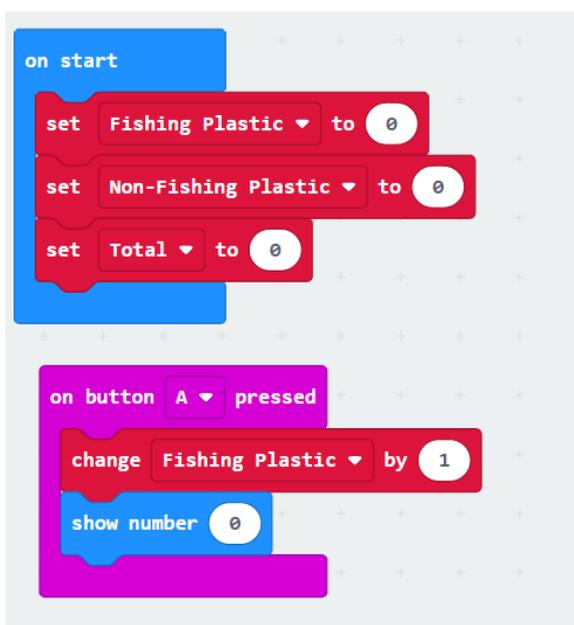
```

on start
  set Fishing Plastic to 0
  set Non-Fishing Plastic to 0
  set Total to 0

on button A pressed

```

- Go back to the red variables options and select the block that says "change Total by 1" and drag this into the gap in the pink button A block. Click on the "Total" option and change it to "Fishing Plastic".
- Now go to the basic options and select the "show number 0" block and snap it under the change variable block.



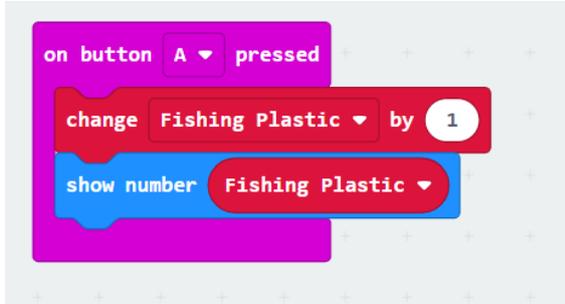
```

on start
  set Fishing Plastic to 0
  set Non-Fishing Plastic to 0
  set Total to 0

on button A pressed
  change Fishing Plastic by 1
  show number 0

```

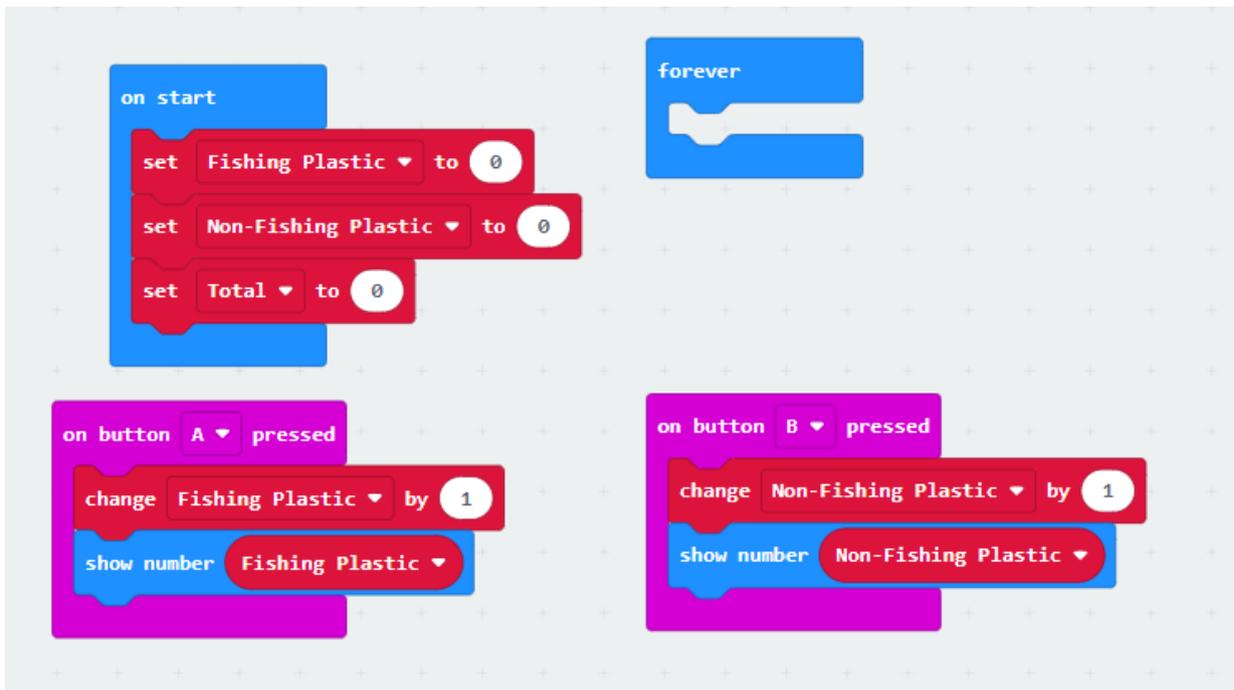
10. Go back into the red variables menu and pick the round block that says Fishing Plastic. You will need to then drag that in to replace the 0 in the "show number" block. A helpful little red dot and yellow line should pop up to make sure you get it in the right place.



```

on button A pressed
  change Fishing Plastic by 1
  show number Fishing Plastic
  
```

11. Next you need to repeat steps 7-10 and build this block of code next to the one you already have. This time you want it to say "button B" instead of A and "Non-Fishing Plastic" instead of "Fishing Plastic". Here is how your code should look:



```

on start
  set Fishing Plastic to 0
  set Non-Fishing Plastic to 0
  set Total to 0

  forever

on button A pressed
  change Fishing Plastic by 1
  show number Fishing Plastic

on button B pressed
  change Non-Fishing Plastic by 1
  show number Non-Fishing Plastic
  
```

12. Do the same again but with the input option "when A+B are pressed" and have the red variable block say "Total".



```

on button A+B pressed
  change Total by 1
  
```

WE ARE ALMOST THERE!

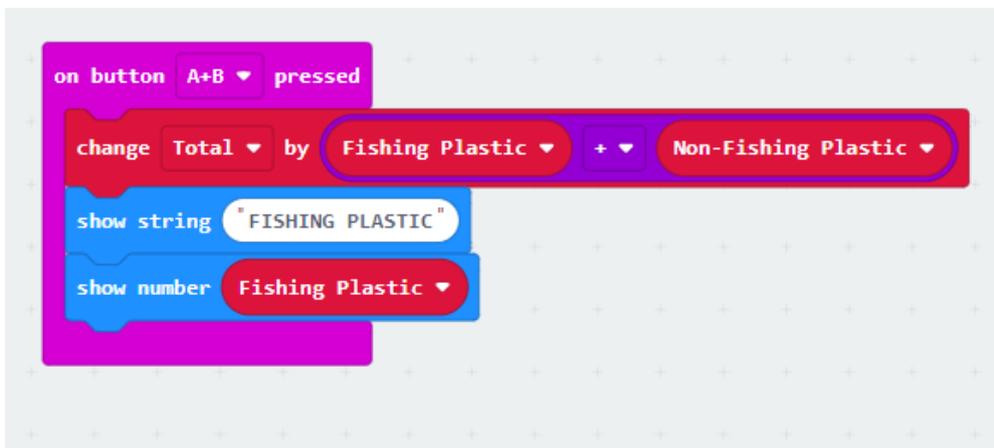
13. Now we are going to introduce some maths commands so your counter can add up both of your plastic options for a total on the amount of plastic you counted. Go to the purple Math menu and drag an addition block that says "0+0". Place this block within the space on the variable block that says 1.



14. Go back to the Variables options and select the "Fishing Plastic" circle and put it in the place of one of the math block 0's. Go back to the variables and select "Non-Fishing Plastic" circle and place that in the other 0 space.



15. Now go to the basic menu option and grab the "show string hello" block. Change this block to read "Fishing Plastic".
16. Using the basic menu, choose the "show number 0" block. Put this block under the previous one.
17. Just like you've done before, go to the variable menu and select Fishing Plastic and drop that into the 0 place on the "show number 0" block.



18. Now repeat those steps again but for your "Non-Fishing Plastic" options.

19. Finally do it one more time, this time with the “Total” variable options.

```

on button A+B pressed
  change Total by Fishing Plastic + Non-Fishing Plastic
  show string "FISHING PLASTIC"
  show number Fishing Plastic
  show string "NON-FISHING PLASTIC"
  show number Non-Fishing Plastic
  show string "TOTAL"
  show number Total
  
```

WELL DONE, YOU ARE DONE WITH THE CODING BIT!

Here is what your final code should look like:

```

on start
  set Fishing Plastic to 0
  set Non-Fishing Plastic to 0
  set Total to 0

on button A pressed
  change Fishing Plastic by 1
  show number Fishing Plastic

on button B pressed
  change Non-Fishing Plastic by 1
  show number Non-Fishing Plastic

on button A+B pressed
  change Total by Fishing Plastic + Non-Fishing Plastic
  show string "FISHING PLASTIC"
  show number Fishing Plastic
  show string "NON-FISHING PLASTIC"
  show number Non-Fishing Plastic
  show string "TOTAL"
  show number Total
  
```

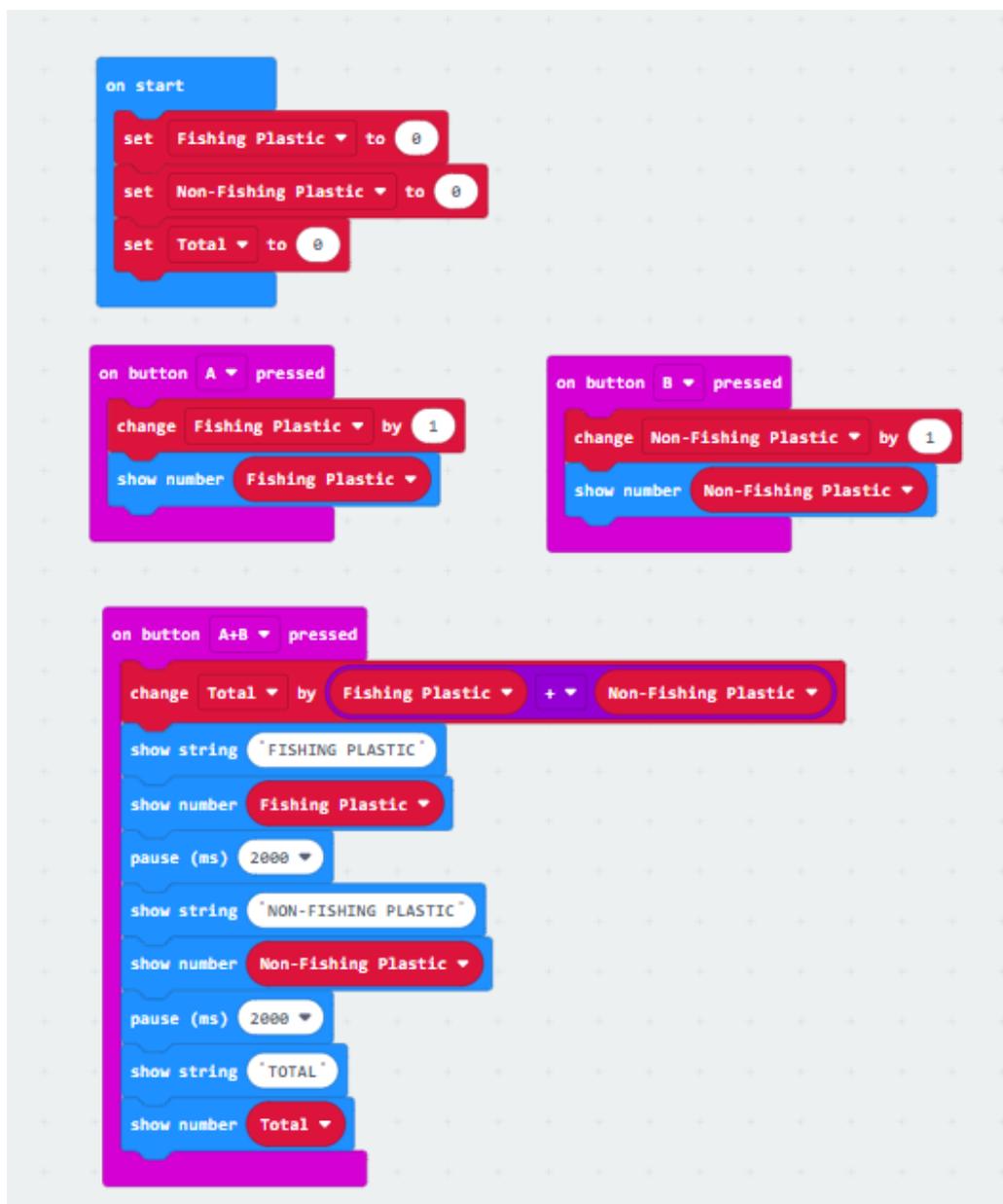
Now let's test it out.

Using the simulator on the side, press the A button 5 times. Now press the B button 6 times. Now if you press the A+B button you should have text across the micro:bit that says "FISHING PLASTIC 5" then "NON-FISHING PLASTIC 6", then "TOTAL 11". Did it work? If not go back through and see if there are any steps you missed.

Did you notice the numbers went really fast?

To slow them down add some pause options from the blue basic menu. Select the "pause (ms)" block and place it after the "Show Number" options in your code. Now select the option for 2 seconds (or 2000 ms) seconds from the time option.

Your code should now look like this:



```

on start
  set Fishing Plastic to 0
  set Non-Fishing Plastic to 0
  set Total to 0

on button A pressed
  change Fishing Plastic by 1
  show number Fishing Plastic

on button B pressed
  change Non-Fishing Plastic by 1
  show number Non-Fishing Plastic

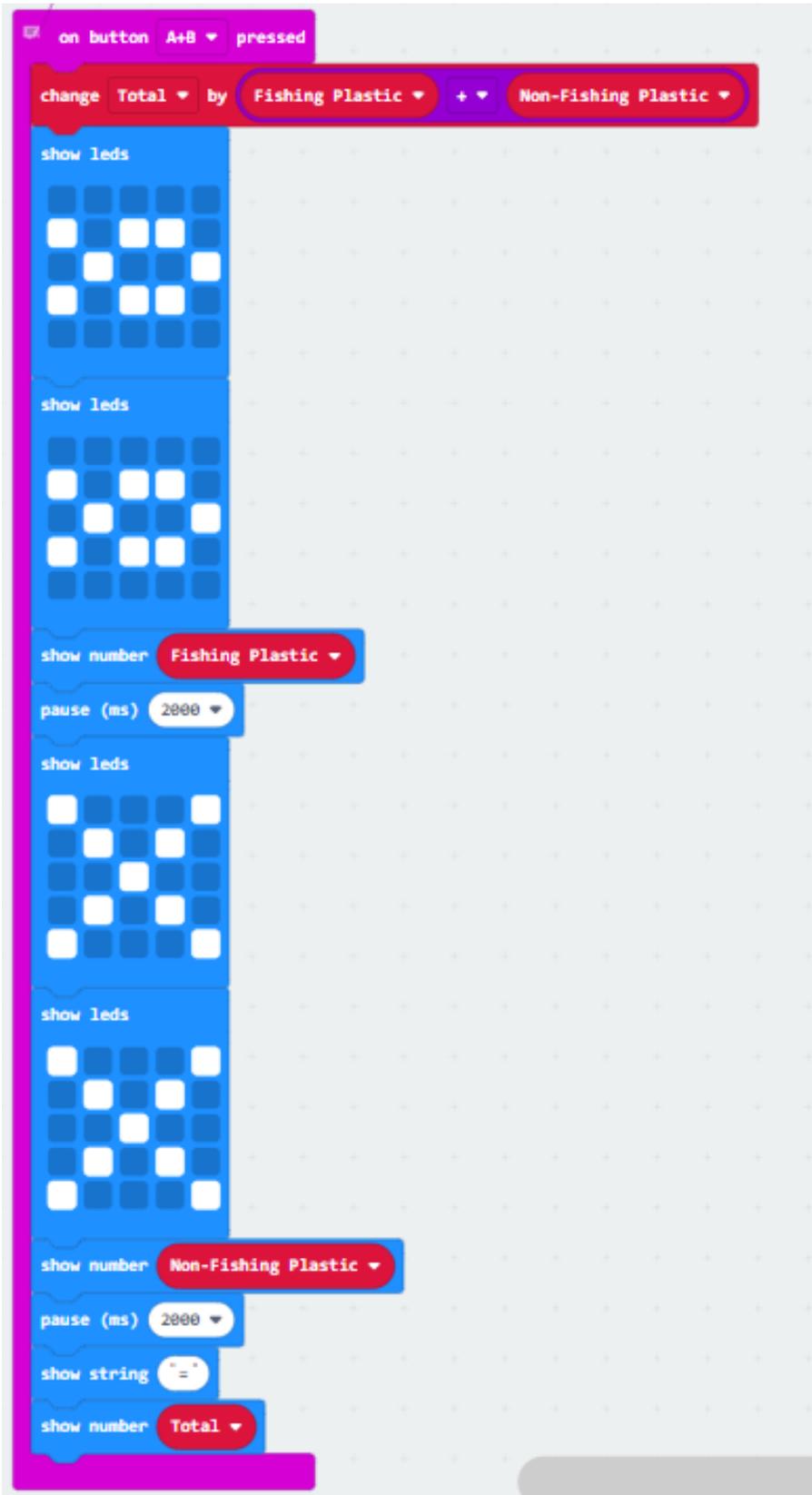
on button A+B pressed
  change Total by Fishing Plastic + Non-Fishing Plastic
  show string "FISHING PLASTIC"
  show number Fishing Plastic
  pause (ms) 2000
  show string "NON-FISHING PLASTIC"
  show number Non-Fishing Plastic
  pause (ms) 2000
  show string "TOTAL"
  show number Total
  
```

What happens next?

You've built your very own plastic beach counter. There are now a few different options if you want to modify the project.

For example, you could change the code so instead of text scrolling (which can take a while) you have images of a Fish or Non – Fish.

That code would look like this:



```
on button A+B pressed
  change Total by Fishing Plastic + Non-Fishing Plastic
  show leds
  show leds
  show number Fishing Plastic
  pause (ms) 2000
  show leds
  show leds
  show number Non-Fishing Plastic
  pause (ms) 2000
  show string "="
  show number Total
```

Ready to collect your plastic?

You are now ready to do a beach clean and count all the plastic you have found. You can bring a micro:bit with you on the beach, using the battery pack to power it. Or you can use the micro:bit mobile app and use the emulator on the app to act as your micro:bit. We have included a tutorial on how to use the app if you have been doing your code on a computer so far.

If you do take your micro:bit to the beach you should put it into a plastic bag to keep it safe from the sand and water. Why not re-use the plastic bag your micro:bit came in? Great way to recycle and not use more plastic.

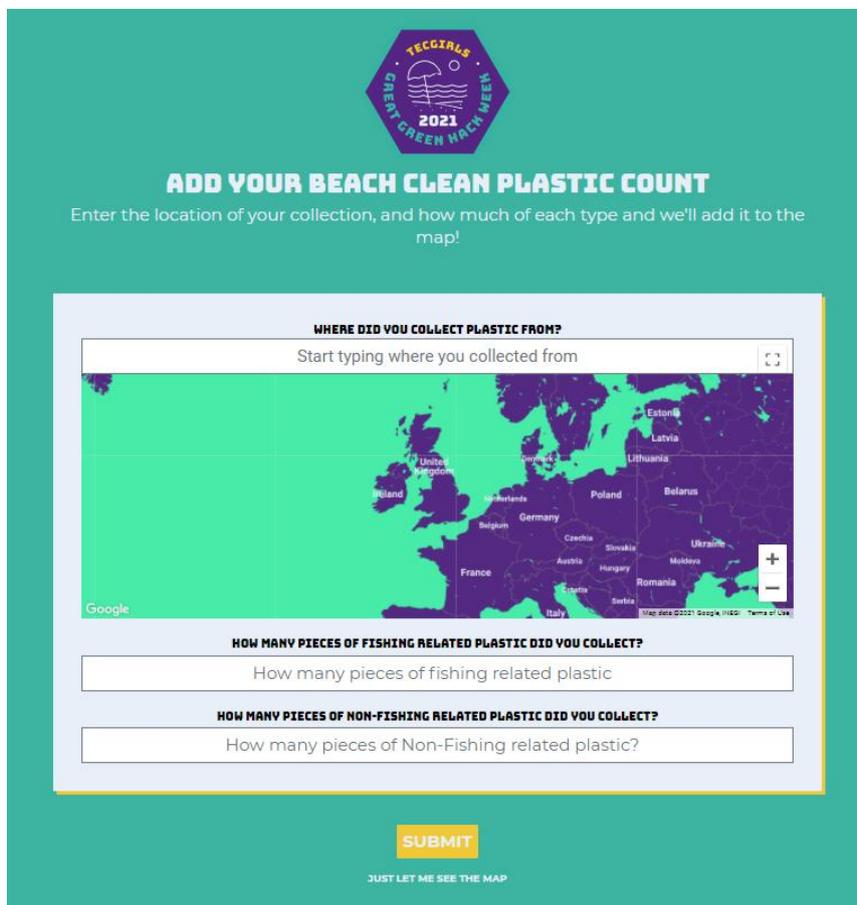
TIP: Make sure your battery pack is fully plugged in and topped up. If it comes out the data you enter may be lost.

You can also bring your plastic home and count it at home if you don't have a micro:bit or don't want to take it to the beach.

Record your findings:

Now you've collected your data it's time to share it, helping organisations like the Cornish Plastic Pollution Coalition understand the size of the plastic pollution problems on our local beaches. We are also keen to see what the plastic pollution problem looks like around the world, so anyone can enter their data into the map.

1. To enter your data, go to this webpage <https://beachclean.tecgirls.co.uk/> and put in the location for where you did your beach clean.



The screenshot shows a web form titled "ADD YOUR BEACH CLEAN PLASTIC COUNT" with the instruction "Enter the location of your collection, and how much of each type and we'll add it to the map!". The form includes a text input field for the location, a map of Europe, and two input fields for the number of fishing-related and non-fishing-related plastic pieces collected. A "SUBMIT" button and a link "JUST LET ME SEE THE MAP" are also visible.

TECGIRLS GREAT GREEN HATCH WEEK 2021

ADD YOUR BEACH CLEAN PLASTIC COUNT

Enter the location of your collection, and how much of each type and we'll add it to the map!

WHERE DID YOU COLLECT PLASTIC FROM?

Start typing where you collected from

Google

HOW MANY PIECES OF FISHING RELATED PLASTIC DID YOU COLLECT?

How many pieces of fishing related plastic

HOW MANY PIECES OF NON-FISHING RELATED PLASTIC DID YOU COLLECT?

How many pieces of Non-Fishing related plastic?

SUBMIT

JUST LET ME SEE THE MAP

- Now check your micro:bit for your total counts by holding down A + B. Please note, if the micro:bit has lost power (battery pack died or it lost connection) the count will be lost, so it might be good to enter this data right away on the app using a parent's phone at the beach.

TEGGIALS GREAT GREEN HATCH WEEK 2021

ADD YOUR BEACH CLEAN PLASTIC COUNT

Enter the location of your collection, and how much of each type and we'll add it to the map!

WHERE DID YOU COLLECT PLASTIC FROM?

Perranporth, UK

HOW MANY PIECES OF FISHING RELATED PLASTIC DID YOU COLLECT?

10

HOW MANY PIECES OF NON-FISHING RELATED PLASTIC DID YOU COLLECT?

30

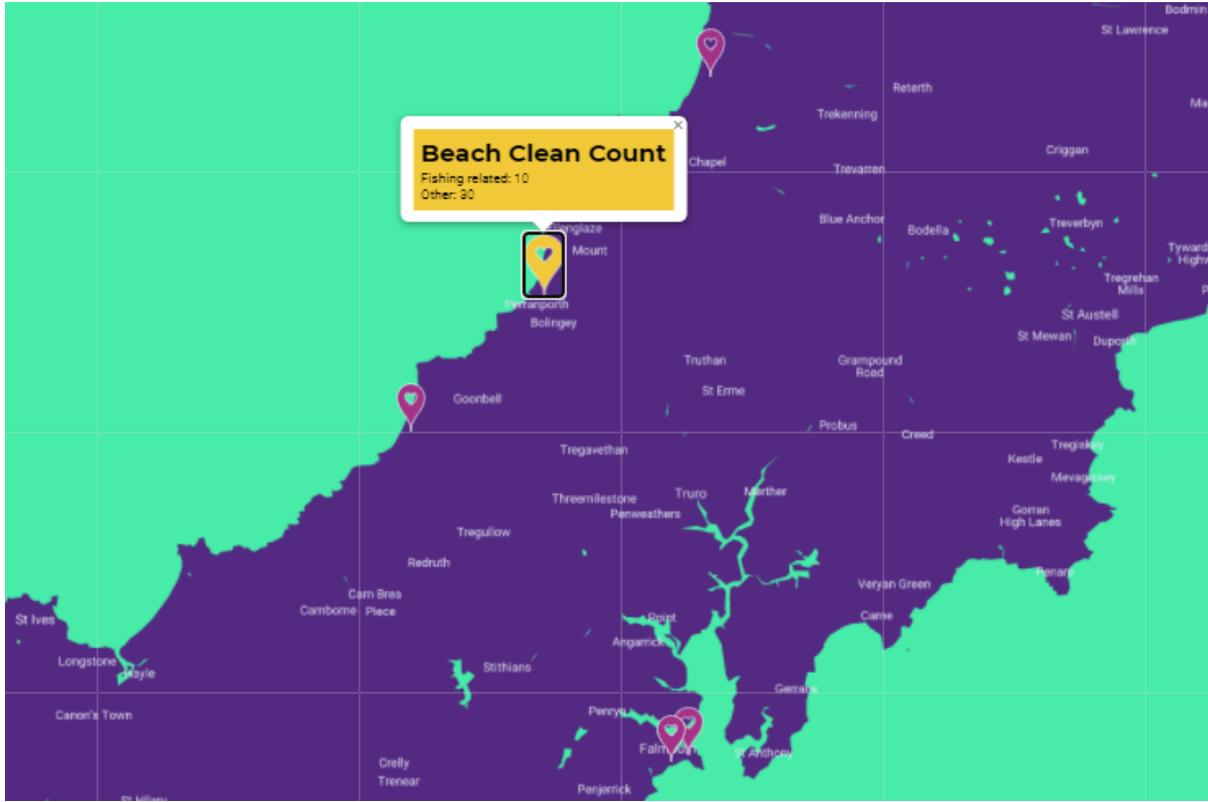
SUBMIT

JUST LET ME SEE THE MAP

- After you've entered in the data press submit and you should see the map with pins in it. Your results will be the yellow pin. You can zoom in and out to see results from around the world.



- If you click on the pin you can see the results of the data you entered. You can also click on any of the other pins to see the results from other kid's beach cleans.



Remember, you can do this as many times as you like. The more we clean up the beaches and capture important data like this, the more we can do to help tackle this problem together. Also be sure to tell your friends and your school. They don't have to have a micro:bit to do the counting and data entry. Same if you're at the beach one day and you don't have it with you - you can still help enter the data into our map.

FINISHED!

Connecting your micro:bit device and uploading your code:

To get started, you should have:

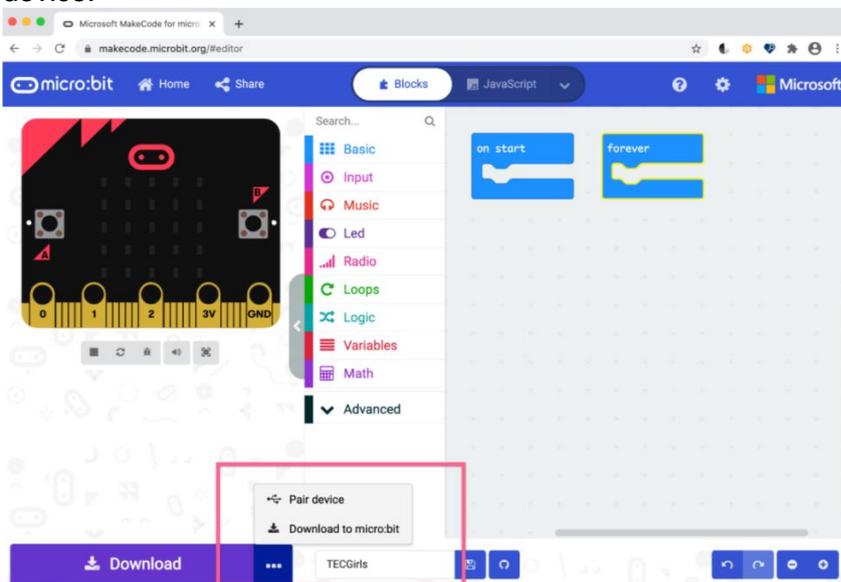
- 1 x micro:bit
- 1 x microUSB - USB A cable
- 1 x micro:bit battery pack with 2 xx AAA batteries
- 1 x PC/Laptop with a USB port and Google Chrome or Microsoft Edge browser

These few steps make it really easy to update the micro:bit directly from the editor, rather than having to save a file each time and drag and drop it on to the micro:bit.

- Plug the micro:bit into your computer with the USB cable



2. Click on the more ... menu next to Download and follow the instructions to pair your device.



3. That's it! You're ready to go. For more information on this process and some instructional videos visit: <https://microbit.org/get-started/first-steps/set-up/>

Here is how to connect the micro:bit from the mobile app [Guide to mobile apps | micro:bit](https://microbit.org/guide/mobile-apps/) (microbit.org)