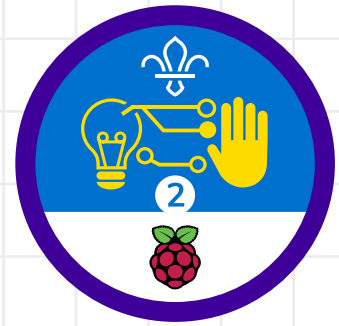


# Make a micro:bit map

1



## Outcomes

This activity will help young people to gain a range of practical and modern skills for school, work, and their social life.

## Overview

This activity meets **requirement two** of **stage two** of the **Digital Maker Staged Activity Badge** ('Create a simple computer program to help with a Scouts activity, and try it out') and **requirement four** of **stage two** of the **Navigator Staged Activity Badge**. It shows people how to use Scratch and a micro:bit to draw a map of a wilderness area that they've visited or are planning to visit. You can find the completed project online at [rpf.io/scouts-microbit-map-on-complete](https://rpf.io/scouts-microbit-map-on-complete).

## You will need:

- Laptops or desktop computers with Bluetooth technology
- micro:bits and USB cables
- Scratch editor (online: [rpf.io/scratch-new](https://rpf.io/scratch-new) or offline: [rpf.io/scratchoff](https://rpf.io/scratchoff))
- Scratch Link software (preinstalled: [rpf.io/scratch-link](https://rpf.io/scratch-link))
- Activity handouts



### For each group:

- One laptop or desktop computer
- One micro:bit
- One USB A to micro USB B cable
- Starter project at [rpf.io/scouts-microbit-map-on](https://rpf.io/scouts-microbit-map-on)

## Key messages

- External inputs, such as buttons and sensors, can be used with a computer.
- Infinite loops can be used to detect events, then conditional selection can be used to alter the behaviour of a program depending on the event detected.
- Scratch can be used as a digital canvas that images can be drawn on.



45 minutes



Flexible (ideally two young people using each computer and micro:bit)



Download the Scratch Link software and install the Scratch micro:bit HEX code on the micro:bits beforehand. You can find instructions at [rpf.io/scratch-link](https://rpf.io/scratch-link). If you're running this activity without internet access, you'll also need to download the software and starter project ahead of time. You'll probably also want to print handouts.



Wherever you have computer access

## If your meeting place has internet access

- Run Scratch online in a web browser using this link: [rpf.io/scratchon](https://rpf.io/scratchon)
- Download the Scratch Link software and install the Scratch micro:bit HEX code on the micro:bits beforehand. You can find instructions at [rpf.io/scratch-link](https://rpf.io/scratch-link)

## If your meeting place doesn't have internet access

- Download the Scratch desktop application before you begin. Check out the Scratch guide at [rpf.io/scouts-scratch](https://rpf.io/scouts-scratch) for instructions
- Download the Scratch Link software and install the Scratch micro:bit HEX code on the micro:bits before you begin. You can find instructions at [rpf.io/scratch-link](https://rpf.io/scratch-link)

## Leader instructions



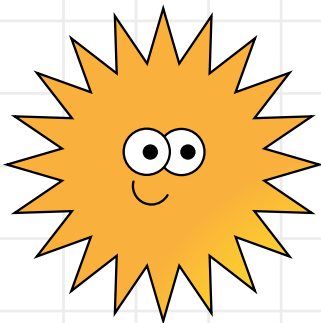
- 1 Download the Scratch Link software and install the Scratch micro:bit HEX code on the micro:bits beforehand. You can find instructions at [rpf.io/scratch-link](https://rpf.io/scratch-link)
- 2 Discuss digital arts programs that the young people may have used (such as Microsoft Paint). Talk about how they might use a mouse or a tablet to draw on a digital canvas.
- 3 Explain that you can use a variety of input devices to interact with a computer. In this activity, everyone will make a program they can use to draw their own maps.
- 4 If people haven't used them before, introduce the micro:bits. Explain that micro:bits have two buttons (for input), and can sense which way they're tilted.
- 5 Show everyone how to start the Scratch Link software.



### Scratch Link

Trusted Microsoft Store app

- 6 Show everyone how to connect the micro:bit to the computer, and open Scratch (online or offline) and then the starter project at [rpf.io/scouts-microbit-map-on](https://rpf.io/scouts-microbit-map-on).



## Alternatives



- If you don't have access to micro:bits, people can use key presses and the mouse to complete the resource instead.

## Safety



If young people are working online, they should ask for permission before viewing any other websites. It's a good idea to set up parental controls – you can find instructions on the NSPCC website ([rpf.io/scouts-nsppc-online](https://rpf.io/scouts-nsppc-online)). You should also give each young person a 'Stay safe' leaflet ([rpf.io/scouts-staysafe](https://rpf.io/scouts-staysafe)).

## Adaptability

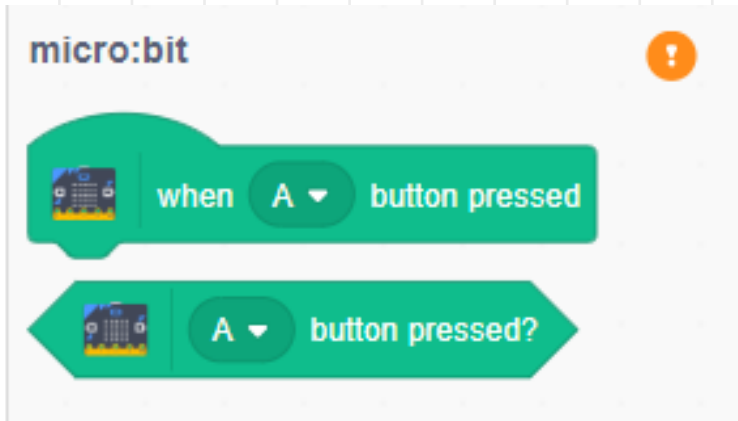


- More advanced learners can extend their projects by adding more sprites.
- Young people who are really advanced learners and are familiar with Scratch could adapt the key concepts in this handout to create other styles of games. For example, they could use the micro:bit to control a sprite in a game in the style of Space Invaders.

# Make a micro:bit map

3

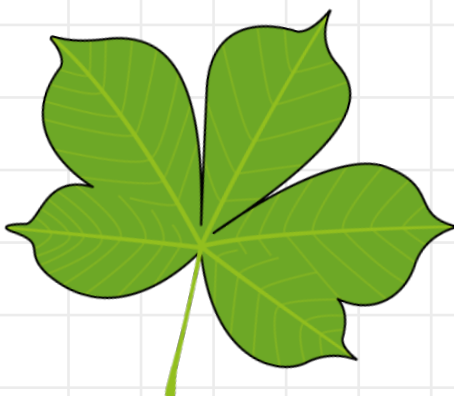
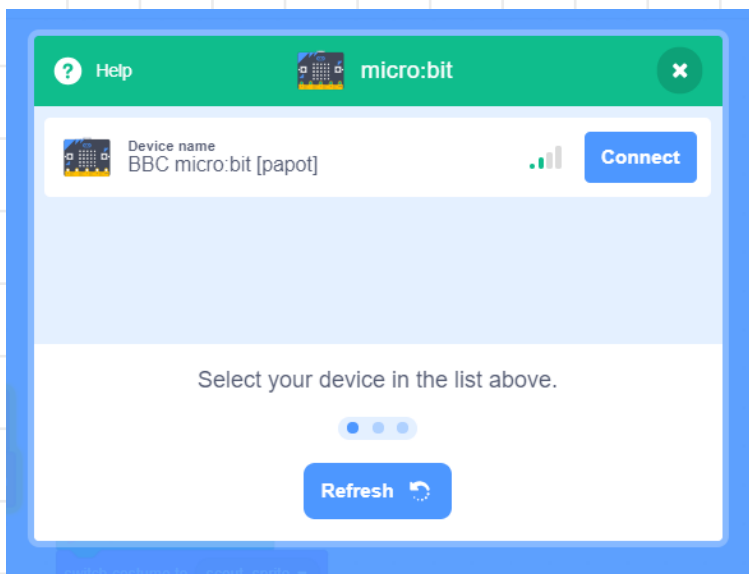
- 7** Click on the 'micro:bit' menu, and then on the orange '!' to connect to the micro:bit.



- 8** Everyone should use the instructions on the handout to create code in Scratch.

- 9** Once the project is finished, everyone can use it to create their own custom maps of a campsite environment they've visited.

- 10** You can show everyone the completed project at [rpf.io/scouts-microbit-map-get](http://rpf.io/scouts-microbit-map-get)

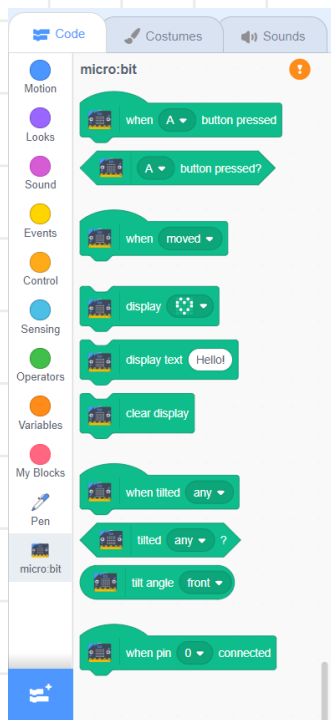


# Make a micro:bit map

You're going to use Scratch to make a computer program that will let you use a micro:bit to control your sprite and create a digital map of an area. You'll be able to tilt the micro:bit to control where the sprite will move, and use the buttons for drawing paths and placing map icons.

## Part one: set up

- 1 Open the Scratch Link program from your **Applications** menu.
- 2 Open the Scratch starter project:
  - If your device is connected to the internet, open the starter project at [rpf.io/scouts-microbit-map-on](http://rpf.io/scouts-microbit-map-on)
  - If your device isn't connected to the internet, open the starter project that's already been downloaded.

- 4 Click on the 'micro:bit' menu, then click on the orange '!'.
 

## Did you know

Digital maps have led to some very interesting discoveries. For example, an amateur satellite archaeologist called Angela Micol is currently researching two potential pyramids in Egypt that she found using Google Earth.

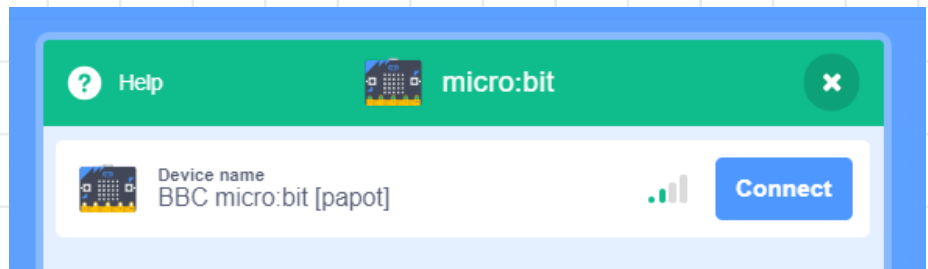
- 3 Make sure that your micro:bit is powered by a USB cable or a battery pack.



# Make a micro:bit map

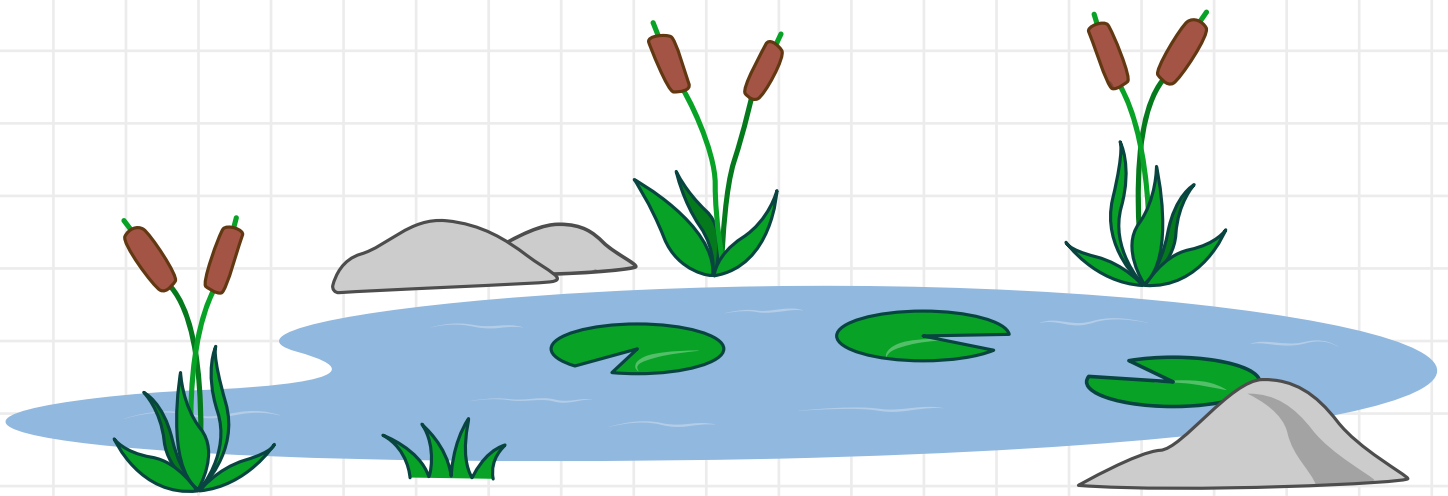
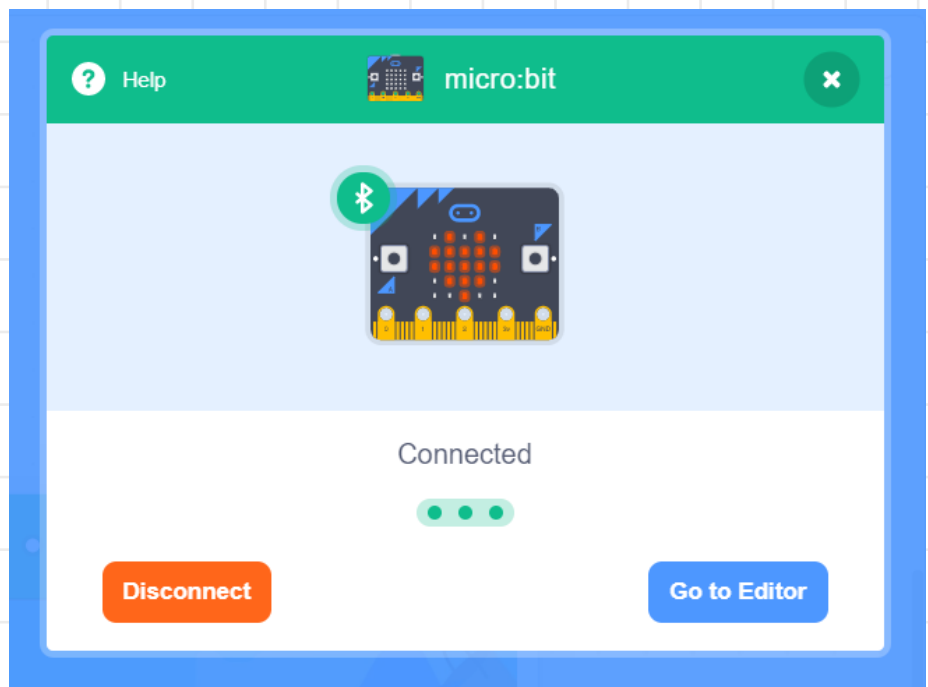
5

- 5** Select your micro:bit (the name should be scrolling on the LEDs) and click on **Connect**.



- 6** Click the **Go to Editor** button to return to the Scratch project.

- 7** Click on the green flag. The Scout sprite should read out the instructions for the map maker program and then shrink down in size.



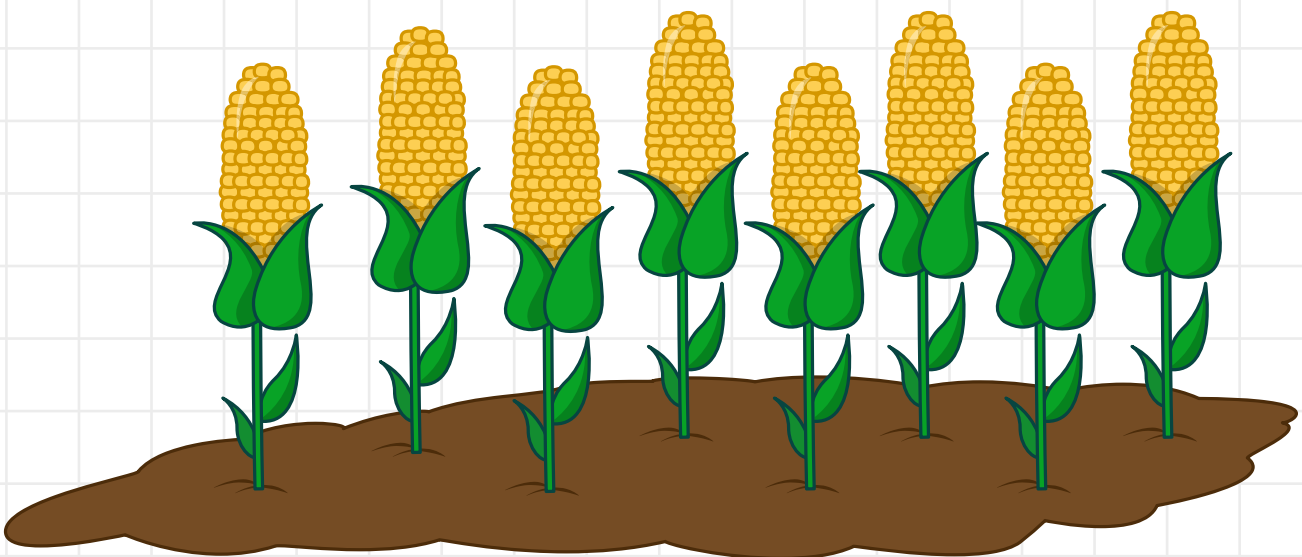
## Part two: move the Scout

In this step, you'll write some code that will control the direction in which the Scout sprite moves, based on the direction in which the micro:bit is tilted.

- 1 Add a **when green flag clicked** block to the program from the 'Events' menu.

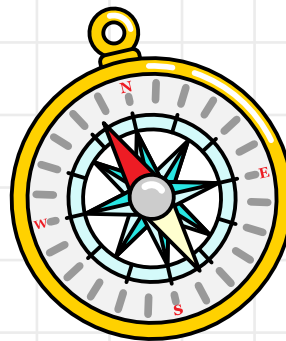


- 2 The program needs to be able to detect any movement of the micro:bit. To do this, it needs to always be listening for events. Add a **forever** loop beneath the **when green flag clicked** block.

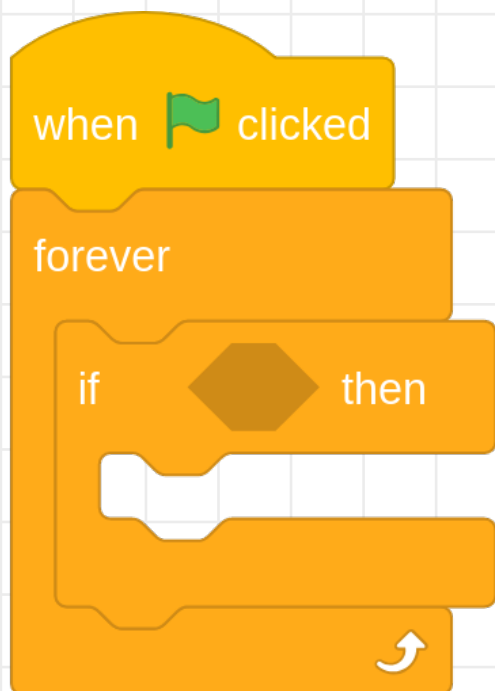


# Make a micro:bit map

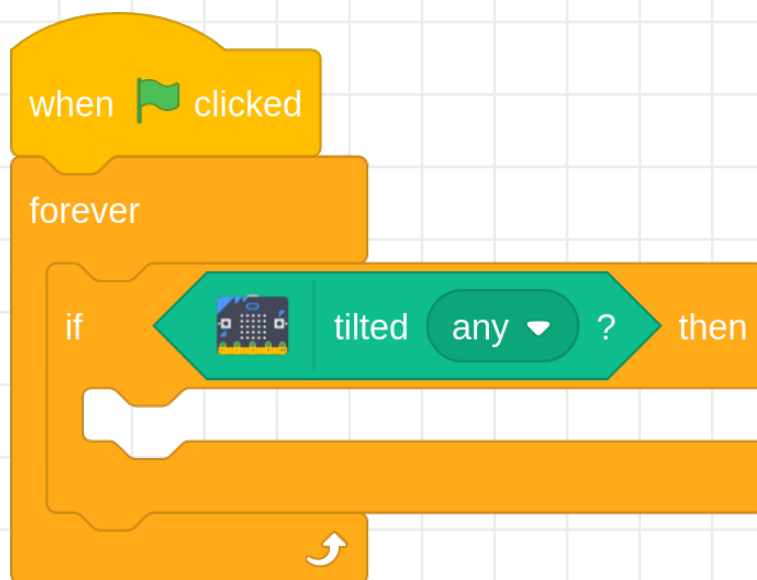
7



- 3** Inside the **forever** loop, add an **if then** block from the 'Control' menu.

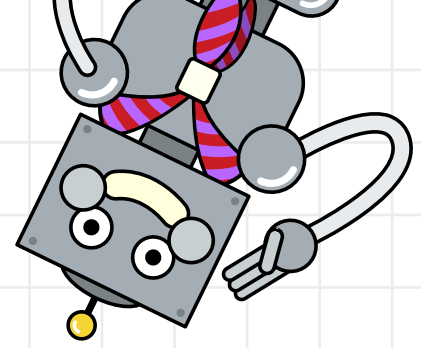


- 4** Now, you can add in a block to detect a tilt of the micro:bit. From the 'micro:bit' menu, find the **tilted any ?** block and place it into the **if then** block.



# Make a micro:bit map

8



**5** Use the drop-down menu within the **tilted any ?** block to change it to **tilted right ?**. Then, within the **if then** block, tell your program to change the **x** position of the sprite. You can find the blocks to change position in the 'Motion' menu.

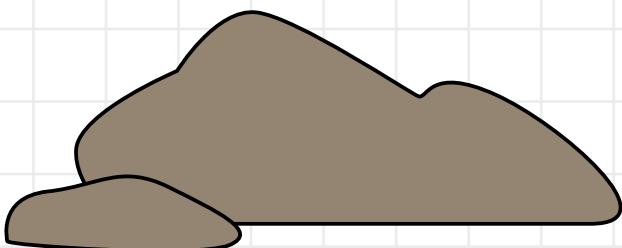
**6** Click on the green flag to run your program. After the sprite reads the instructions, tilt your micro:bit to the right. Your sprite should move across the screen.

**7** Now that the sprite can be controlled in one direction, it's time to add in the other directions. Add in more **if then** and **tilted any ?** blocks, along with blocks to change direction, until your program looks like the program shown on the right.

**8** Run your program again and test that you can use the micro:bit to move your sprite around the screen. If you tilt the micro:bit in two directions, it will move diagonally.

```
when green flag clicked
forever loop
  if tilted right ? then
    change x by 2
```

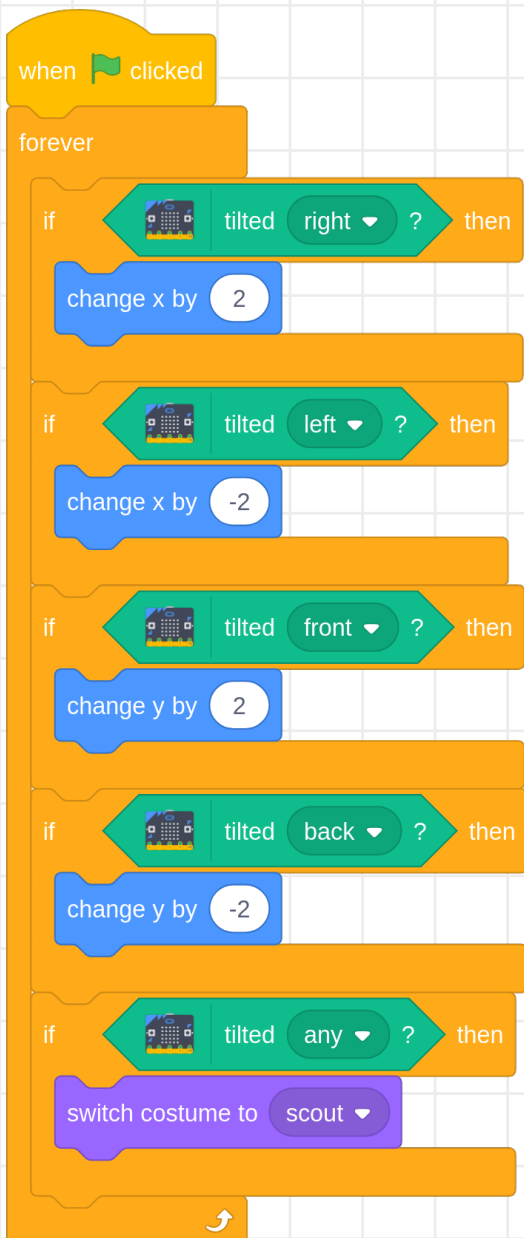
```
when green flag clicked
forever loop
  if tilted right ? then
    change x by 2
  if tilted left ? then
    change x by -2
  if tilted front ? then
    change y by 2
  if tilted back ? then
    change y by -2
```



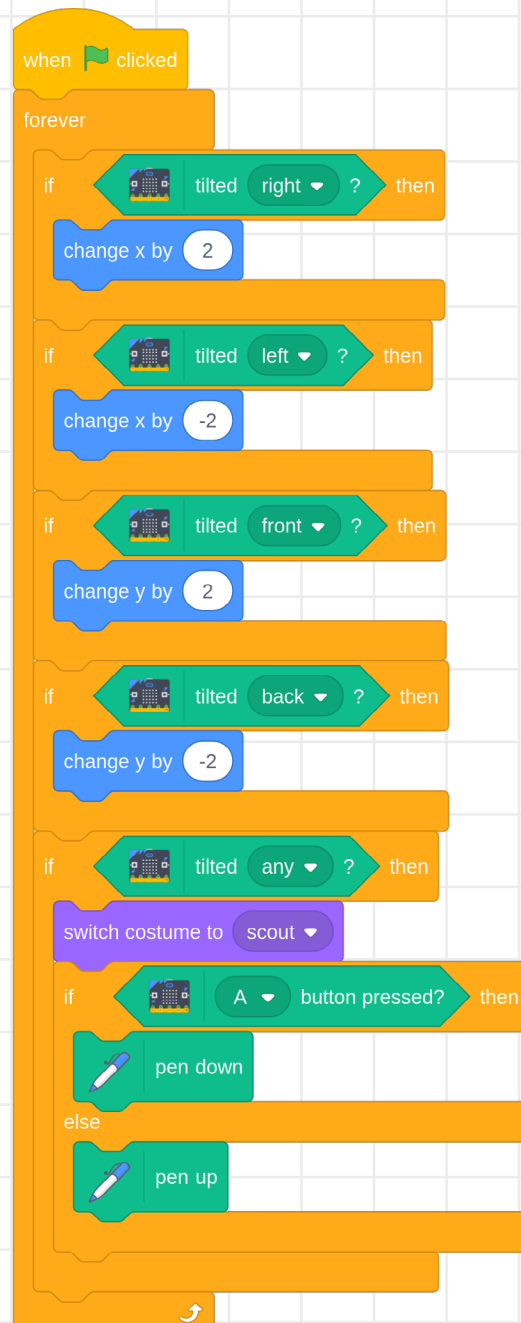
# Make a micro:bit map

9

**9** Later on, you'll add some code to change the Scout's costume. However, when the micro:bit is tilted, you need the costume to change back to the Scout costume. Use a **tilted any ?** block within an **if then** block to make sure that the costume is always a Scout when the micro:bit is tilted. You can find the **switch costume to** block in the 'Looks' menu.

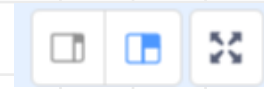


**10** When the micro:bit is tilted and you hold down button A, the Scout should draw a line on the screen, to represent a path or a trail. Add an **if then else** block to your program that detects if the button is pressed, and then places the **pen down** if it is pressed, or lifts the **pen up** if it's not pressed. You can find the blocks to control the pen in the 'Pen' menu.



**11**

Switch into 'Full Screen Control' by clicking on the icon in the top right-hand corner of the screen.

**12**

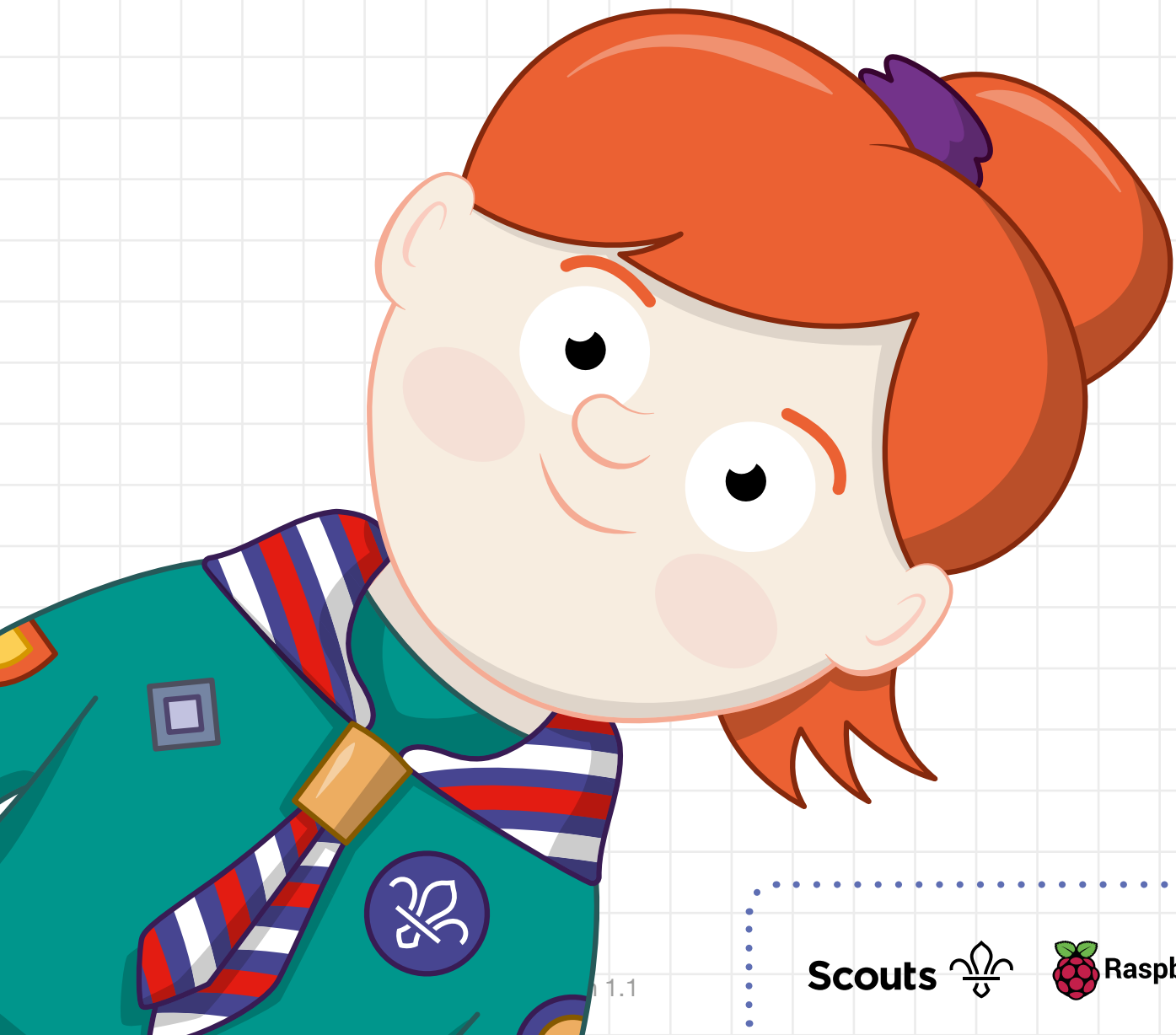
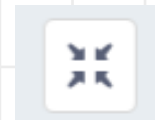
Test your program again. When you hold down **button A** and move the sprite around, it should draw a brown line. When you release the button, it should stop drawing. If the micro:bit is not tilted, then no lines should be drawn.

**13**

Practise drawing lines on the screen using the micro:bit.

**14**

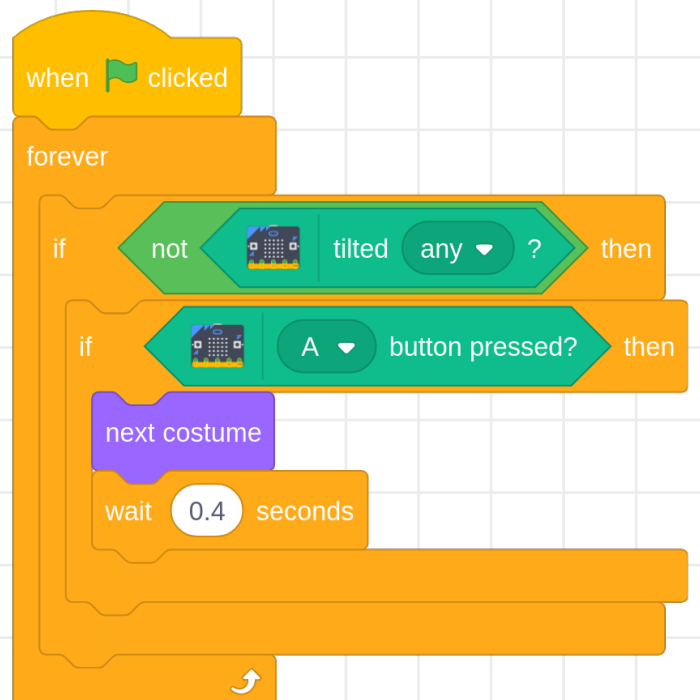
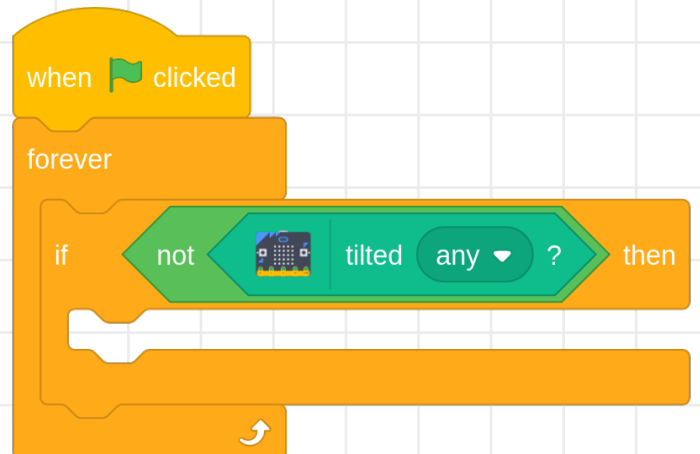
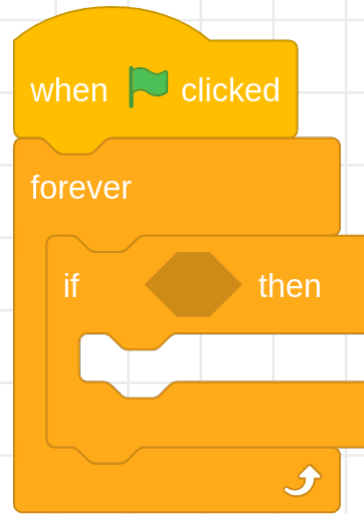
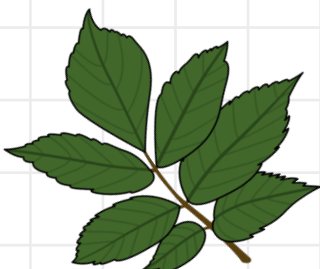
When you've finished testing, click on the icon to switch out of 'Full Screen Control'.



## Part three: add map icons

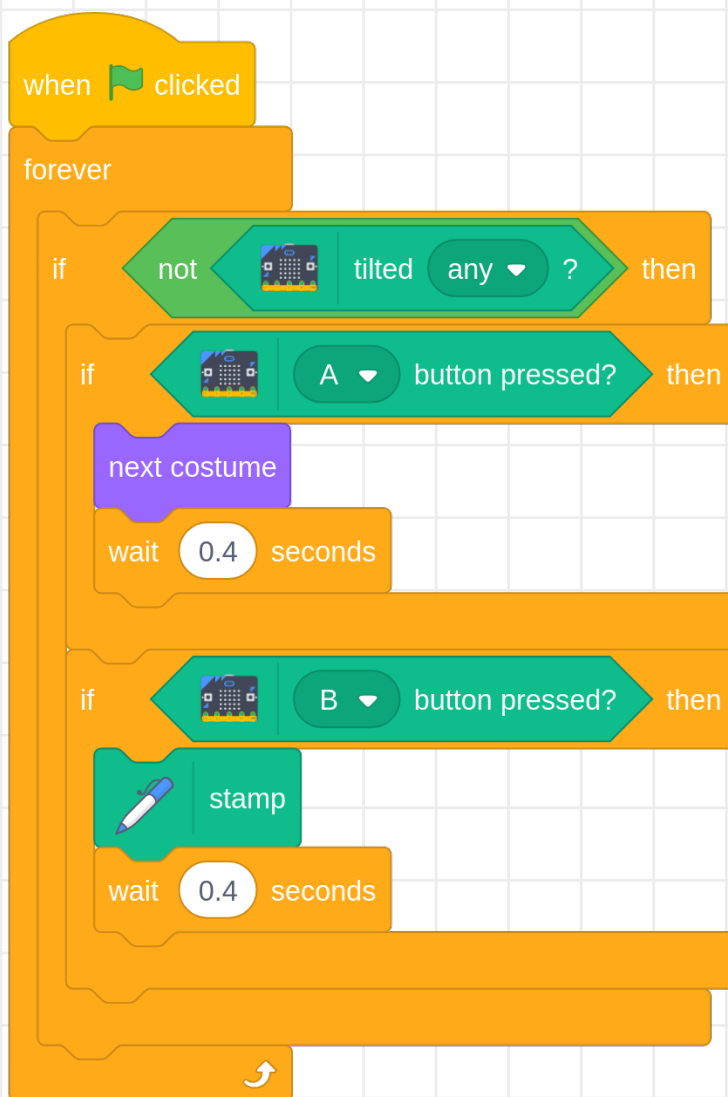
Now that you can move the Scout around the screen and draw trails, it's time to add icons to the map.

- 1 You'll need a new set of blocks for this part of the program, which will listen for button pushes when the micro:bit is not tilted. First, add a **when green flag clicked** block, a **forever** block, and an **if then** block.
- 2 To detect that the micro:bit isn't being tilted, you can use a **not** block. You can find this in the 'Operators' menu.
- 3 Add blocks so that when you press **button A**, the sprite cycles through its costumes, and then **waits** briefly. You can find the blocks that you need in the 'Controls' and 'Looks' menus. You currently have lots of different map sprites, as well as a white square that you can use to erase stamps. You can add more costumes later if you like.



**4** Test that your code works: move the micro:bit around, and then hold it flat and press **button A**. When you tilt the micro:bit again, the costume should change back to the Scout sprite.

**5** Next, add blocks so that when you press **button B**, the costume that's displayed is stamped on the Stage. You can find the **stamp** block in the 'Pen' menu.

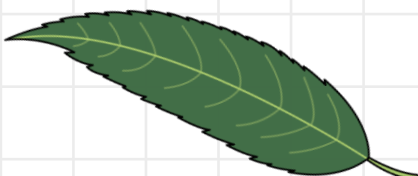
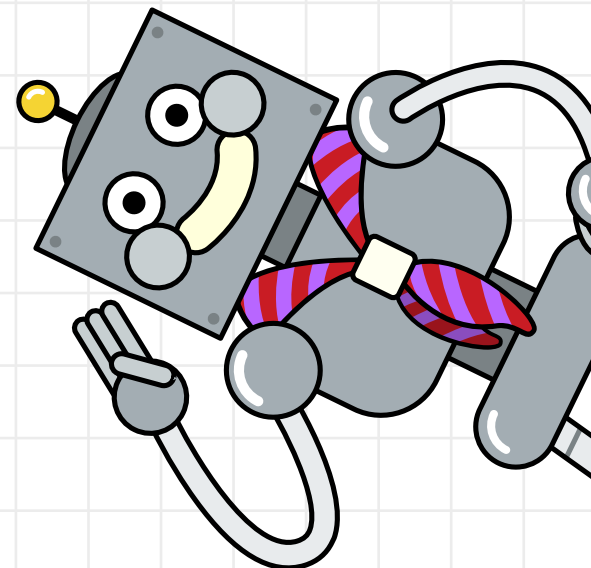


**6** Now that your program's finished:

- You should be able to move your sprite around by tilting the micro:bit.
- When you hold the micro:bit level, you should be able to use **button A** to change costumes to any of the map icons, and **button B** to place the icons on the Stage.

**7** Try to create your own map of a place that you've visited, or design your own map of your perfect campsite.

**8** When you've finished drawing your map, you can right-click on the Stage and click on **Save image as...** to keep your map. If you like, you could then print it off.



## Tip

People may find it easier to hand-draw their maps first, or to attempt to copy a map that has been provided for them.

## Sharing

You can share the games on the Scratch website by logging in and using the 'Share' option.

## Reflection

You can talk about how digital cartography (map making) has changed everyone's lives over the last few years:

- Online maps with photographic overlays allow people to view an area with a high level of detail.
- Route-finding algorithms allow computers to plan fast and efficient routes between two points.
- Digital maps in combination with GPS technology allow people to know their exact location along a route at any given time.

Ask the young people in your group to think about how often they use digital maps, for example, in the car or on a walk.

