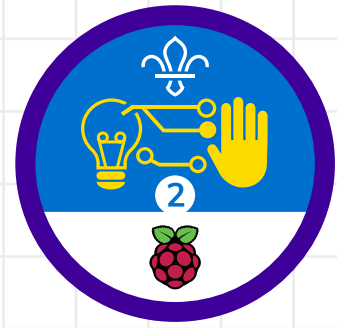


# micro:bit make a map

1



## Outcomes

Young people develop a range of practical and contemporary skills which are useful in their school, work and social life.

## Overview

This activity fulfills **Stage 2, Requirement 2** of the **Digital Maker Staged Activity Badge** ('Create a simple computer program to help with a Scouting activity, and try it out') and Stage 2, Requirement 4 of the Navigator Staged Activity Badge.

Young people will use Scratch and a micro:bit to draw a map of a wilderness area that they have 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).



45 minutes



Flexible (ideally two young people per 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 access to WiFi, you will also need to download the software and starter project ahead of time. You may also wish to print handouts.



Wherever you have computer access

## 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
- Per group:
  - One laptop or desktop computer
  - One micro:bit
  - One USB A to micro USB B cable

## If your meeting place has WiFi

- 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 WiFi

- Download the Scratch Desktop application beforehand; refer to 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 beforehand. You can find instructions at [rpf.io/scratch-link](https://rpf.io/scratch-link).

## Key messages



- External inputs, such as buttons as 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 on which images can be drawn.

## Leader instructions

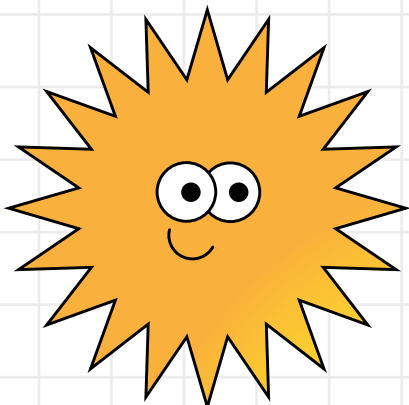


- 1** Download the Scratch Link software and install the Scratch micro:bit HEX code on the micro:bits beforehand. You can find instructions at [rpf.io/scratch-link](https://rpf.io/scratch-link).
- 2** Discuss digital arts programs that the young people may have used, such as Microsoft Paint, and how you 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, and that the young people are going to make a program that will allow them to draw their own maps.
- 4** If they have not used them before, introduce the young people to the micro:bit. Explain that micro:bits not only have two buttons (for input), they are also able to sense which way they are tilted.
- 5** Demonstrate how to start the Scratch Link software.
- 6** Demonstrate how to connect the micro:bit to the computer and open Scratch (online or offline), and then the starter project.



**Scratch Link**

Trusted Microsoft Store app



## Alternatives



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

## Safety



Supervise young people when they're online. Give safety advice, and remind them about staying safe online at home.

## Adaptability



- If you do not have access to micro:bits, the resource could be adapted to use keyboard control to move the Scout around the map.
- More advanced learners can extend their projects by adding more sprites.
- For very advanced learners who are familiar with Scratch, the key concepts in this resource could be adapted 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.

## Leader instructions

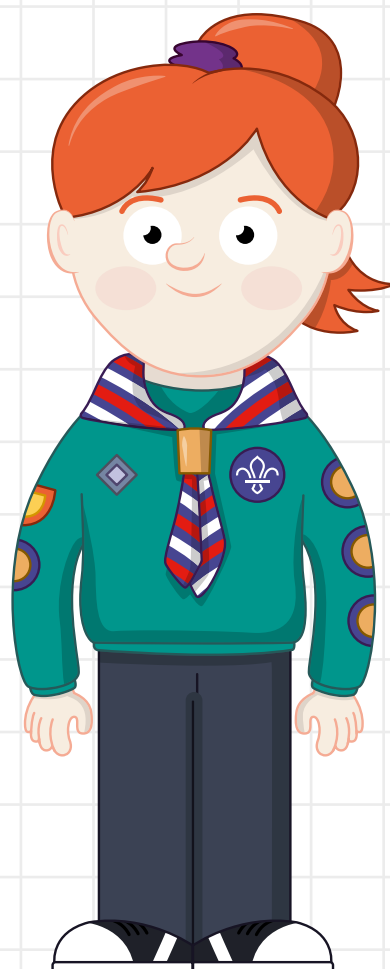
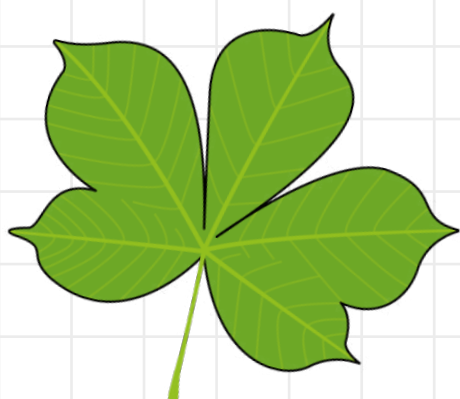
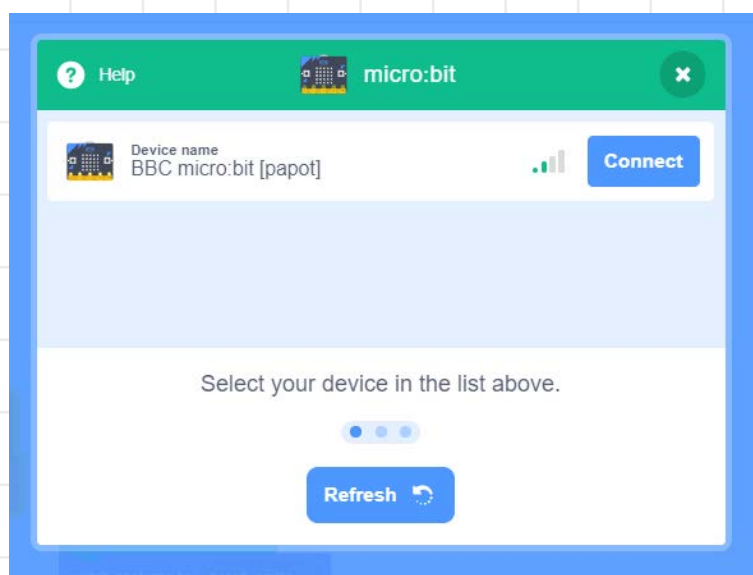


**7** Demonstrate how to use the Scratch Link software to connect the micro:bit.



**8** With the instructions on the printout, the young people will create code in Scratch which will allow them to use their micro:bits to draw a map.

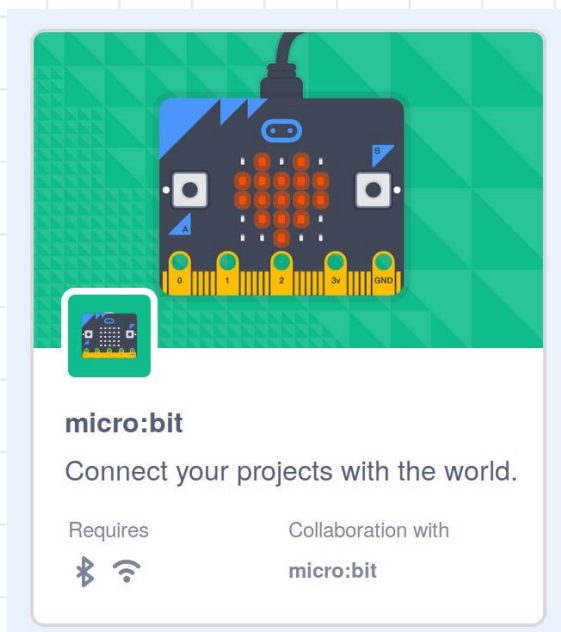
**9** Once the project is complete, young people can use their program to create their own custom maps of a campsite environment that they have visited.



You are going to use Scratch to make a computer program that will let you use a micro:bit to control your sprite, and then create a digital map of an area you have visited or will be visiting. 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 down map icons.

## Part 1: Set up

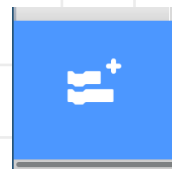
- 1 Open the Scratch Link program from your **Applications** menu.
- 2 Open the Scratch starter project:
  - If your device is connected to the internet: open the starter project at [rpf.io/scouts-microbit-map-on](https://rpf.io/scouts-microbit-map-on).
  - If your device is not connected to the internet: open the starter project that your leader has downloaded.
- 5 Then, select the micro:bit extension.



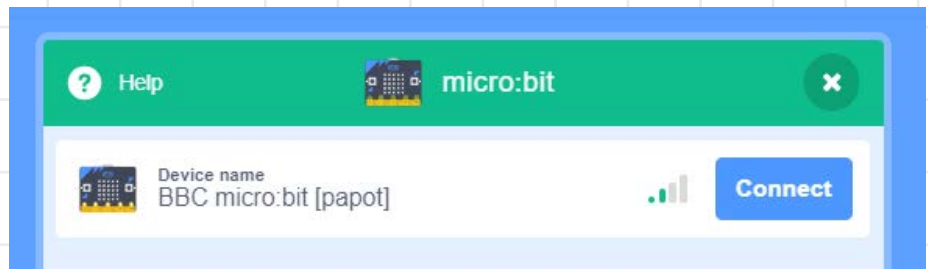
## Did you know?

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 Ensure that your micro:bit is powered by a USB cable or a battery pack.
- 4 Return to the Scratch starter project. Click on the icon in the bottom left-hand corner of the screen to open the 'Extensions' menu.

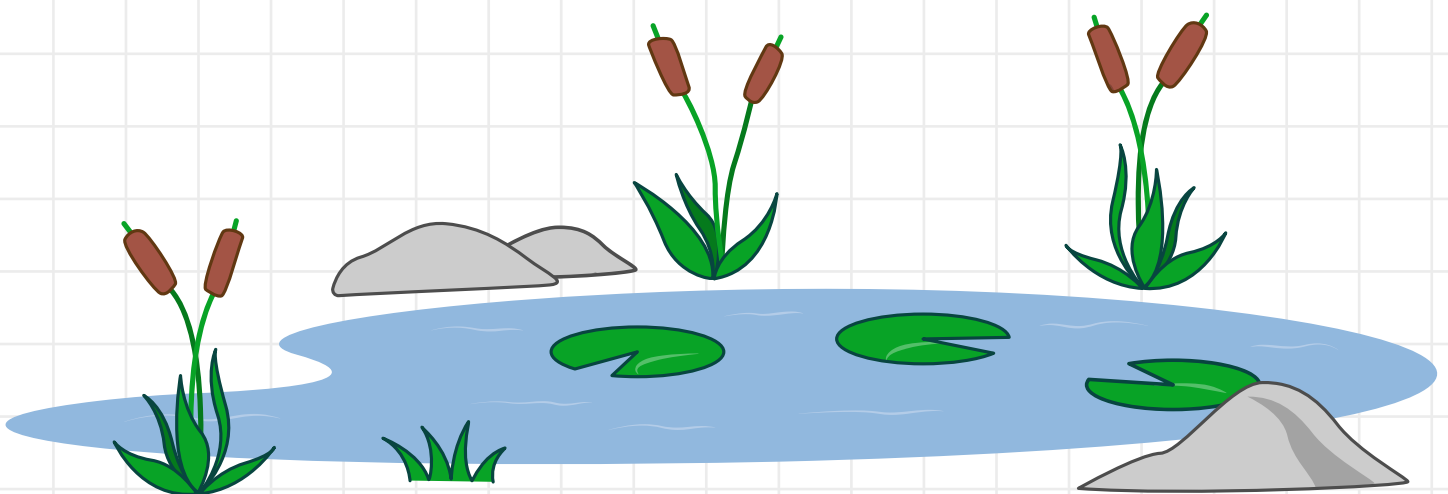
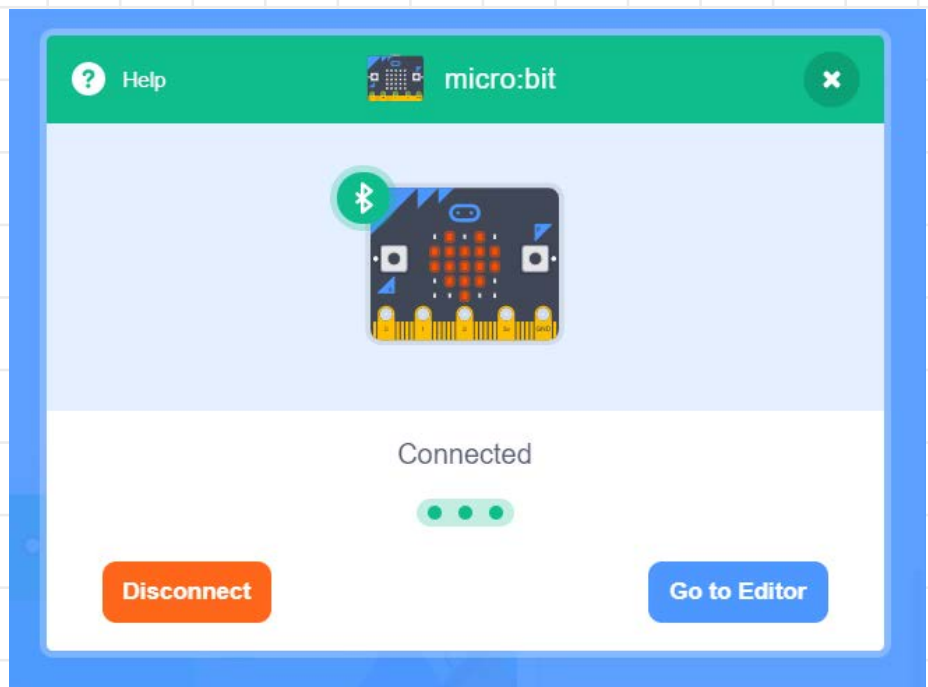


- 6 Select your micro:bit (the name should be scrolling on the LEDs) and click on 'Connect'.



- 7 Click the 'Go to Editor' button to return to the Scratch project.

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



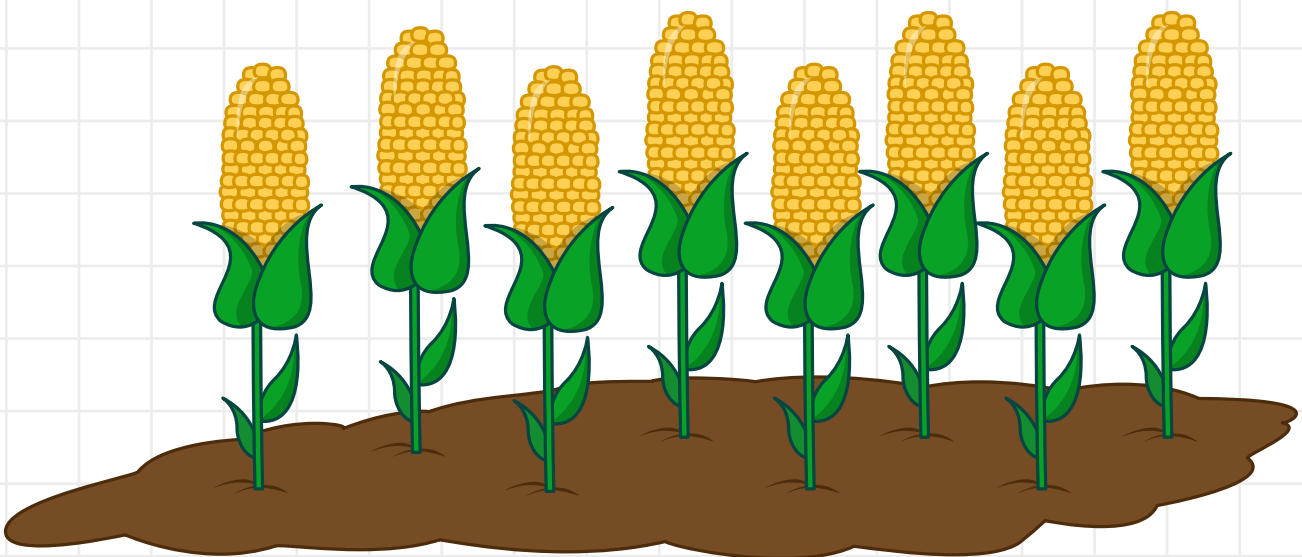
## Part 2: Move the Scout

**In this step, you will 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.



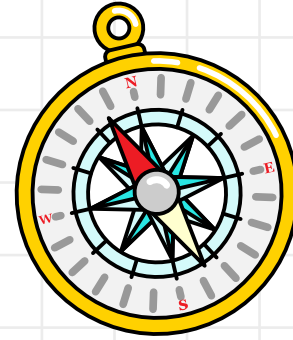
- 2 The program needs to be able to detect any movement of the micro:bit. To do this, it needs always be listening for events. Add a forever loop beneath the when green flag clicked block. You can find the block in the 'Control' menu.



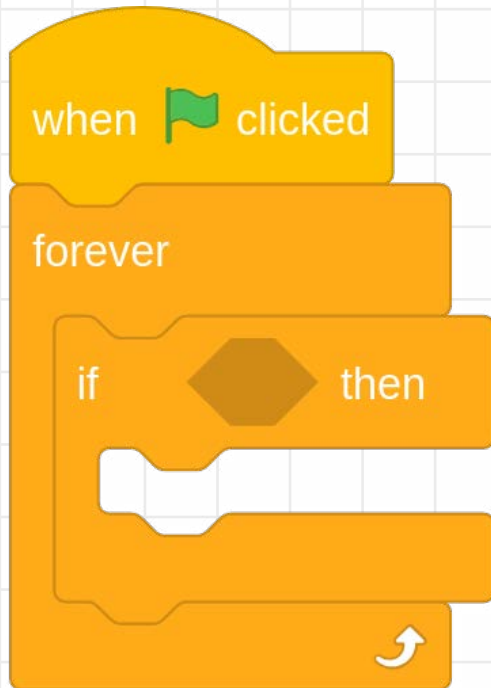


# micro:bit make a map

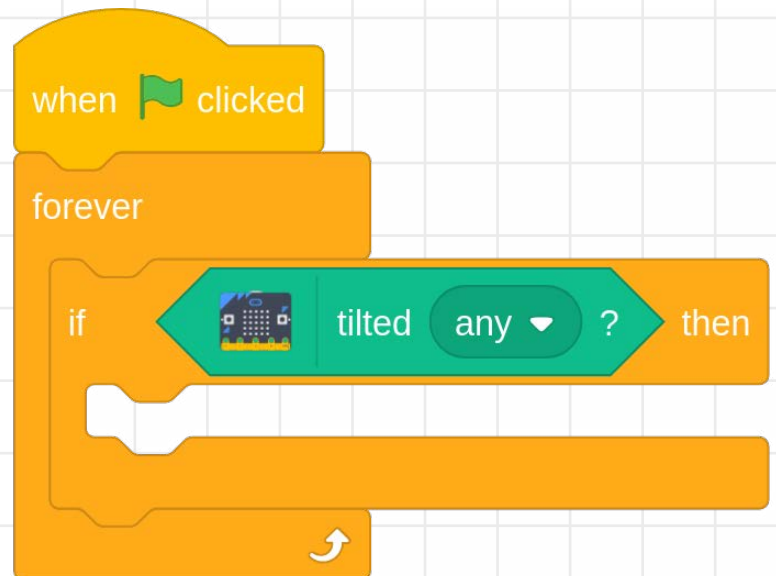
7

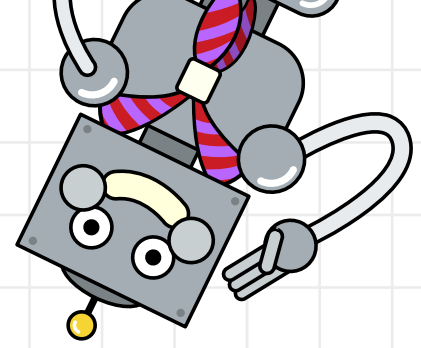


- 3** Inside the forever loop, add an if then block from the 'Control' menu.



- 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.



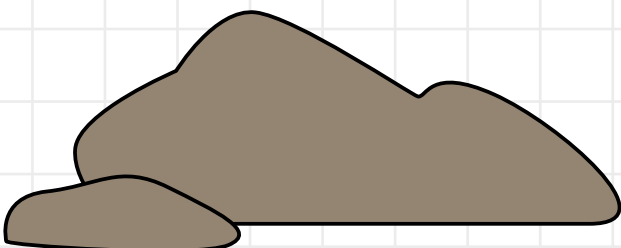
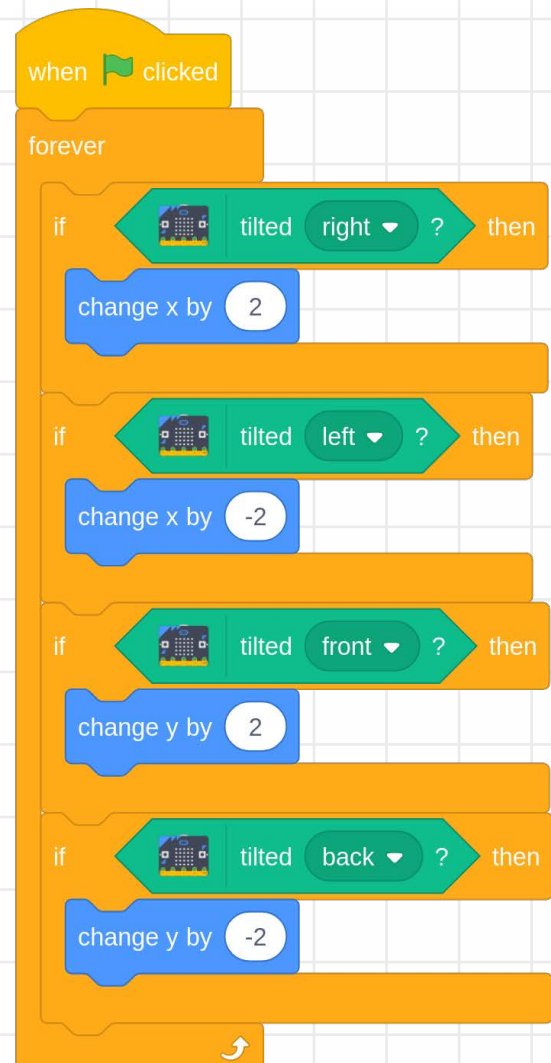
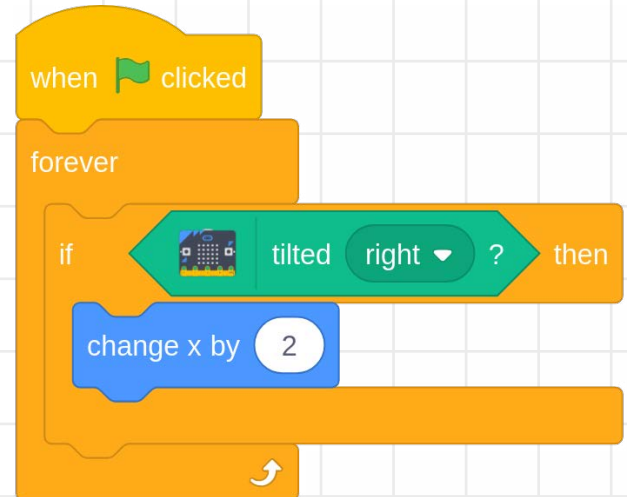


**5** Use the drop-down menu within the tilted any ? block to change it to tilted right ?. Then, within the if then block, tell your program to change the x position of the sprite. You can find the blocks to change position in the 'Motion' menu.

**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 is time to add in the other directions. Add in more if then and tilt 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. You will see that if you tilt the micro:bit in two directions, it will move diagonally.



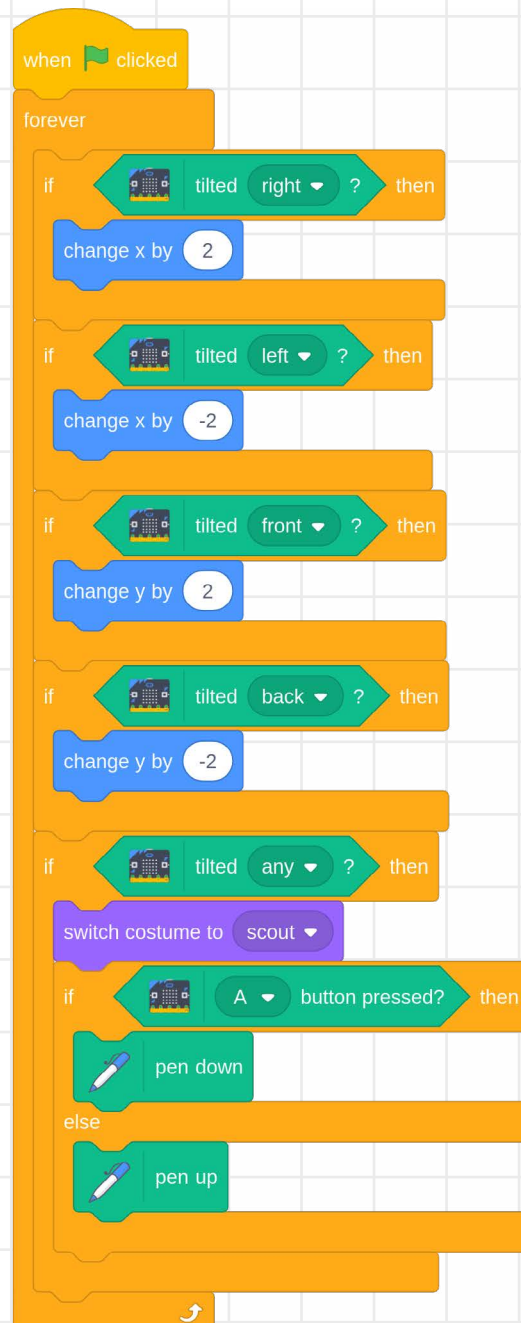
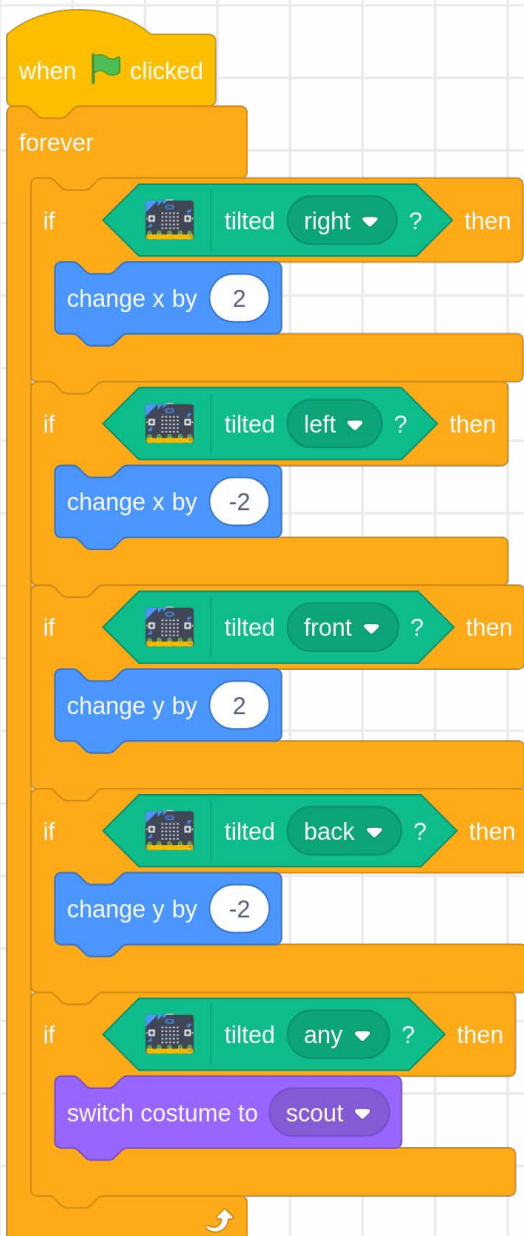


9

Later on, you will 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 **tilt 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 is not pressed. You can find the blocks to control the pen in the 'Pen' menu.

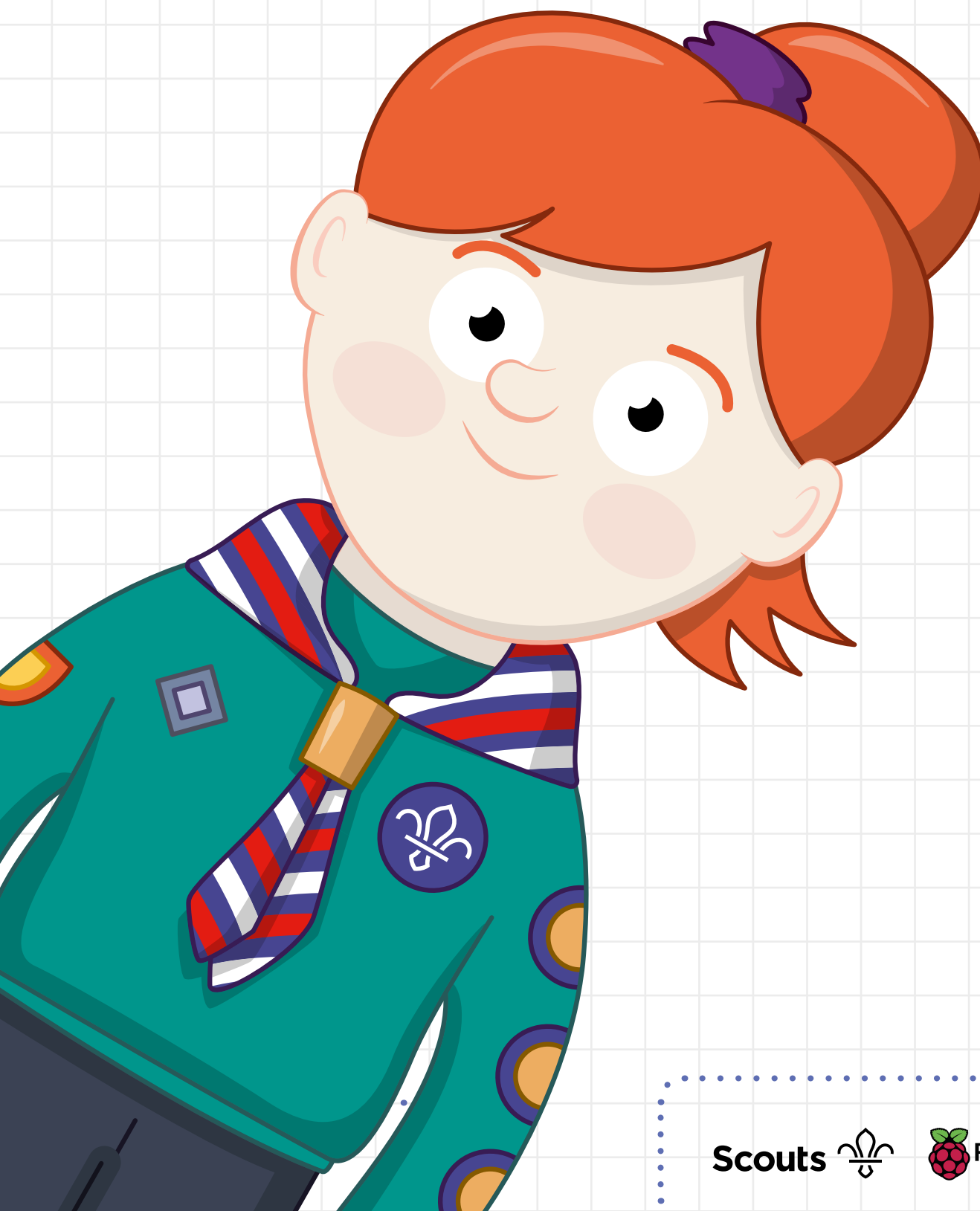


## 11

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.

## 12

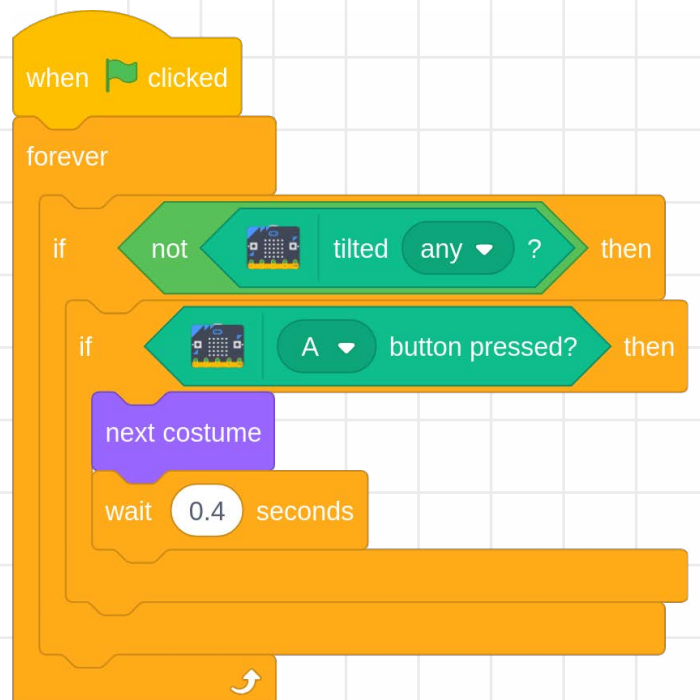
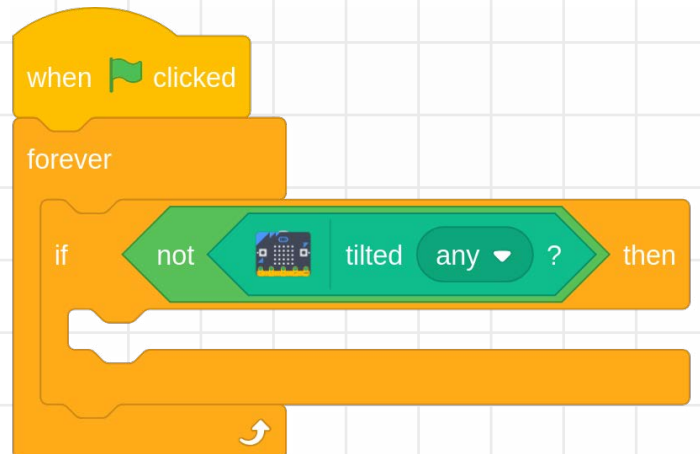
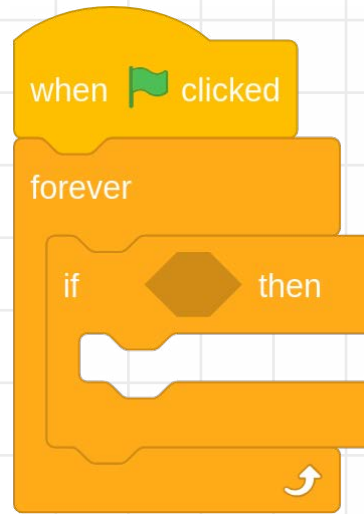
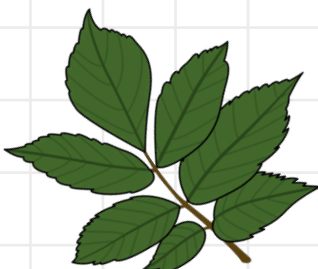
Practise drawing lines on the screen using the micro:bit.



## Part 3: Add map icons

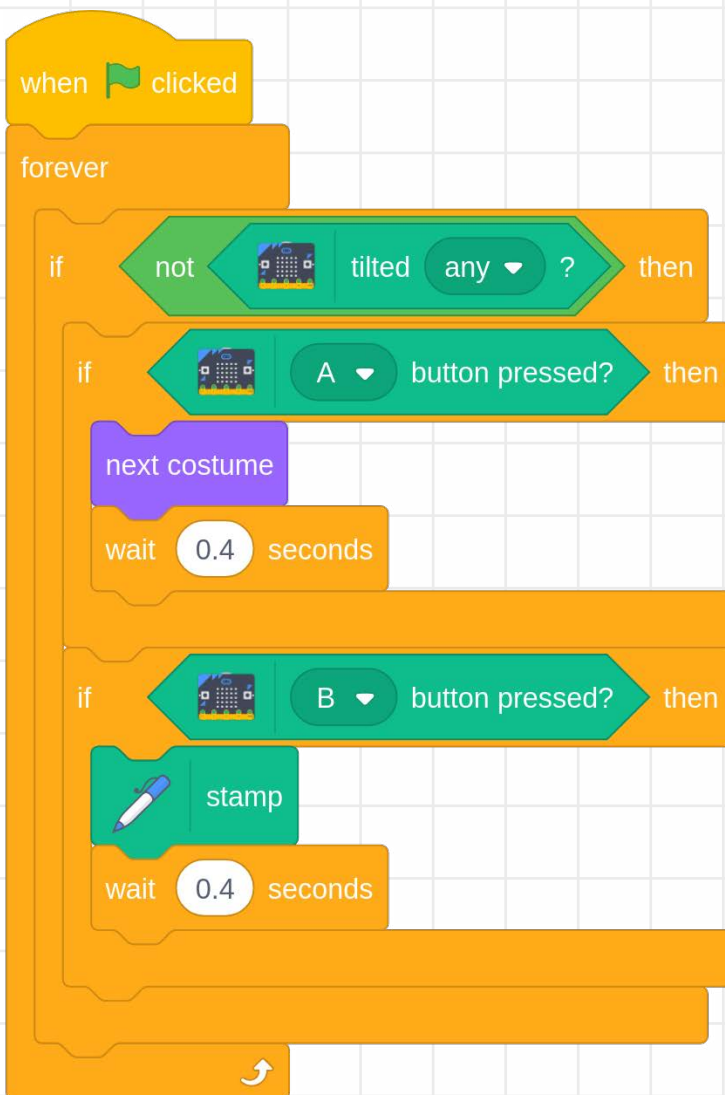
Now that you can move the Scout around the screen and draw trails, it is time to add icons to the map.

- 1 You will 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 is not 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 a tree, a hill, a campsite, and 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 is displayed is stamped on the Stage. You can find the stamp block in the 'Pen' menu.

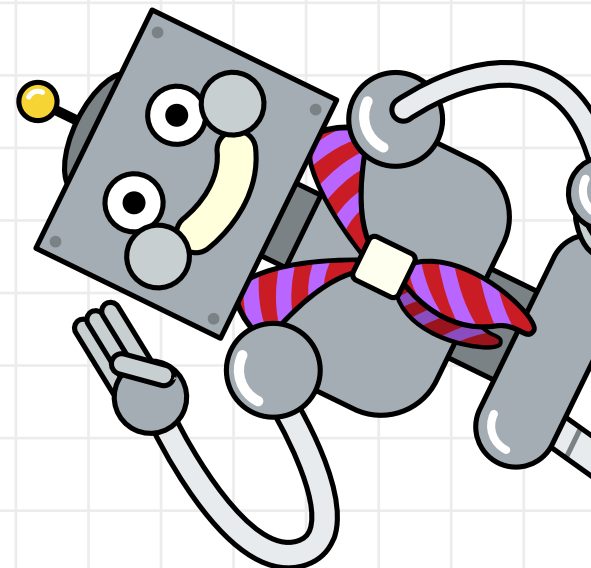
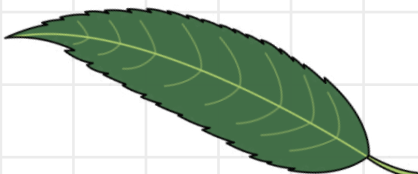


**6** Now, your program is complete:

- 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 use **button B** to place the icons on the Stage.

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

**8** When you have 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

The young 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 has changed all our 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.

