

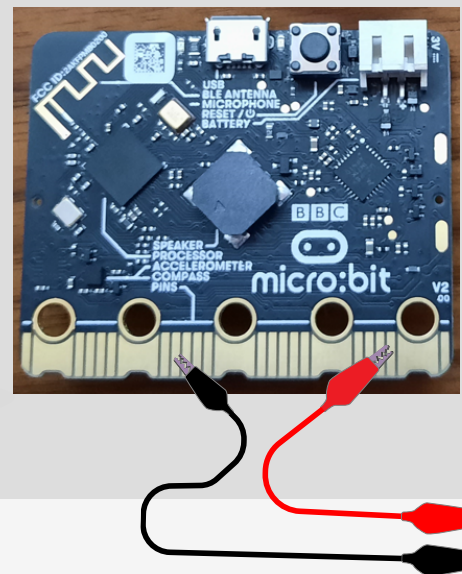
**Explore *our*  
*growing brain* by  
testing your  
reaction rate with  
the Micro:bit**

# OUR GROWING BRAIN

## Micro:bit Activity

### MATERIALS

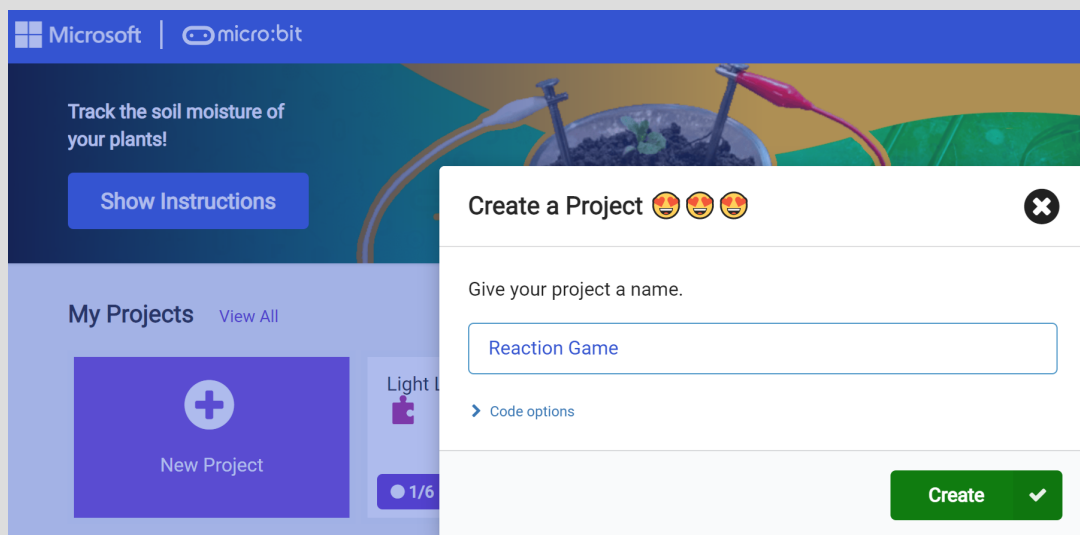
- [Micro:bit](#)
- A device to make the code.
- [MakeCode website](#).
- 4 crocodile clips & leads
- 2 pieces of cardboard
- 4x pieces of aluminium foil
- Sellotape
- Scissors
- Marker pen



### METHOD

1

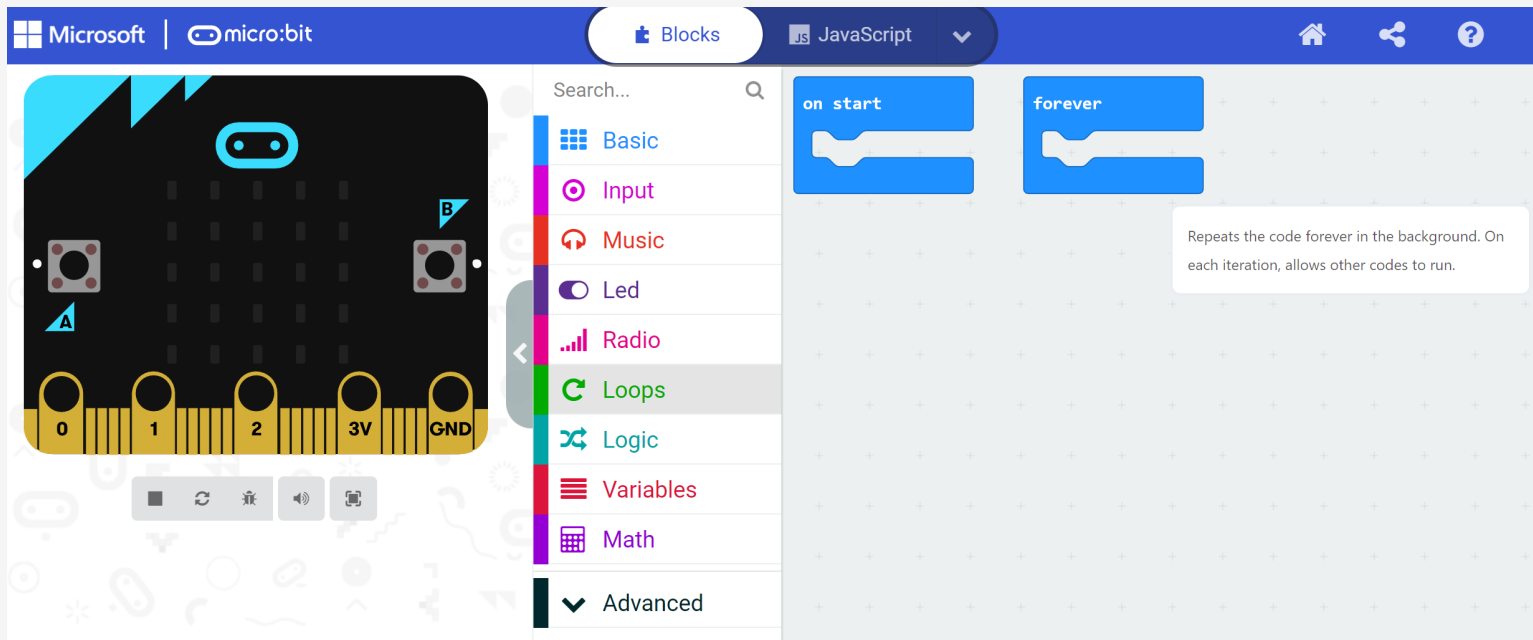
- Open the [tutorial](#) in one browser tab and the [MakeCode website](#) in a second tab.
- On the MakeCode website, click on New Project.
- Name the project "Reaction Game". Click "Create".



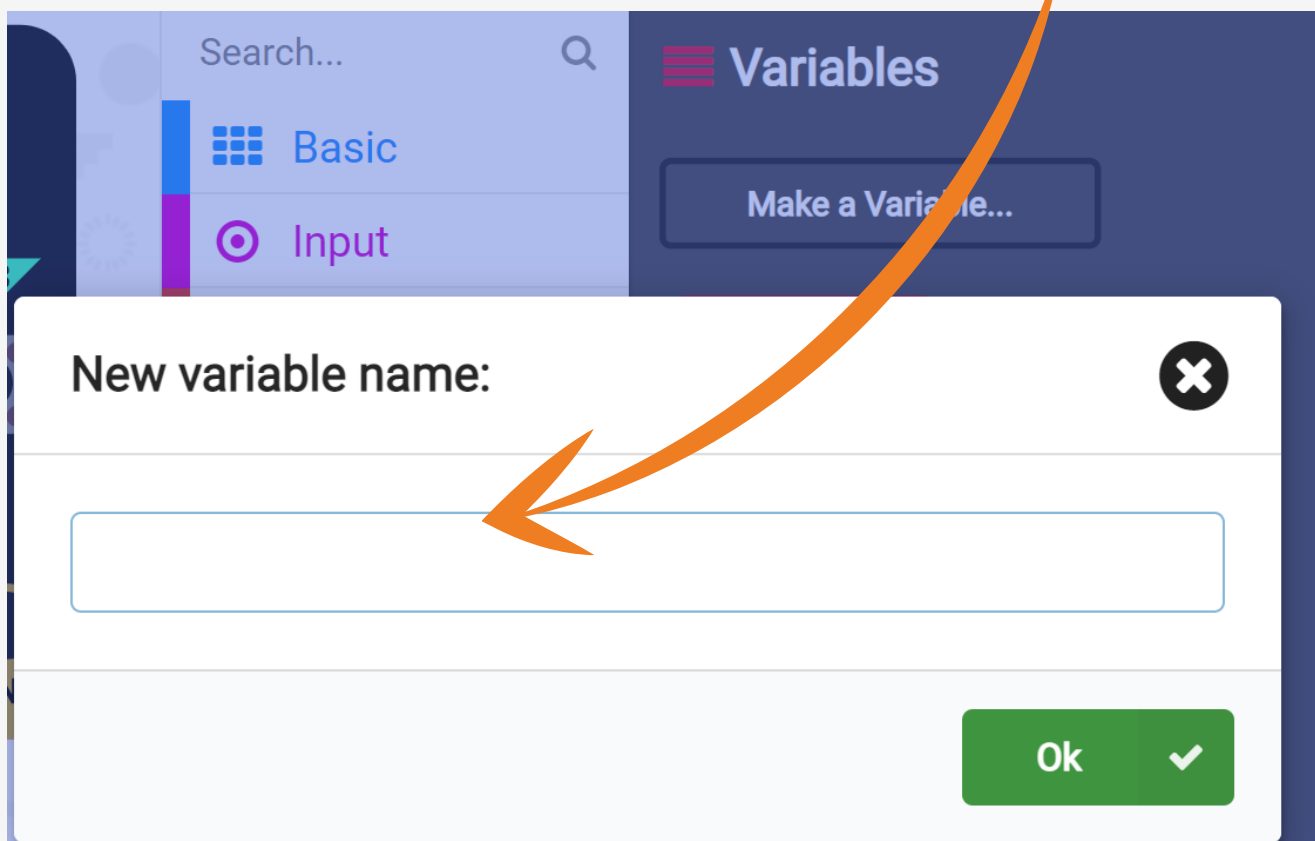
2

Use the tutorial to create the code on the MakeCode project window. Alternatively, use the step-by-step instructions below.

1. Click on "loops" and then "forever".



2. Click on "Variables" and "Make a variable". Name this "Game started".

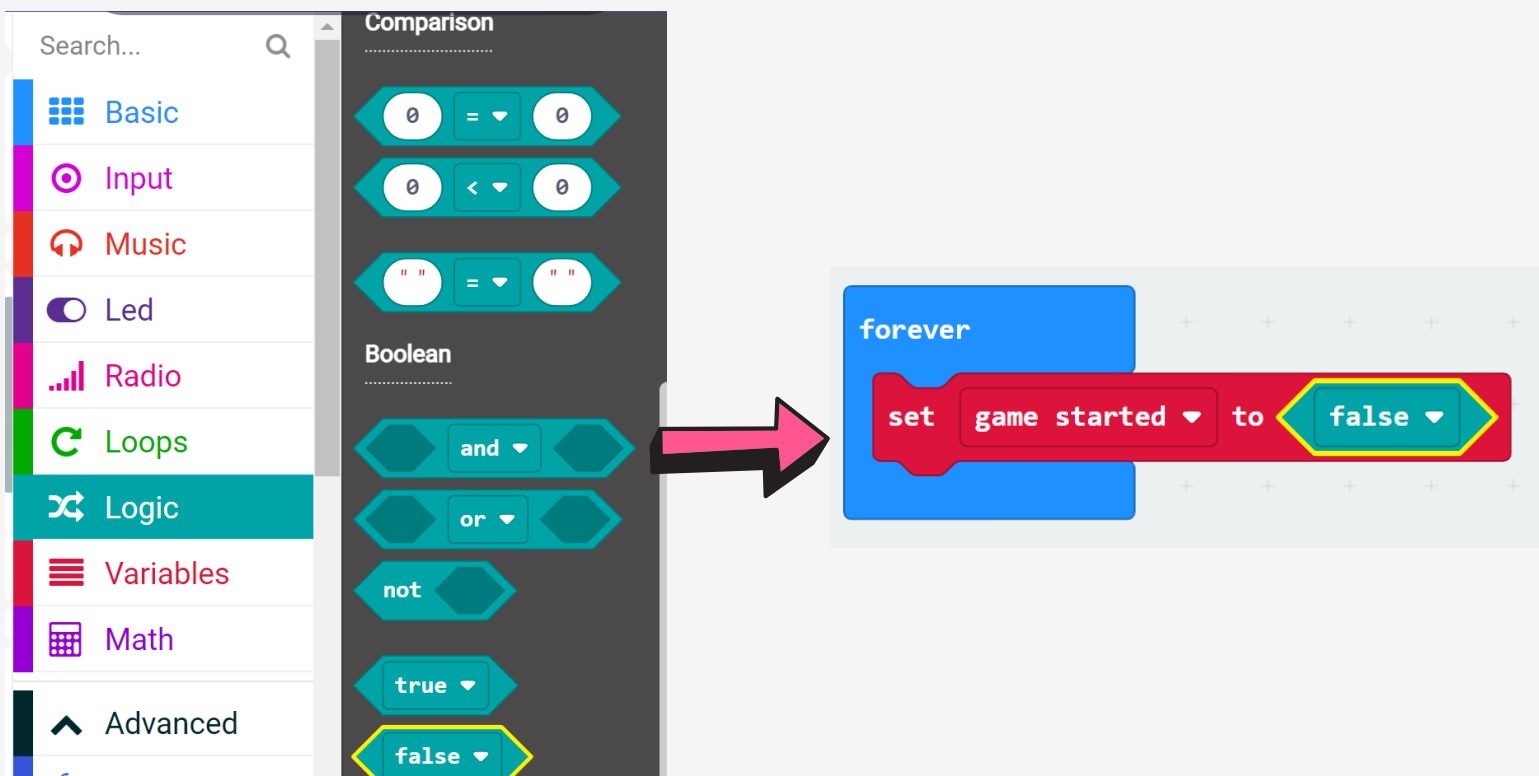


3. Click on Variables → Select the option highlighted in yellow in the image below.



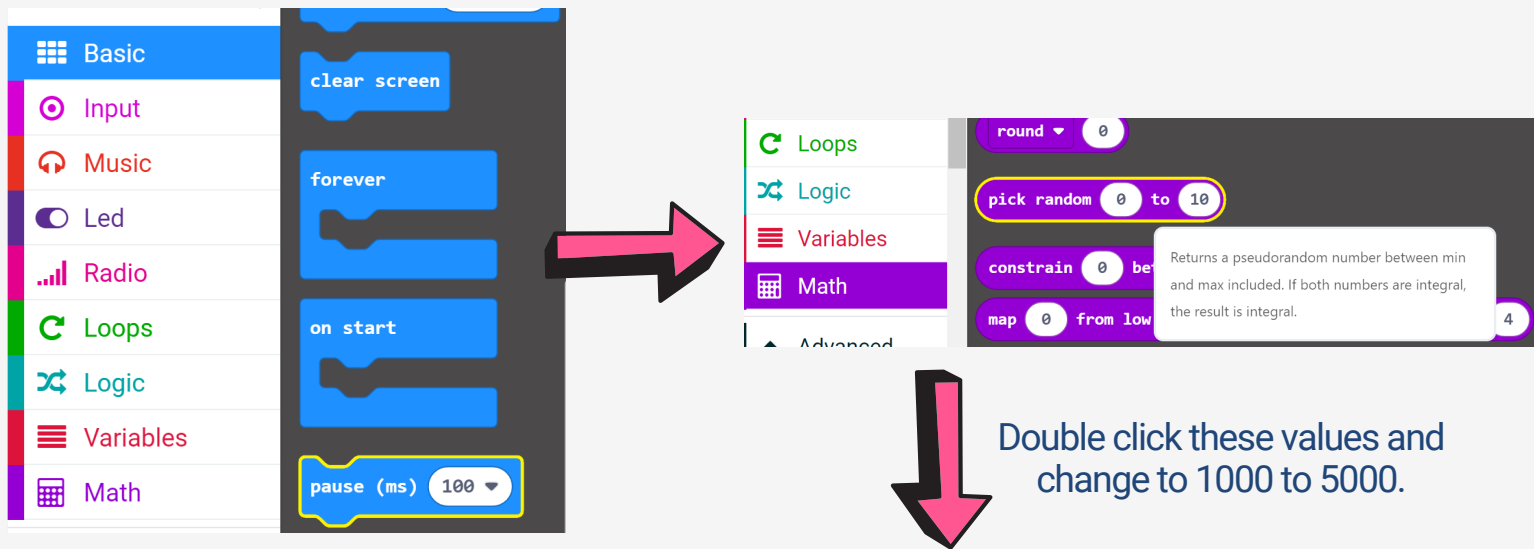
4. Drag the red code inside the "forever loop". Then, click on "Logic" and scroll down until you see "False". Click on "False". and drag it to replace "0" in the red code.

*You will notice that the code is all colour-coded.*

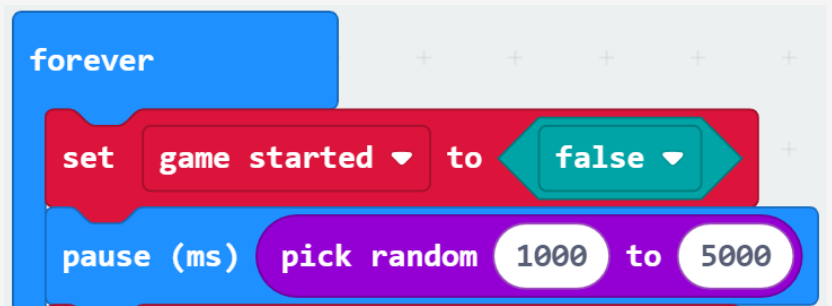


5. Click "Basic" -> "Pause". Insert this into the forever loop.

Click "Math" and "pick random 0 to 10". Drag this into the position as shown in the image below.

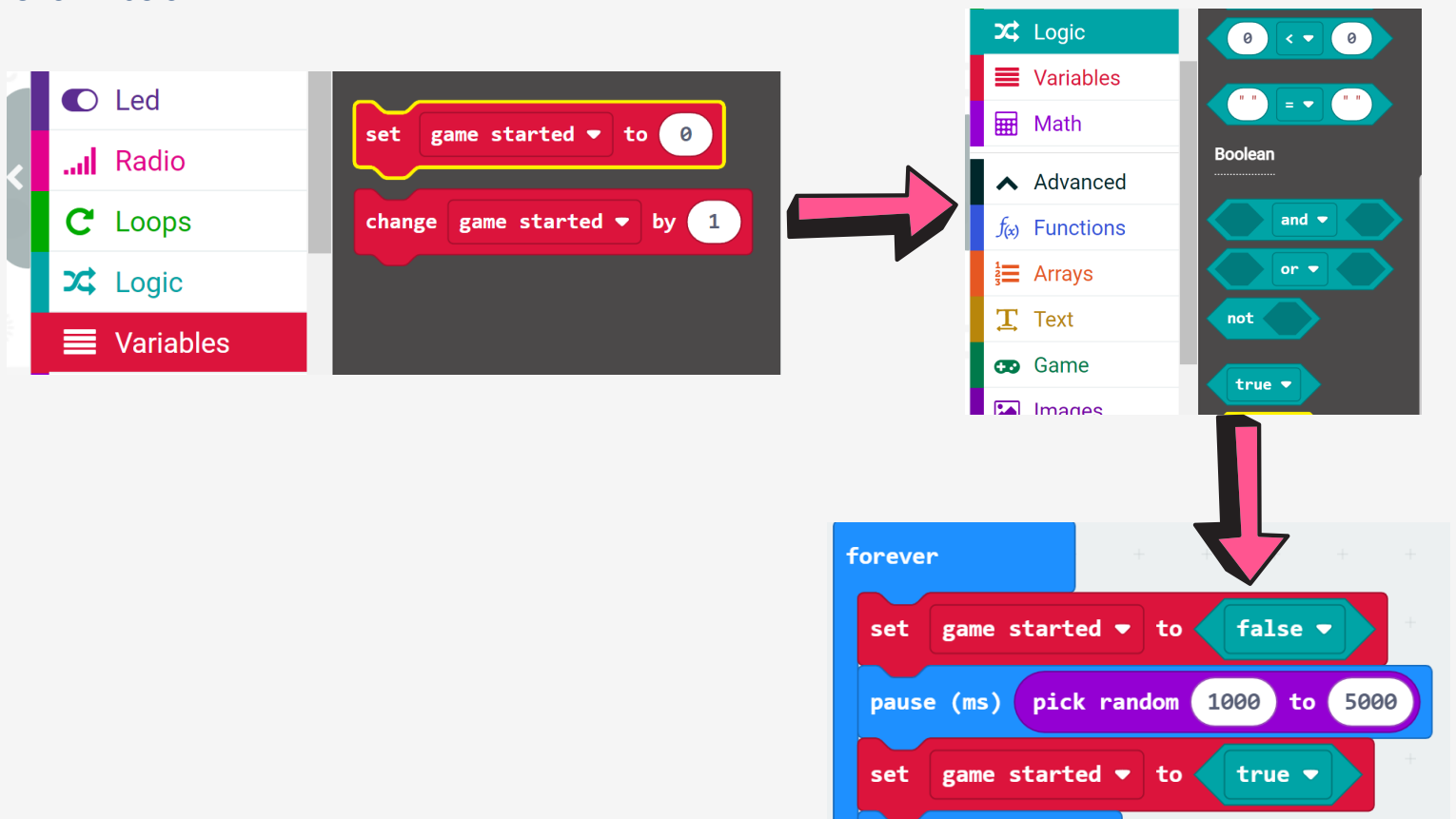


The image shows the Scratch block palette on the left with categories: Basic, Input, Music, Led, Radio, Loops, Logic, Variables, and Math. A 'forever' loop block is highlighted in the 'Basic' category. A pink arrow points from the 'forever' block to a 'pause (ms)' block with the value '100'. Another pink arrow points from the 'Math' category to a 'pick random 0 to 10' block. A tooltip for the 'pick random' block reads: "Returns a pseudorandom number between min and max included. If both numbers are integral, the result is integral." Below these elements, a pink arrow points down to the text: "Double click these values and change to 1000 to 5000."



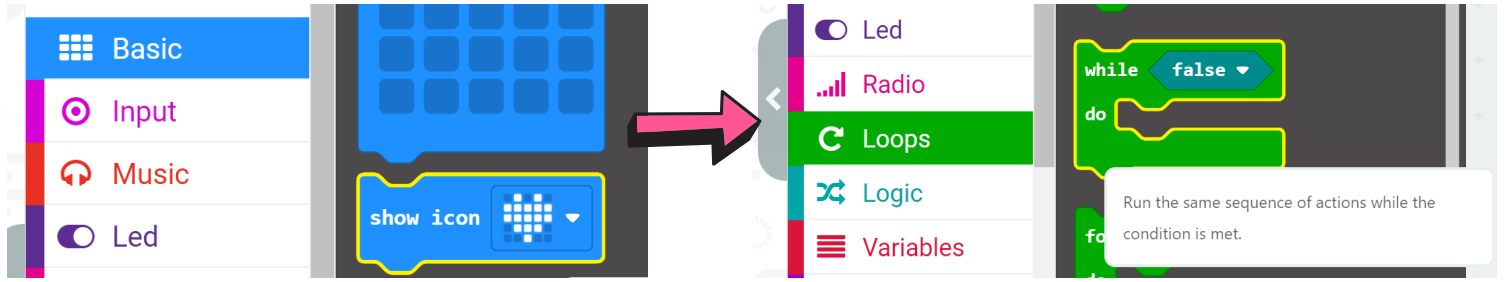
The image shows a 'forever' loop block containing two sub-blocks. The first is a 'set game started to false' block. The second is a 'pause (ms) pick random 1000 to 5000' block. The values '1000' and '5000' are highlighted in a purple box.

6. Select "Variables" -> "set game started to 0". Select "Logic" -> "true". Drag "True" into the position shown below.

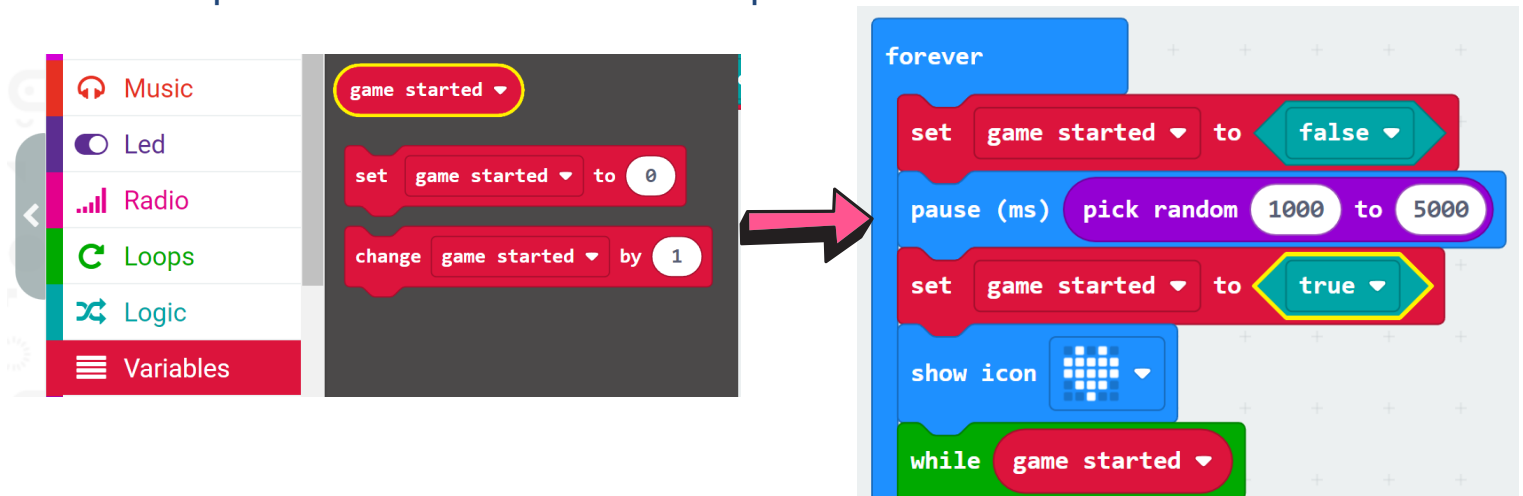


The image shows the Scratch block palette on the left with categories: Led, Radio, Loops, Logic, and Variables. A 'set game started to 0' block is highlighted in the 'Variables' category. A pink arrow points from this block to the 'forever' loop block in the previous image. Another pink arrow points from the 'Logic' category to a 'true' block. Below these elements, a pink arrow points down to the text: "Drag 'True' into the position shown below." The final image shows the 'forever' loop block with three sub-blocks: 'set game started to false', 'pause (ms) pick random 1000 to 5000', and 'set game started to true'. The 'true' block is highlighted in a purple box.

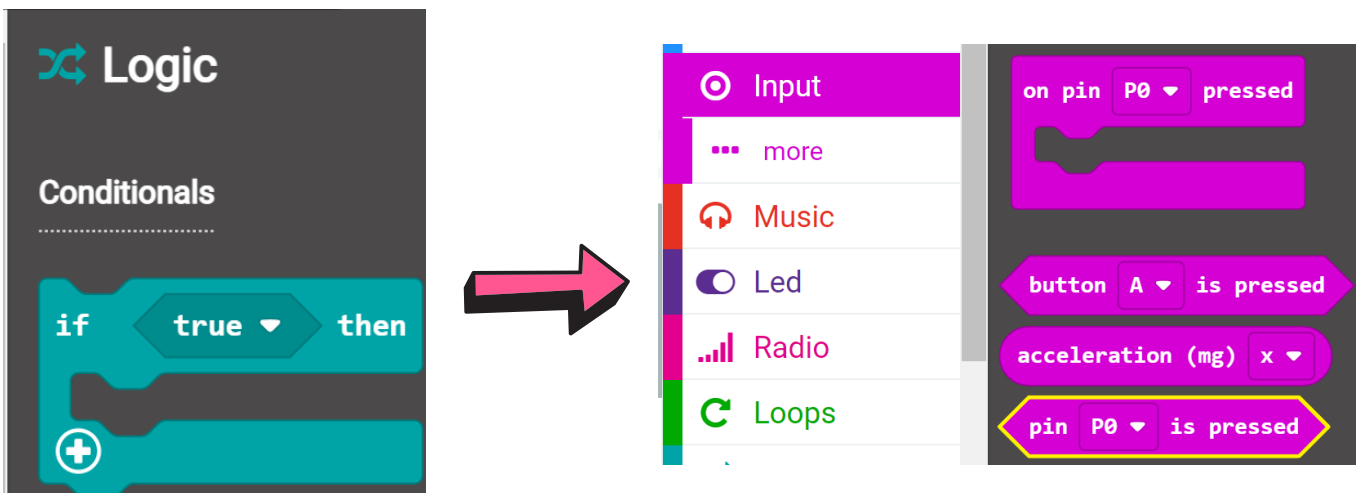
7. Click "Basic" -> "show icon". Then click "loops" -> "while..." as shown below.



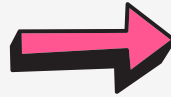
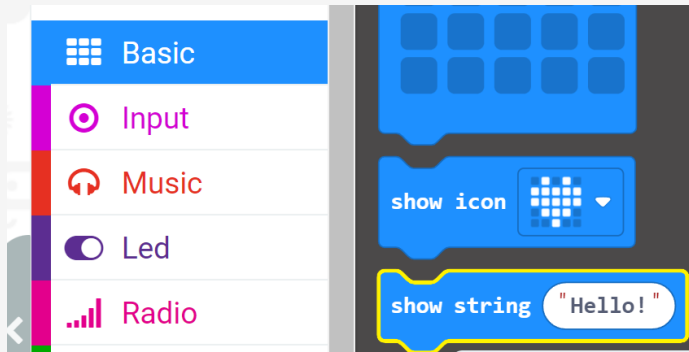
8. Click "Variables" -> "Game started" (highlighted in yellow below). Click and drag "game started" to replace "false" within the "while" loop.



9. Click "Logic" -> "If..." as shown in the diagram opposite. Drag the "If" code within the "while" code". Select "input" and choose the option highlighted in yellow below. Change P0 to P1.



10. Select "Basic" -> "show string..." as shown below. Drag the code into position and double click "hello" to change it to "A". Select "Variables" -> "set game started to 0..." -> select "Logic" -> select "false" and drag into position as shown opposite.



```

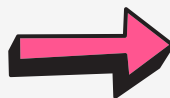
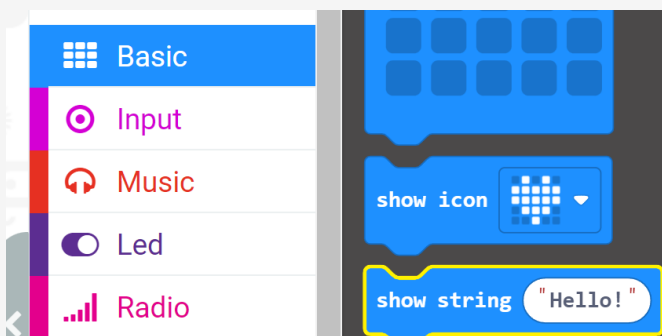
forever
  set game started to false
  pause (ms) pick random 1000 to 5000
  set game started to true
  show icon
  while game started
  do
    if pin P1 is pressed then
      show string "A"
      set game started to false
  
```



### What is your code saying so far?

The code instructs the microbit to wait between 1000-5000ms before showing the heart icon. As soon as the icon appears, players A and B should try to hit their button. If P1 (player A) hits first, "A" will appear on the microbit. This ends the game. But what if player B hits their button first? We need to write that code.

11. Repeat Step 9 above. Changing P0 to P2 this time. Select "Basic" -> "show string..." as shown below. Drag the code into position and double click "hello" to change it to "B". Select "Variables" -> "set game started to 0..." -> select "Logic" -> select "false" and drag into position as shown opposite.



```

while game started
do
  if pin P1 is pressed then
    show string "A"
    set game started to false
  if pin P2 is pressed then
    show string "B"
    set game started to false
  
```



## What is your code saying so far?

The completed "while" loop says: while the game is playing, if player A presses their button first, show "A" on the screen and end the game; if player B presses their button first, show "B" on the screen and end the game. But what next?

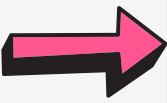
12. We now need to reset the game. Go to "Basic" -> "pause (ms)" and shown below. Click and drag the block into position. Change "100" to "3000" using the keyboard.

The image shows the Scratch block palette on the left and a code editor on the right. The palette has a search bar and categories: Basic, Input, Music, Led, Radio, Loops, Logic, Variables, Math, Advanced, Functions, and Arrays. The 'Basic' category is selected, and the 'pause (ms)' block is highlighted with yellow starburst effects. A pink arrow points from this block to the code editor. The code editor shows a 'forever' loop containing several blocks: 'set game started to false', 'pause (ms) pick random 1000 to 5000', 'set game started to true', 'show icon', 'while game started do' loop containing 'if pin P1 is pressed then' (show string 'A', set game started to false) and 'if pin P2 is pressed then' (show string 'B', set game started to false), and a 'pause (ms) 3000' block at the bottom of the loop.



13. The final block code we need will clear the screen. Click "Basic" -> "Clear Screen". Drag the block into position at the end of the code.

The image shows the Scratch block palette with the 'Basic' category selected. The 'clear screen' block is highlighted with a yellow border. Other visible blocks include 'show icon', 'show string "Hello!"', and a grid of blue blocks.



```
forever
  set game started to false
  pause (ms) pick random 1000 to 5000
  set game started to true
  show icon
  while game started
  do
    if pin P1 is pressed then
      show string "A"
      set game started to false
    if pin P2 is pressed then
      show string "B"
      set game started to false
    pause (ms) 3000
    clear screen
```

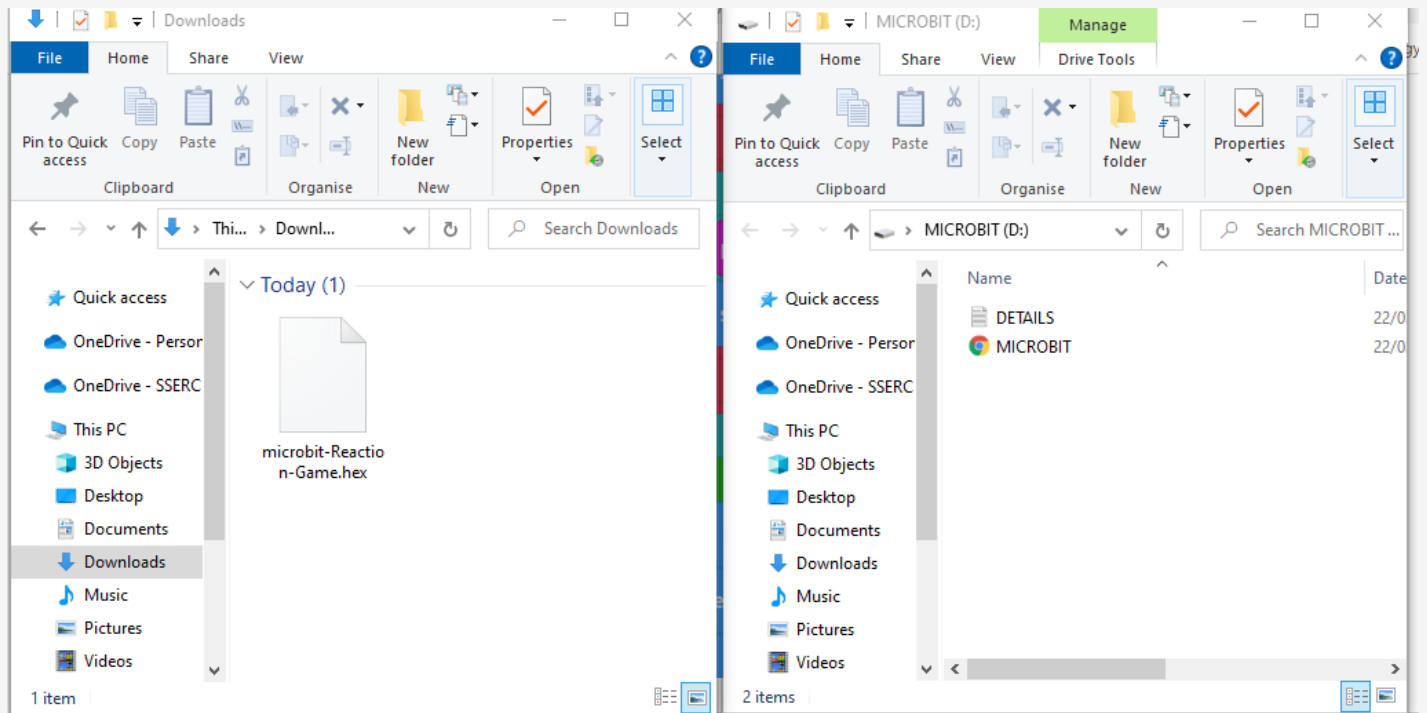
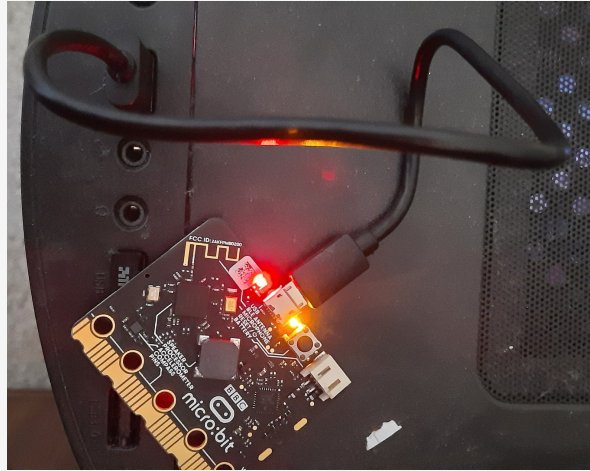
14. Now you need to download your code and add it to your Micro:bit. At the bottom left of the screen, click the three dots beside "Download" and "Download as file". The hex file for this completed code can also be downloaded [here](#).

A screenshot of the 'Download' button in the Scratch interface. A three-dot menu is open, showing options: 'Connect device', 'Download as file', and 'Help'. The 'Download' button is purple and the menu is light grey.



A screenshot of the 'Download completed...' notification. It contains the text: 'Your code is being downloaded as a .hex file. You can drag this file to your micro:bit using your computer's file explorer.' Below this is a 'New!' banner that says 'Download your code faster by pairing with web usb! Pair now'. At the bottom are 'Help', 'Download again', and 'Done' buttons. An illustration of a micro:bit and a laptop is also present.

15. Connect the Microbit device to your computer. Open the window for the Micro:bit and the Download folder. Drag the "microbit-reaction-game.hex" file from the Download folder into the Microbit folder. It will copy across and then seemingly disappear. This is normal - your microbit is ready to use as a reaction timer. Disconnect the microbit from your computer.



## What next?

You've written your code and uploaded it to your Micro:bit. But where is your game board? You have to make it! You are now going to need two pieces of cardboard, 4 pieces of aluminium foil, 4 leads and crocodile clips, some sellotape and a marker pen.

# BUILD YOUR GAME BOARD

Follow the instructions below and watch the accompanying videos to build your 2-player reaction game board.

1

Cut 2 pieces of cardboard. The pieces in the image below measured 24cm x 14cm.



2

Cut 4 rectangles of foil and fold them around the edge of the cardboard as shown in the image above (view from the top) and below (view from the back of the game board). Secure the foil with sellotape.



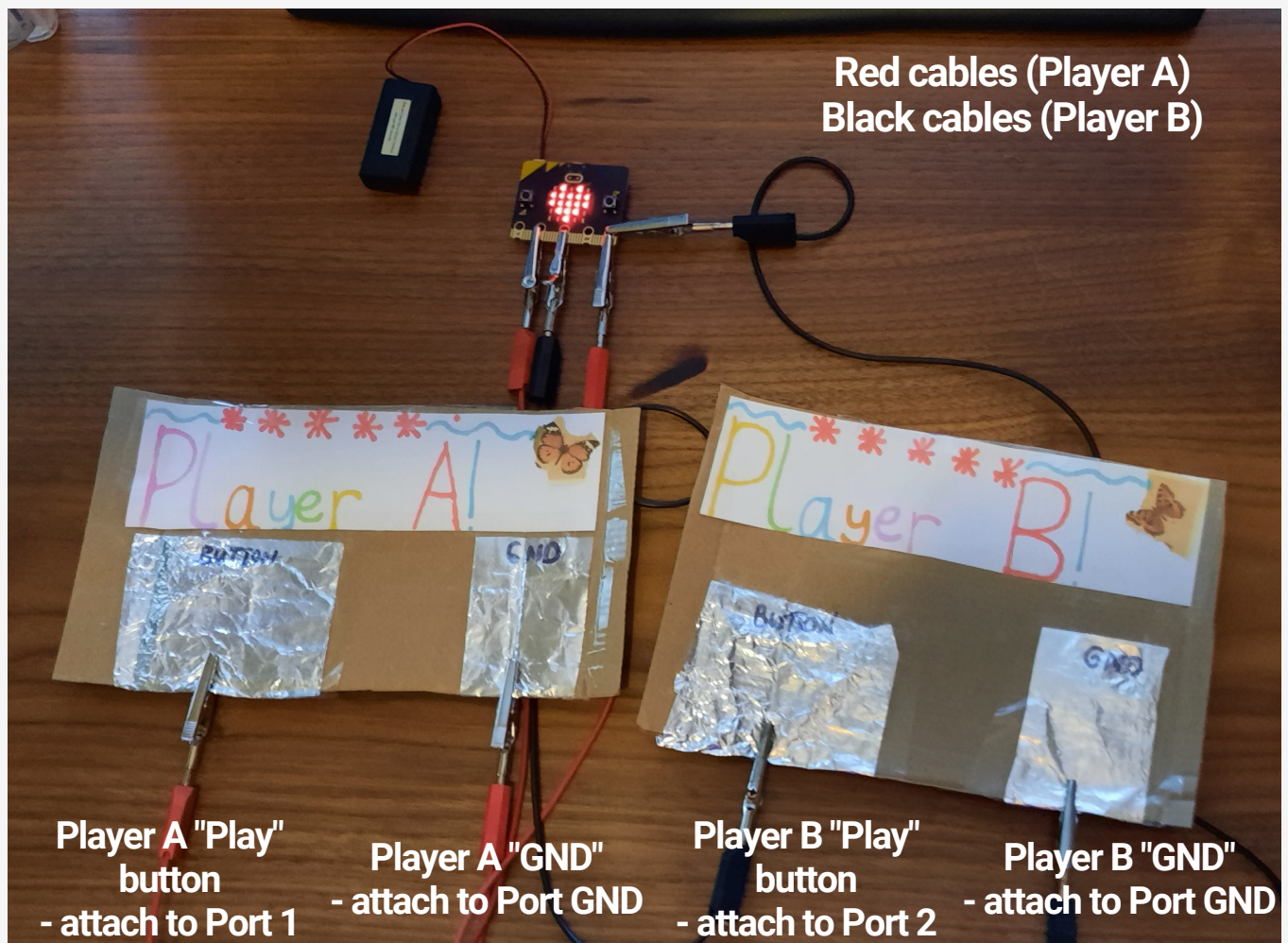
3 Now connect your leads. Add a crocodile clip to each end of each lead.

- Lead 1 - Connect from Player A (left panel) to Port 1 (Micro:bit).
- Lead 2 - Connect from Player A (right panel) to GND (Micro:bit).
- Lead 3 - Connect from Player B (left panel) to Port 2 (Micro:bit).
- Lead 4 - Connect from Player B (right panel) to GND (Micro:bit).

For each of the leads above, the crocodile clip needs to be clipped over the edge of the cardboard, making contact with the foil on both sides.



This video tutorial show how to connect each of the leads, as outlined in the steps above.



# GAME

## PLAY YOUR GAME



You have now coded your own 2-player reaction game. At all times, both players must keep their right hand on the "GND" button. When the heart icon appears on the Micro:bit, the first person to hit their "Play" button wins the point. Watch the video to see it in action.