

# Hour of Code

## Merry Micro:bits





We are a bilingual Canadian charity determined to give every Canadian child access to digital skills education, with a focus on girls and underserved communities. Since 2013, we have reached more than 6000 teachers and over 200,000 students.

We encourage inclusive and sustainable learning by teaching kids and the educators who play a crucial role in their development. We teach computational thinking, coding, artificial intelligence, and physical computing to provide kids with the confidence and skills needed to create, communicate, and innovate with the tools of the 21st century.



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# Hour of Code

## Micro:bit Snow Globe

### Length:

60 minutes

### Learning Objectives:

- Familiarity with physical computing through micro:bit.
- Familiarity with basic concepts like sequences, modularization and repetition.
- Familiarity with computational practices like planning and debugging

### Materials:

- Online Editor [makecode.microbit.org](https://makecode.microbit.org)
- One micro:bit with its USB cable (optional)

### ACTIVITY 1 My LED Snow Globe



The class will use MakeCode blocks to create a “snow globe” animation on the micro:bit.

This activity uses blocks from the Basic, Input, Led, and Functions categories. Notice that the categories and blocks are colour-coded, which makes it easy to follow the screenshots below and find the blocks students will need.

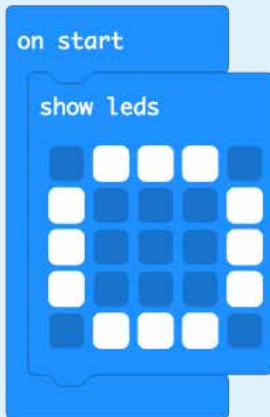
Follow the steps below and help students create their own sparkling snow globe!

# Hour of Code

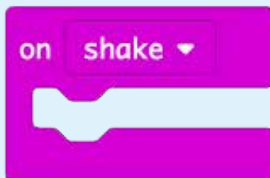
## Micro:bit Snow Globe



### STEP 1 Basic: create the shape of the globe

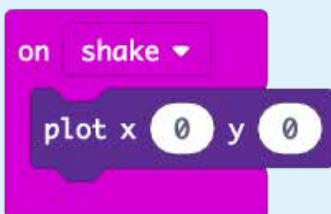


### STEP 2 Input: choose the trigger button “on shake”



### STEP 3 LEDs on and off

**A)** Inside the on shake block, add a plot x 0 y 0 block. Try it in the emulator, clicking the SHAKE button. Where does it light up? It's outside the snow globe, not where we want it.





# Hour of Code

## Micro:bit Snow Globe

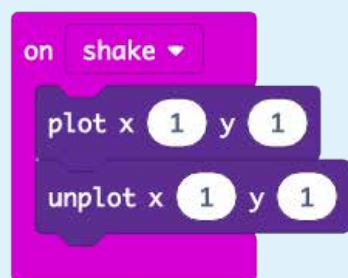
Each LED light on the micro:bit has a code, just like coordinates on a graph . On the micro:bit, the codes start at the top left (x 0, y 0) and work their way across to the right (x) and down (y).

What are some x,y coordinates that would be inside the globe? Have the class guess a few and test them out in the code. SHAKE the emulator to verify the result.

Here is an LED that works inside the globe: **plot x 1 y 1**.



**B)** To make this behave more like a snowflake, have the class add an unplot with the same coordinates.






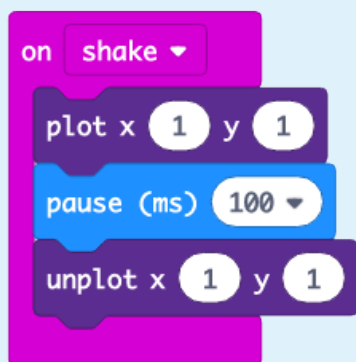
# Hour of Code

## Micro:bit Snow Globe

Test it. The code is right, but it looks like nothing is happening. Can the class guess what's wrong? The micro:bit is turning on and off so quickly, we can't see it.

Use the “snail” button  on the emulator, to slow the pace.

A **pause** block is used to slow down the program in real time.



Students could add more snowflakes with more **plot**, **pause**, and **unplot** blocks. However, adding lots of blocks gets tedious and ultimately makes the script hard to read.

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## Micro:bit Snow Globe

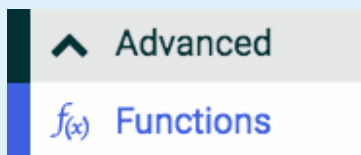


### STEP 4 Functions

The class is now ready to give the basic plot-pause-unplot steps a shorthand name and then run them by “calling” the name. This simple but powerful technique will help make the program easier to read and easier to extend with more snowflakes.

**A)** In the Advanced category, create a function and name it “snowflake1” (“snowflake” and the number “1”).

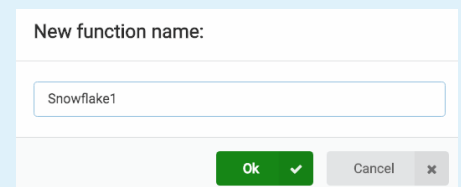
1.



2.



3.



4.



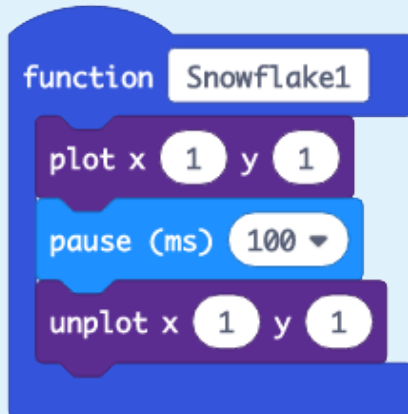


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## Micro:bit Snow Globe

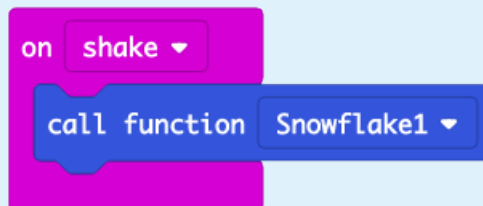


**B)** Drag the first set of **plot-pause-unplot** instructions into the **snowflake1** function.



With the **snowflake1** function “defined,” open the **Functions** blocks, that the **call snowflake1** block out and put it into the **on shake** block.

Use the snail button  to demonstrate how the function is “called” with the “call function” block. In snail mode, each block is highlighted as the program runs each snowflake sequence.



Test this in the emulator. The single snowflake should turn on and off as before.

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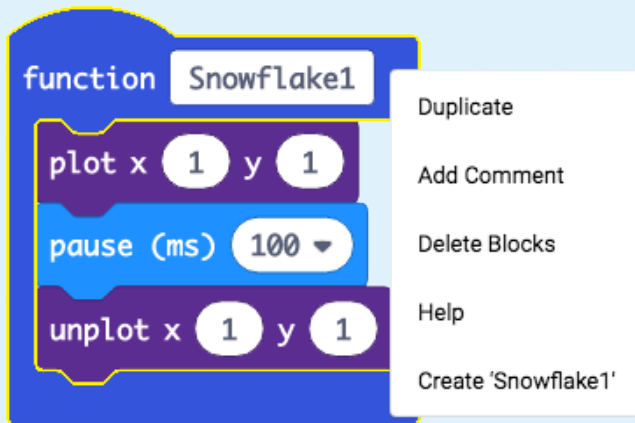
## Micro:bit Snow Globe



### STEP 5 More functions

Next step is to add more snowflakes using the same function technique.

A) Right-click the **snowflake1** function and **Duplicate** it.



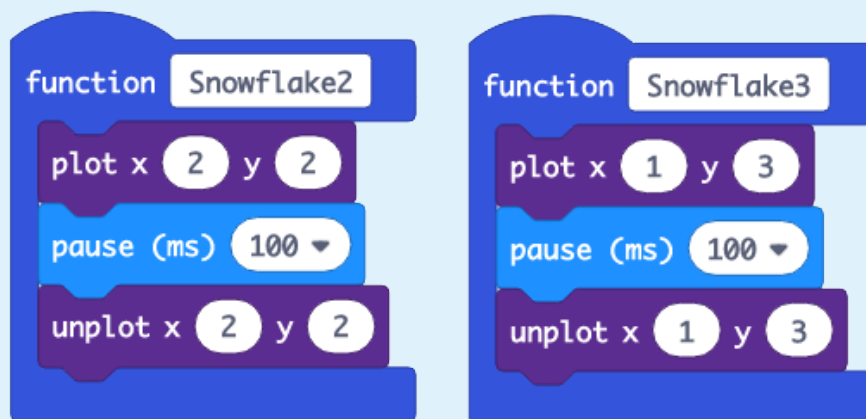
This will automatically create a new function with a number. (**snowflake2, snowflake3, etc.**)



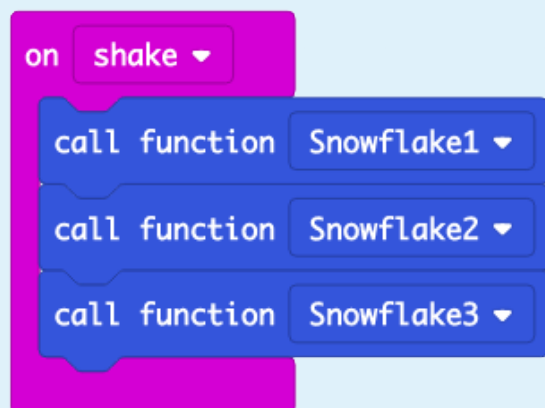
# Hour of Code

## Micro:bit Snow Globe

**B)** For each of the new functions, change the coordinates (x,y) to create the effect of snow sparkling inside the globe. Here are two coordinates that work (students can choose their own).



**C)** Finally, students use the **on shake** block to call all three functions.



# Hour of Code

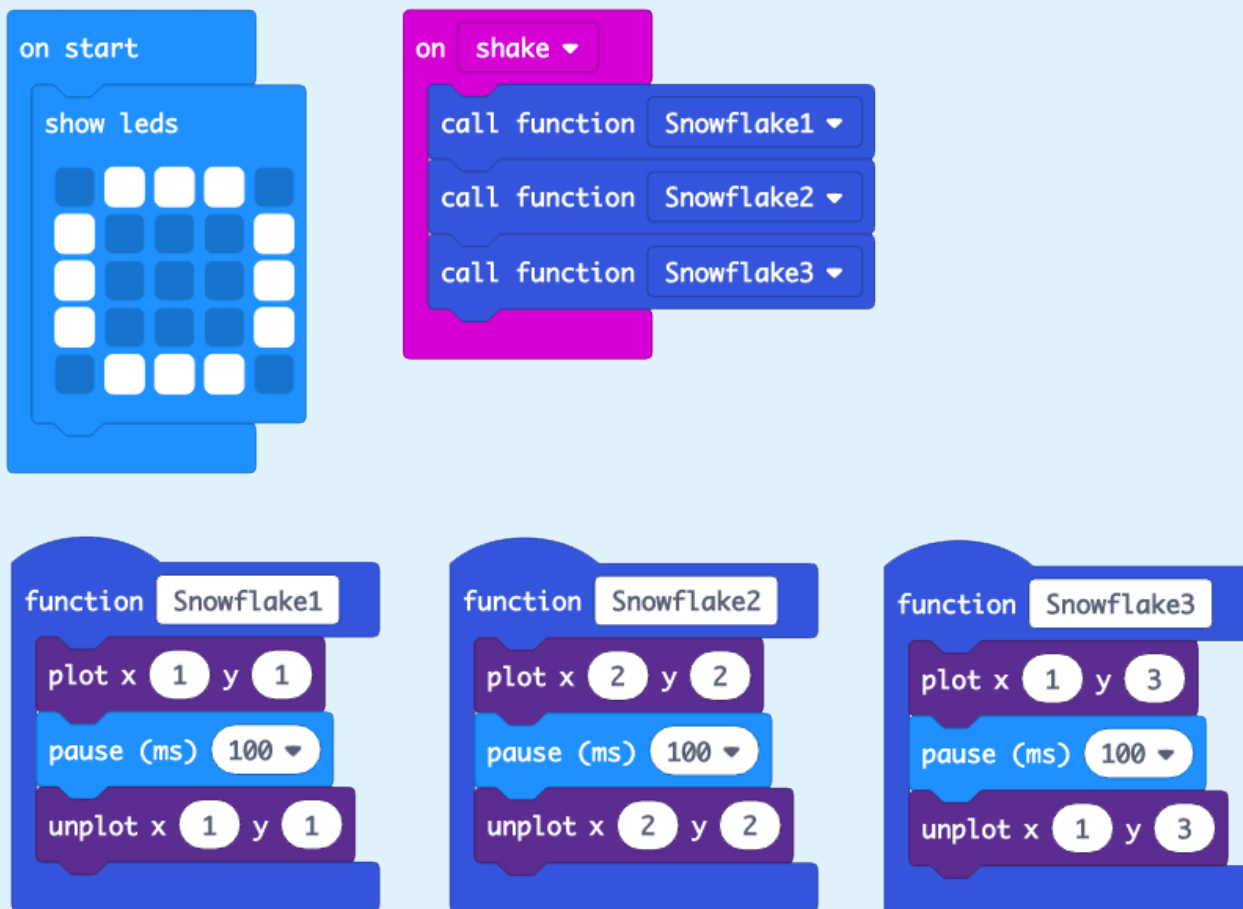
## Micro:bit Snow Globe



### STEP 6 Check and continue

**A)** The class should now have all these elements in their programs.

They may be arranged differently on each student's canvas. This is fine; it has no impact on how the program runs. Students can drag the stacks around as they like to make their programs easy to read.



**B)** Make more snow!

# Hour of Code

## Micro:bit Snow Globe



From here, the class can start to play. Have students continue making more snowflake functions, turning more LEDs on and off.

They may change the coordinates inside each function to make the snow “look” the way they want. Invite them to switch the order in which they call the functions, or call the same function multiple times. Have the class look inside the other block categories for a block that **repeats** the code a bunch of times in a single **shake**.

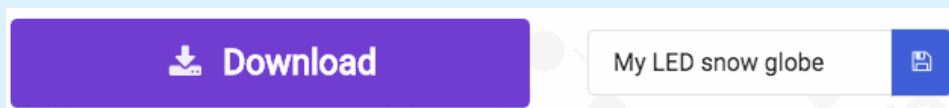
### ACTIVITY 2 Let's download our animation to the micro:bit



#### Optional

Transferring your program to the micro:bit is as simple as saving a file to a drive on your computer.

- **Connect** the micro:bit to your computer with the USB cable.
- **Name** your program and click Download (a .hex file will be saved in your Downloads)
- **Drag** the .hex file from your computer onto your micro:bit.



The participants will practice for a few minutes.

# Hour of Code

## Micro:bit Snow Globe



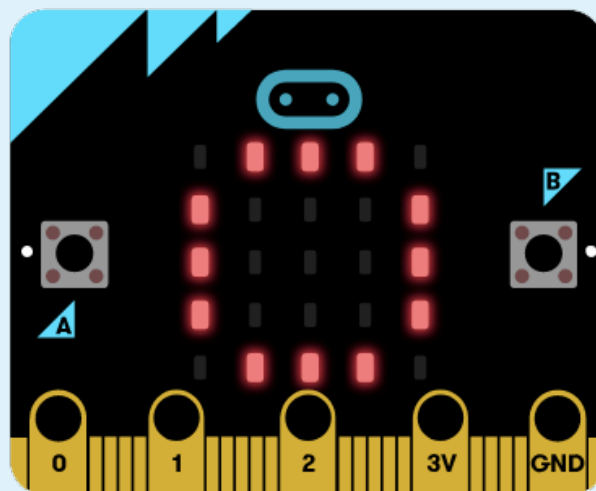
### QUESTIONS?

The following link has instructions for the browser that you are using (Safari, Chrome, Firefox, etc.)

<https://makecode.microbit.org/device/usb>

Challenge alert! Can you find more ways to animate your globe?  
Post pictures, videos, or even a link to your project on social media  
and tag [@kidscoding](#) so we can see!

Have fun!





# Top 5 Strategies to Get Unstuck When Coding (According to Kids)

## 1. Read through your code

Go back to the beginning. Read it as if it was normal text. Be critical and analytical of what you've built.

## 2. Experiment with your code

Take blocks out. Add blocks in. Tinker with it. Play with it.

## 3. Look for examples

How are your friends doing this? While micro:bit does not yet have the same bank of projects as Scratch, there are many example of projects on the landing page that might give you ideas for how to resolve a problem. Look for different examples to inspire yourself and build something new.

## 4. Work with someone else

Collaboration and consultation are essential. You will be able to build more together than when you are alone. Effective teamwork is key to attaining growth and success.

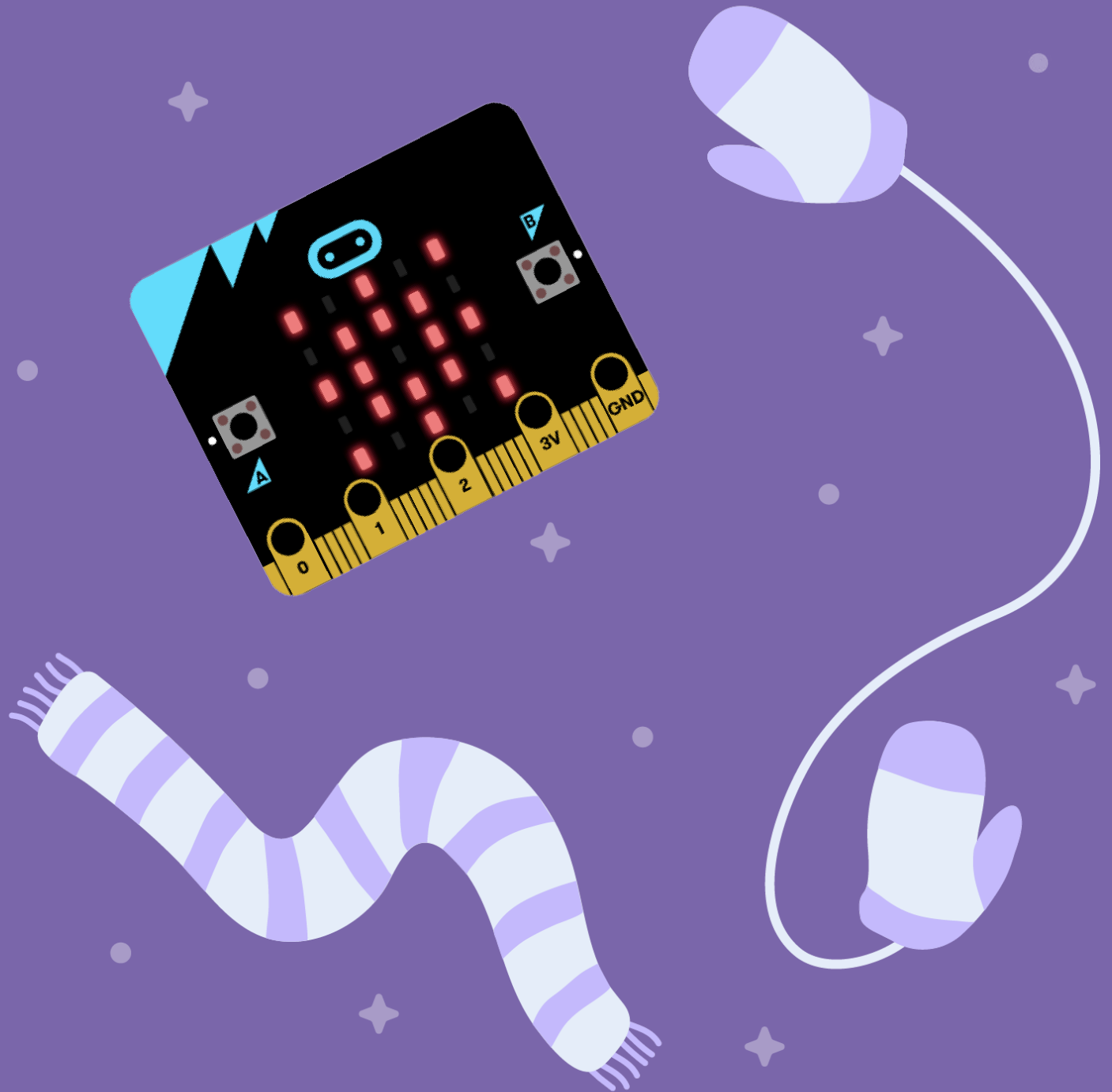
## 5. Be persistent but know when to take a break

Persistence is a quality found in all innovators. When you are unable to solve a problem after working on it for a long time, take a break. This will allow you to see the bigger picture and view the problem from different perspectives to find a solution or a better idea.

**Survey conducted by Harvard Graduate School of Education.** See "Getting Unstuck: Karen Brennan's '8 for 8'" video: [https://youtu.be/c\\_AdWBIGkRw](https://youtu.be/c_AdWBIGkRw)

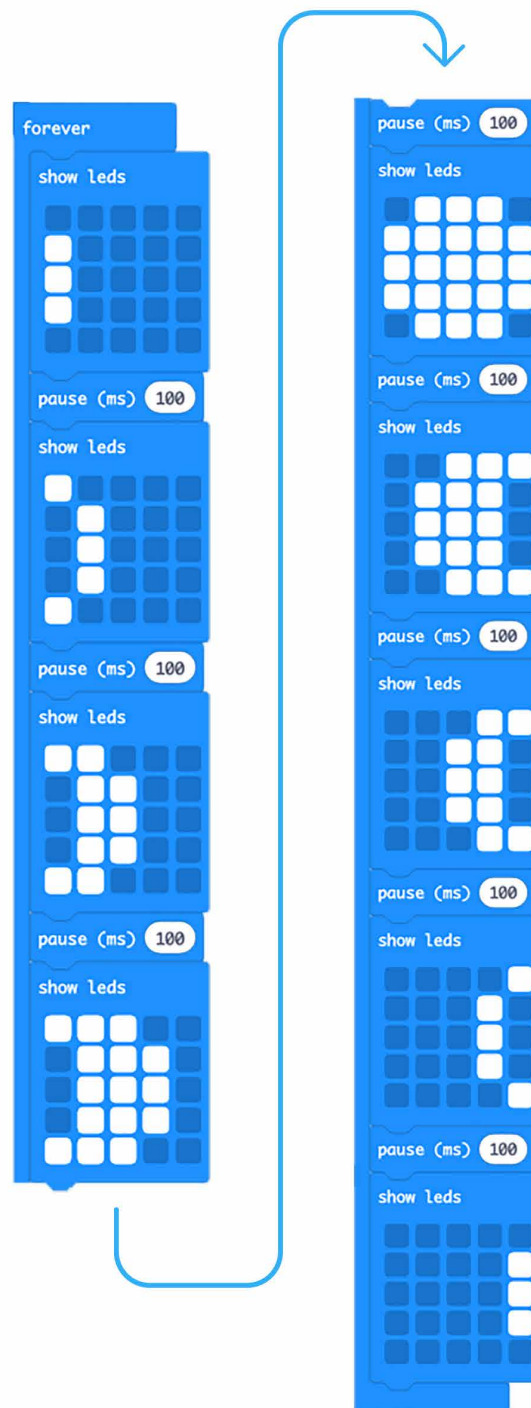
# Activity Cards

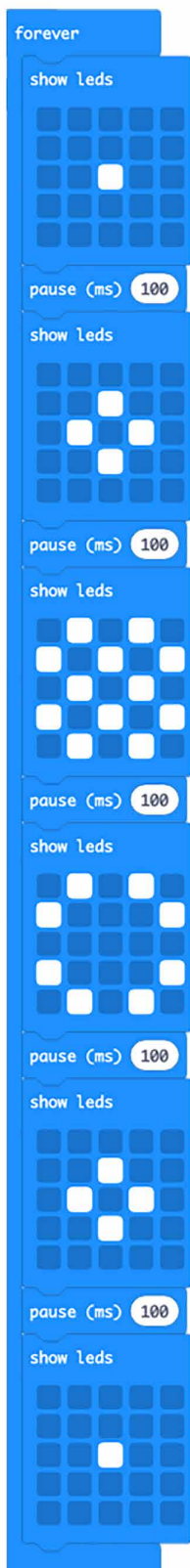
Go further with the micro:bit!





# Moon Phases

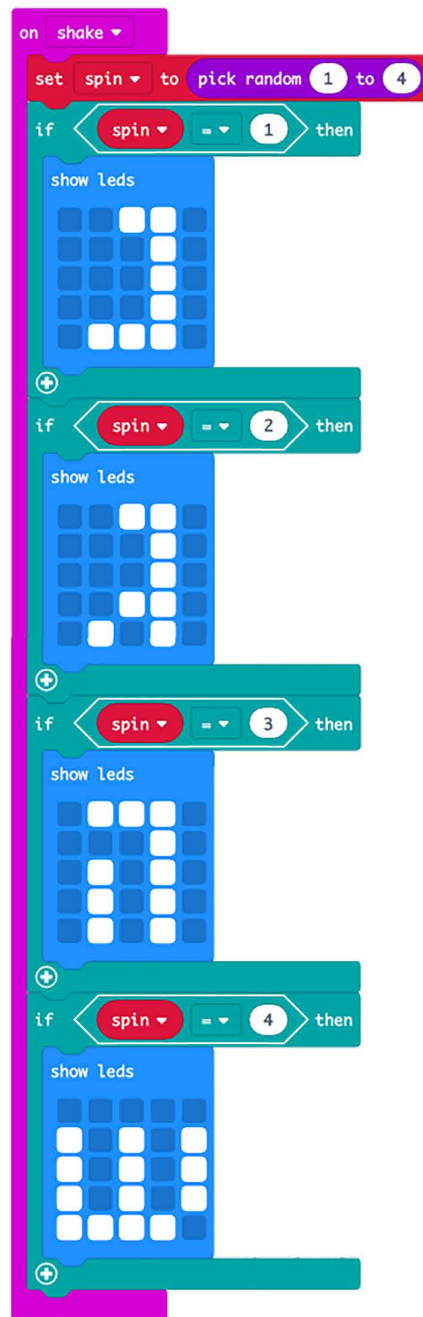
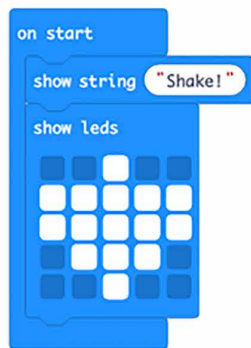




## Starry Lights

```
forever
  plot x pick random 0 to 4 y pick random 0 to 4
  unplot x pick random 0 to 4 y pick random 0 to 4
```

# Spinning Dreidel



**Tip:** Duplicate functions to create more candles that scroll across the screen.



The image displays a series of Scratch code blocks designed to animate a menorah. The main script, triggered by 'on button A pressed', repeats a sequence of function calls (Men1 through Men9) three times, followed by a 1000ms pause. Each function block (Men1 through Men9) contains a 'show leds' block with a 5x5 grid of LEDs. Below the grid, a 'repeat 2 times' loop contains a 'do' block with 'toggle x' and 'y' coordinates, followed by a 'pause (ms) 100' block. The functions are arranged in two rows: Men1, Men2, Men3 in the top row; Men4, men5, men6, Men7 in the bottom row.

**Function Men1:** Toggles LEDs at (0, 1), (2, 1), (4, 0), and (4, 1).

**Function Men2:** Toggles LEDs at (1, 1), (3, 0), and (3, 1).

**Function Men3:** Toggles LEDs at (0, 1), (2, 0), (4, 1), and (4, 0).

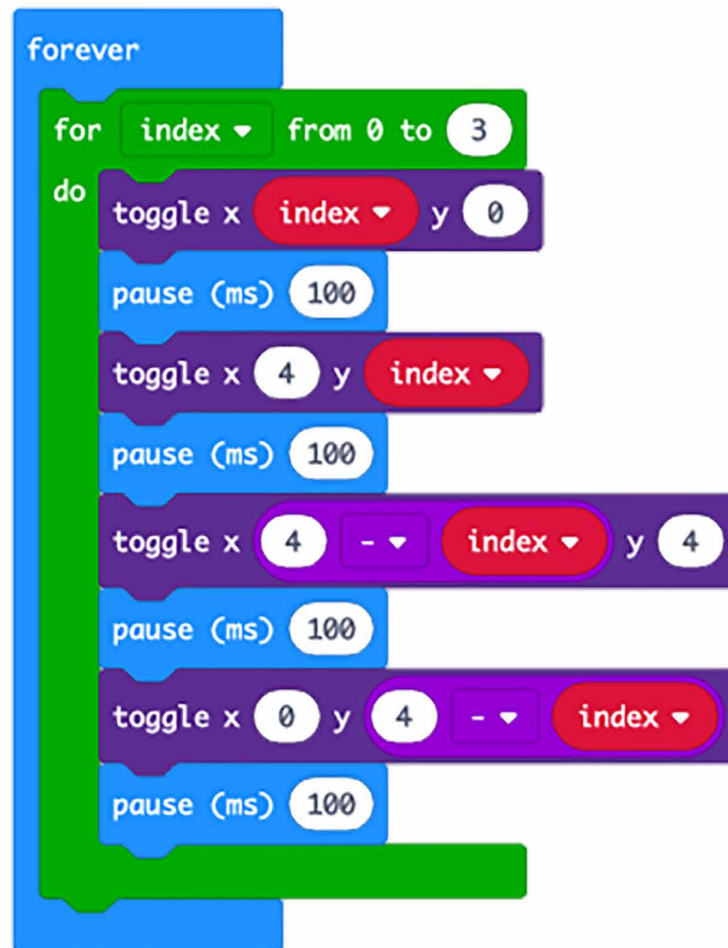
**Function Men4:** Toggles LEDs at (1, 0), (3, 1), and (3, 0).

**Function men5:** Toggles LEDs at (0, 0), (2, 1), (4, 1), and (4, 0).

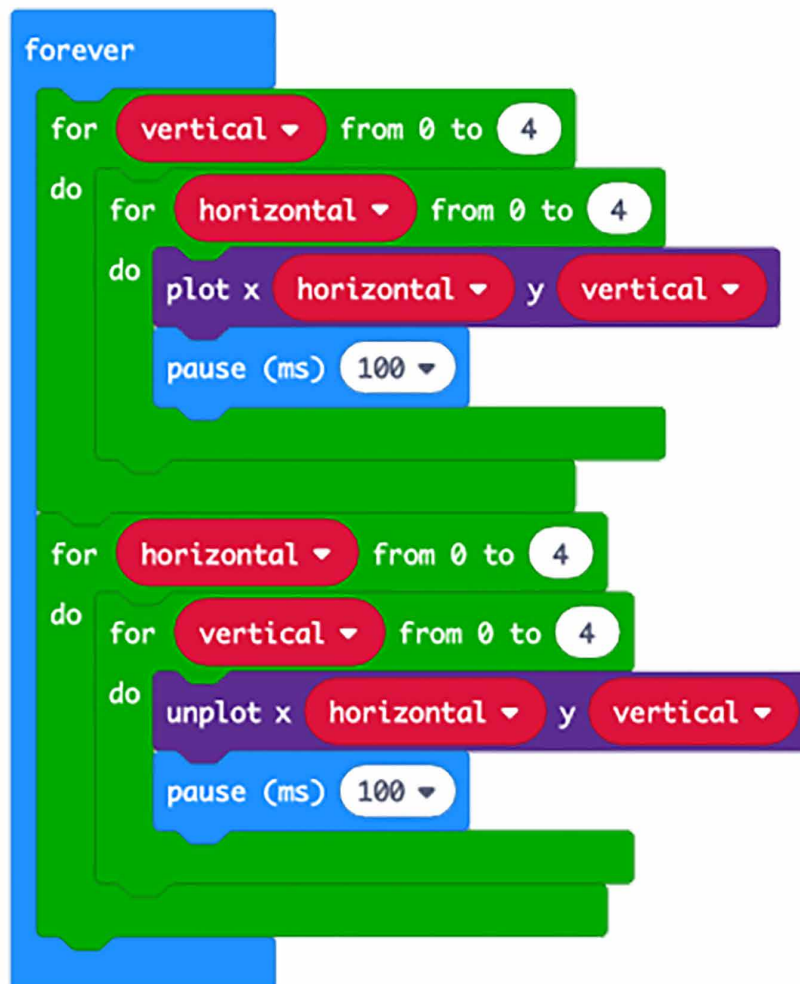
**Function men6:** Toggles LEDs at (1, 1), (3, 1), and (3, 0).

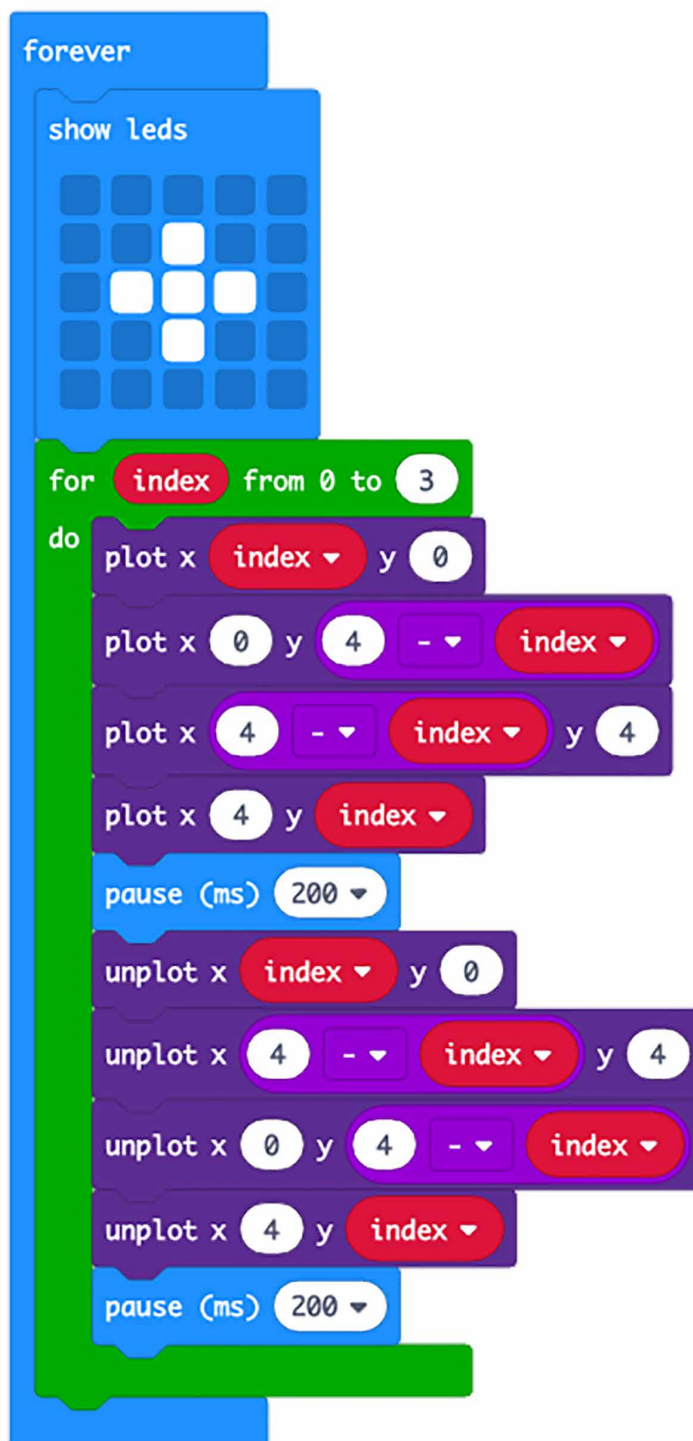
**Function Men7:** Toggles LEDs at (0, 1), (2, 1), and (2, 0).

## Square Dance



## Square Dance 2









# Resources

Microbit resources for teachers include lesson plans, curriculums, project ideas:

<https://microbit.org/teach/>

The KCJ art:bit facilitates animation and makes using the micro:bit easier for younger students. It is currently available for chromebooks and soon to be available for iPads.

<https://kidscodejeunesse.org/artbit.html>

Code Club micro:bit projects are great for stretch challenges:

<https://codeclubprojects.org/en-GB/microbit/>

**Finished the project? Don't forget to get your very own certificate that says you completed an hour of code! All you have to do is:**

1. Visit this link: [code.org/api/hour/finish](https://code.org/api/hour/finish)
2. Write your name
3. Download your personalized certificate
4. Print it or share it with friends and family!

**We want to see your kids' coding skills!**

Make sure to share pictures, videos, quotes and screen captures on social media. Tag us on social media and use the hashtag **#kids2030** so that we can share with the rest of our online community.

 /kidscodejeunesse

 @kidscoding



