Section 5 Rendering Graphics

Before we get started

Ensure you have completed the **Hello, world! (https://www.microbit.co.uk/blocks/book/hello-world)** tutorials and **Loop (https://www.microbit.co.uk/blocks/book/loops)** tutorials and tested them on a **simulator (https://www.microbit.co.uk/td/simulator)** or on **BBC micro:bit (https://www.microbit.co.uk/device/usb)** .

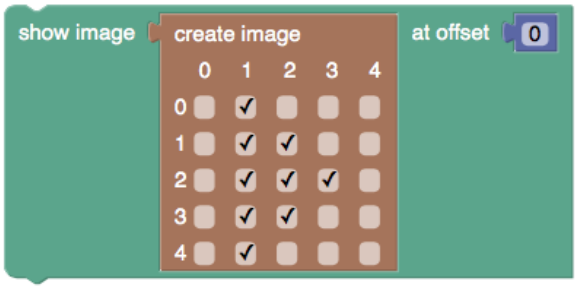
Showing images

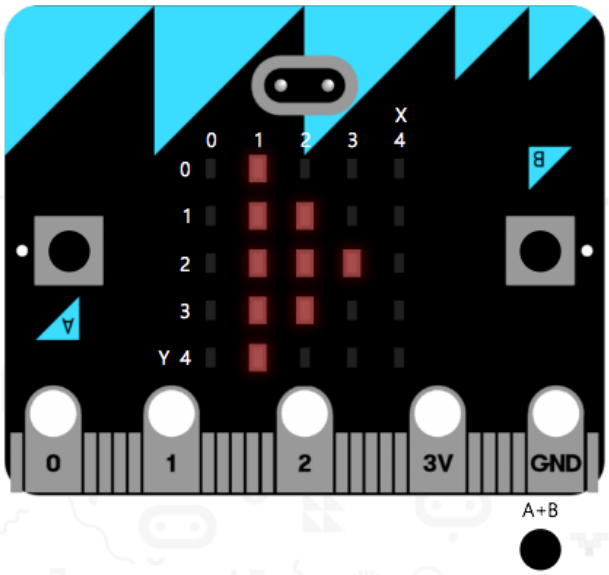
The **BBC micro:bit (https://www.microbit.co.uk/device)** has a grid of 25 LEDs, so we can use these to display images.

We've already experimented with the **show string (https://www.microbit.co.uk/functions/show-string)** block that displays a string (some text) that we program it to. However we can use more blocks from the *Images* drawer to render or display images in different ways.

Pixel Art

We can draw little images from the LEDs by ticking boxes. Drag a **show image (https://www.microbit.co.uk/functions/show-image)** block from the *Images* drawer and connect in a **create image (https://www.microbit.co.uk/functions/create-image)** block. You can customize this image by clicking boxes to tick whether the LED will turn on or off. For example, if we were creating a music player we may want to the show the play block from the *Music* drawer:

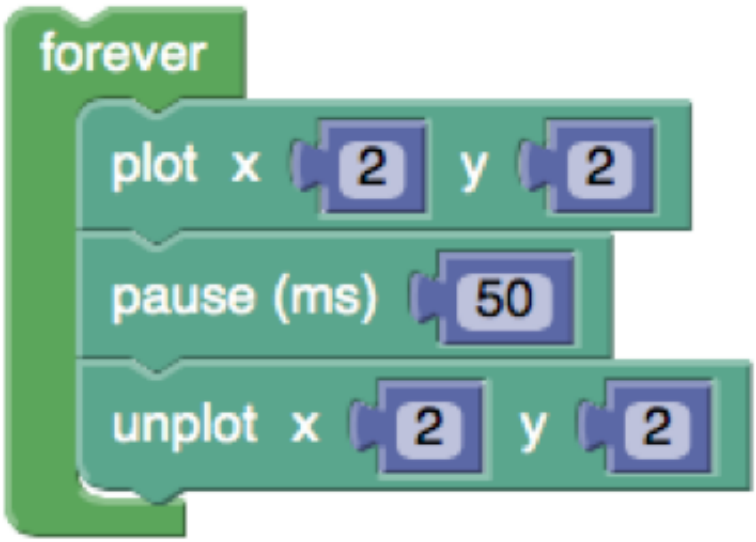




Plotting points

We can also code our bug to plot a point by giving an x (horizontal) and y (vertical) coordinates, from 0 to 4. Click the *LED* drawer and drag a **plot (https://www.microbit.co.uk/functions/plot)** block. Try changing the coordinates and see the effect this has on the **BBC micro:bit (https://www.microbit.co.uk/device)** .

We can also **unplot (https://www.microbit.co.uk/functions/unplot)** a point (turn the LED off again) using the **unplot (https://www.microbit.co.uk/functions/unplot)** block. So we could create a flashing LED program, using the **pause (https://www.microbit.co.uk/functions/pause)** block to create a delay.



We can also use the **clear screen (https://www.microbit.co.uk/functions/clear-**

screen) block to turn off all LEDs.

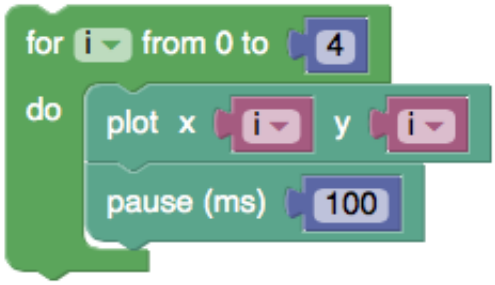
> **Tip**
>
> The **pause (https://www.microbit.co.uk/functions/pause)** block is in milliseconds, so setting it to 1000 will have a pause of a single second.

Devising algorithms for shapes

An algorithm is a set of steps to follow to solve a problem. We can begin to draw shapes on the **BBC micro:bit (https://www.microbit.co.uk/device)** using an algorithm. For example, we could draw a straight line with this code:

Our algorithm is: increase *i* by 1 *from 0* to *4*, and **plot (https://www.microbit.co.uk/functions/plot)** the point *x=i*, *y=0*. The **pause (https://www.microbit.co.uk/functions/pause)** block allows this line to be animated (drawn frame by frame).

Try devising an algorithm for a diagonal line using the code above and the variable *i*. Your code should look like this; as our **variable (https://www.microbit.co.uk/td/var)** increases, so does the location that the BBC micro:bit is plotting at:



We can create more complex algorithms for more complex shapes, too. See the **challenges (https://www.microbit.co.uk/blocks/book/challenges)** section for additional graphical challenges and solutions.

Animations

Animations are changes happening at a certain rate. For example, we could add the **pause (https://www.microbit.co.uk/functions/pause)** block from the *Basic* drawer with our square algorithm – this will slowly draw a square (as an animation).

We could create more complex animations, for example we could make our BBC micro:bit display an explosion or fireworks.

See the **challenges (https://www.microbit.co.uk/blocks/book/challenges)** section for some animation tasks.

Image variables

We can create image variables so we can easily display an image at a later point. For example:

This uses the **set item (https://www.microbit.co.uk/td/assign)** block from the *Variable* drawer, and the **create image (https://www.microbit.co.uk/functions/create-image)** block from the *Image* drawer. This means our image can be displayed without having to replicate the **create image (https://www.microbit.co.uk/functions/create-image)** block each time.

Where next?

Section 4 Loops (https://www.microbit.co.uk/blocks/book/loops)

Section 5 Rendering Graphics (https://www.microbit.co.uk/blocks/book/graphics)

Section 6 Challenges (https://www.microbit.co.uk/blocks/book/challenges)

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