Christmas Microbit Stars

The aim of this exercise is to create messages and animations on a Microbit display in response to button presses.

You will need:

- Microbit attached to a Star
- Microbit Battery Pack
- USB programming Lead
- And will use the Mu editor for MicroPython programming

Basic Hello World Program

Attach the Microbit to the computer with the USB lead. When the box opens on the screen just cancel this. This will appear each time the Microbit is attached or restarted. It can be ignored.

Type the code below into the Mu editor, press the Flash button to upload the code to the Microbit.

```
from microbit import *

display.scroll("Hello world!")
```

The message should scroll across the screen. Change the message to something more suitable for the time of year.

Display an Image

There are a number of predesigned images in the Microbit code library. One is a Christmas tree. Open a new tab for this code:

```
from microbit import *

display.show(Image.XMAS)
```

Design Your Own Image

The display of LED on the Microbit is made up of 25 red LED. Each can be either on or off and at some level in between.

An image is a series of 25 numbers representing the brightness of each LED starting with the top left moving across the rows then down to the last LED on the bottom right.

The code below will turn on all the LED as a basis for you to start designing your own picture. Open another tab to code. Replace myPictureName with a single word name to describe your own picture. Such as star or present.

```
from microbit import *

myPictureName = Image("99999:"
                      "99999:"
                      "99999:"
                      "99999:"
                      "99999")

display.show(myPictureName)
```

Now start switching off those LED you do not need to draw your picture. The code below makes the XMAS image from before. The XMAS2 image is exactly the same just written in a different format in the program. XMAS is a bit easier for you as a human to read, XMAS2 is just a bit neater. Use either as you wish. There is really no difference.

```
from microbit import *

XMAS= Image("00900:"
            "09990:"
            "00900:"
            "09990:"
            "99999")

XMAS2= Image("00900:" "09990:" "00900:" "09990:" "99999")

display.show(XMAS)
```

Button Press to Change Display

With two buttons on the Microbit it will be possible to display three different things. One normally, one on Button A press another on Button B press. Here is the basic button code.

```
from microbit import *

while True:
    if button_a.was_pressed():
        display.scroll("Hello, world!")
```

The while True is a forever loop of code that repeats again and again. Anything inside the loop repeats. Nothing after the loop will ever run as the loop runs forever. Any code indented in from the left is part of the loop. Here is code constantly checks if a button was pressed and only if it was does the Hello world get displayed. Try the code and then add an extra line for the Button B doing something different.

Animate an Image

It is possible to animate an image. Animation is just a series of images repeated in a loop. Each one is slightly different from the previous one. The text scrolling across the LED in Hello world is just a series of different images strung together.

So an animation requires three drawings that are slightly different. The image names are placed in a list and then the list is looped over repeating the images on the display, like this:

```
from microbit import *

# images to animate

AlienLegsDown = Image("09590:" "09550:" "00900:" "09090:" "90009")

AlienLegsMiddle = Image("09590:" "05950:" "00900:" "99099:" "00000")

AlienLegsUp = Image("09590:" "05590:" "90909:" "09090:" "00000")

aliens = [AlienLegsDown , AlienLegsMiddle , AlienLegsUp , AlienLegsMiddle ]

while True:
    display.show(aliens, loop=True, delay=300)
```

Or like this:

```
from microbit import *

# images to animate

AlienLegsDown = Image("09590:" "09550:" "00900:" "09090:" "90009")

AlienLegsMiddle = Image("09590:" "05950:" "00900:" "99099:" "00000")

AlienLegsUp = Image("09590:" "05590:" "90909:" "09090:" "00000")

while True:
    display.show(AlienLegsDown)
    sleep(300)
    display.show(AlienLegsMiddle)
    sleep(300)
    display.show(AlienLegsUp)
    sleep(300)
    display.show(AlienLegsMiddle)
    sleep(300)
```

Now add all these parts together in some way to make your snowflake do different things. What can you create and come up with?