# LEARNING MUSIC WITH MICROBIT V2.

This is an interdisciplinary activity in which Music, Mathematics and Programming are worked through games.

What is Microbit?

The BBC Microbit is a pocket-sized computer that introduces you to how software and hardware work together. It has an LED light display, buttons, sensors and many input/output features that you can program and physically interact with. The latest Microbit adds sound sensing and playback capabilities.
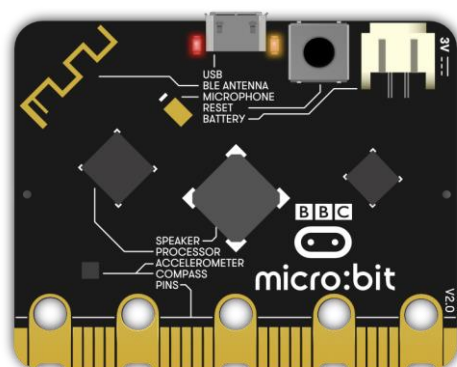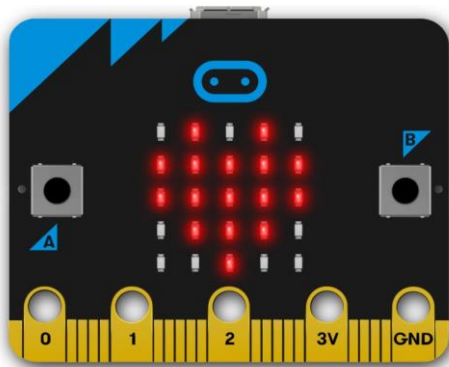
The Microbit V2 with sound adds a built-in microphone and speaker, as well as an extra touch input button and a power button. Find out more in this video:

https://youtu.be/u2u7UJSRuko

Levels to which it is aimed

This activity is aimed at Secondary school students and the last courses of Primary.

Subject/s

This resource is aimed at Music subject, although it could be worked on others such as Mathematics, Technology or Programming.

Is prior knowledge required?

As Microbit works with blocks, it is not necessary to haver previous knowledge in programming.

What objectives are trying to achieve?
- The main objective is to practice musical rhythm with students and develop computational thinking.
- In addition, the mental calculation is worked and the history of programming is reviewed through the chosen song and the previous activity. As it is developed in English, so the students work on vocabulary related to these subjects.
- Introduce and understand the basic operation of some basic blocks in programming, such as waits, loops and repetitions.

Duration

2-3 hours depending on the age and previous knowledge of the students.

Recommended tool

Our students only need to create an account in the link: https://makecode.microbit.org/

If you want to work with a board, you will need:

- A Microbit board and battery pack with 2 AAA batteries (optional).

- A computer, phone or tablet with internet access to load the Microsoft MakeCode (you can work with Python code editors).

- If you are using a computer, a USB lead to connect your Microbit.

- For building and making other projects with Microbit, some extra items that are great to have include headphones, crocodile clip leads and conductive materials such as aluminium foil and paper clips.

You have lots of different projects in this link:

https://makecode.microbit.org/#

Activity 1: Some history.

"Daisy Bell" was composed by Harry Dacre in 1892. In 1961, the IBM 7094 became the first computer to sing, singing the song Daisy Bell. Vocals were programmed by John Kelly and Carol Lockbaum and the accompaniment was programmed by Max Mathews.
This performance was the inspiration for a similar scene in 2001: A Space Odyssey. *Daisy, Daisy, give me your answer do I'm half crazy all for the love of you It won't be a stylish marriage I can't afford a carriage But you'll look sweet upon the seat Of a bicycle built for two.*
(If you wish, you can work more about cinema or history of programming history)

https://youtu.be/41U78QP8nBk

https://youtu.be/Yh97FsULbS0

We show them he original score, but we work with an adapted it.

Daisy Bell

1892 - Henry Dacre

Activity 2: We understand the notes of the score and measure the times.

It is important that students know the values of the different musical figures. If they do not know them, we will teach them or remind them (if we consider that they have seen them before).

o = **Whole note**: looks like a donut

♩ = **Half note**: we add a stem (vertical line) to the donut. The stem can go up or down. Look at any piece of music for examples.

♩ = **Quarter note**: we fill in the whole make it solid and keep the stem.

♪ = **Eighth note**: we add a flag to the stem.

♪ = **Sixteenth note**: we add two flags to the stem
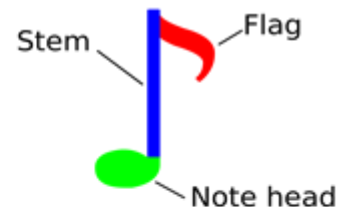
We will also work with the equivalence between the Anglo-Saxon and Latin nomenclature.

C	D	E	F	G	A	B	C
Do	Re	Mi	Fa	Sol	La	Si	Do

To work on this activity we will use the next adapted score:

A Bicycle Built for Two
(Daisy Bell)

Registration 2
Rhythm: Waltz

Words and Music by
Harry Dacre

C
G.

E.

C.

G.

Dai - sy,   Dai - sy,

F   C

A   B   C   A   C   G.   ○.

Give me your an - swer, do,_____

G7
G   C   Am

D.   G.   E.   C.
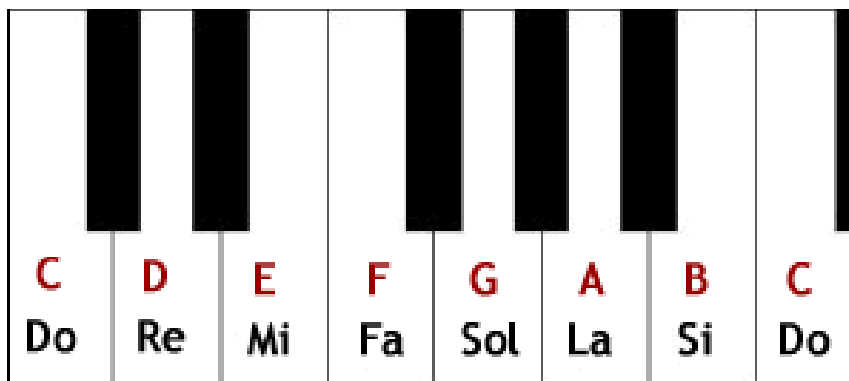
I'm   half   cra -   zy,

D7
D   G7
                 G

          D   E   D.   ○   E
A   B   C

All   for   the   love   of   you,_____ It

In this score we find different figures:

- The white figure: which has a value of 2 times.
- The black figure: which has a value of 1 times.
- The dotted white figure: the dotted figure adds half its value, so it would be worth 3 times.

The measure of our score is four times four, so within each measure we will have to put figures worth 4 beats.
For the students to see it more clearly, we can carry out the following dynamic. We créate boxes in which they will take 4 times:

First staff line			
Second staff line			
Third staff line			
Fourth staff line			

(Print this table in order to complete with the cut outs paper you can see below)

In addition, we will have prepared cut outs on paper for the figures that we will use:

White figure – 2 times
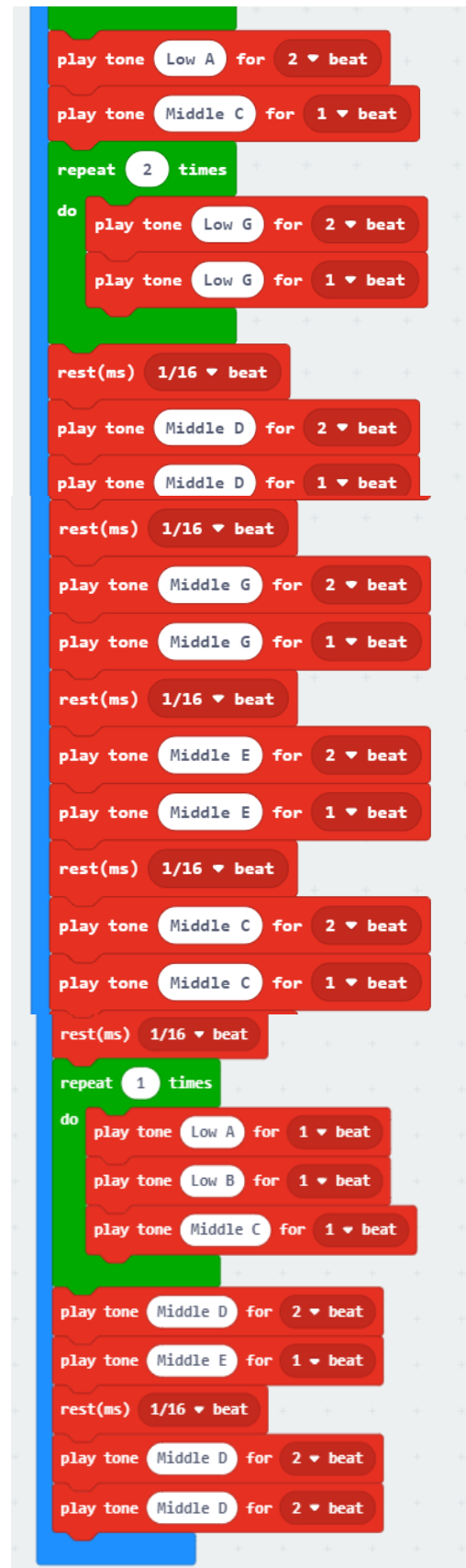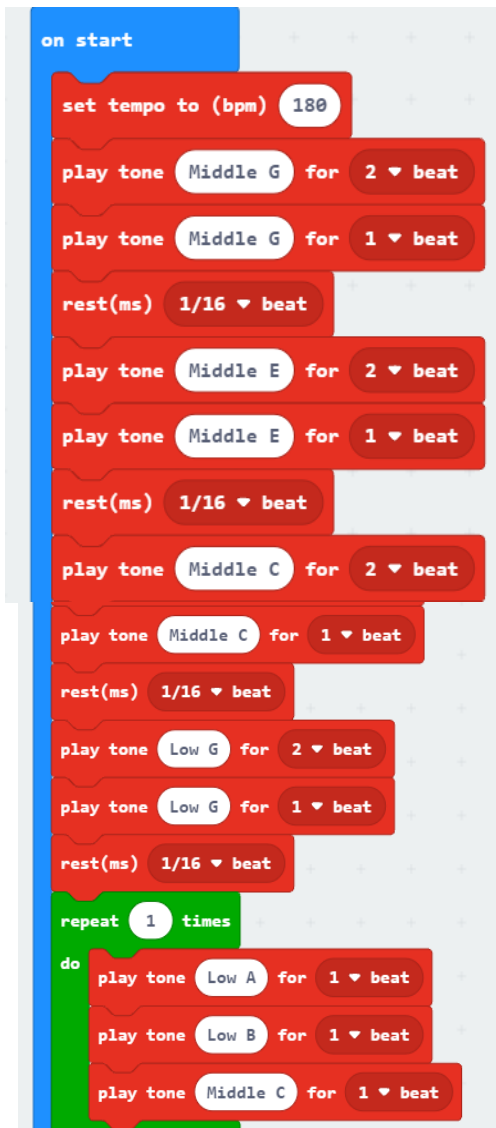

Black figure – 1 time. Its size is half of the White.

Using the grid and the scores, we will have to set the times of this melody. *(You can do it in a word processor or by hand)*

Activity 3: We programm the Microbit board

Once we have thought about the melody times, we can start programming them with MakeCode. The program would look like this:

Left column:

```
on start
  set tempo to (bpm) 180
  play tone Middle G for 2 ▼ beat
  play tone Middle G for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Middle E for 2 ▼ beat
  play tone Middle E for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Middle C for 2 ▼ beat
  play tone Middle C for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Low G for 2 ▼ beat
  play tone Low G for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  repeat 1 times
  do
    play tone Low A for 1 ▼ beat
    play tone Low B for 1 ▼ beat
    play tone Middle C for 1 ▼ beat
```

Right column:

```
  play tone Low A for 2 ▼ beat
  play tone Middle C for 1 ▼ beat
  repeat 2 times
  do
    play tone Low G for 2 ▼ beat
    play tone Low G for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Middle D for 2 ▼ beat
  play tone Middle D for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Middle G for 2 ▼ beat
  play tone Middle G for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Middle E for 2 ▼ beat
  play tone Middle E for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Middle C for 2 ▼ beat
  play tone Middle C for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  repeat 1 times
  do
    play tone Low A for 1 ▼ beat
    play tone Low B for 1 ▼ beat
    play tone Middle C for 1 ▼ beat
  play tone Middle D for 2 ▼ beat
  play tone Middle E for 1 ▼ beat
  rest(ms) 1/16 ▼ beat
  play tone Middle D for 2 ▼ beat
  play tone Middle D for 2 ▼ beat
```

As we can see, when pressing the "play" button, we activate the speaker and set the tempo to 180bpm (which is a little bit faster than the real melody).

From there, it consists of adding music programming blocks with the different notes and times. We will set the white ones at 2 beats, the black ones at 1 beat, etc.

All these blocks are in the music tab
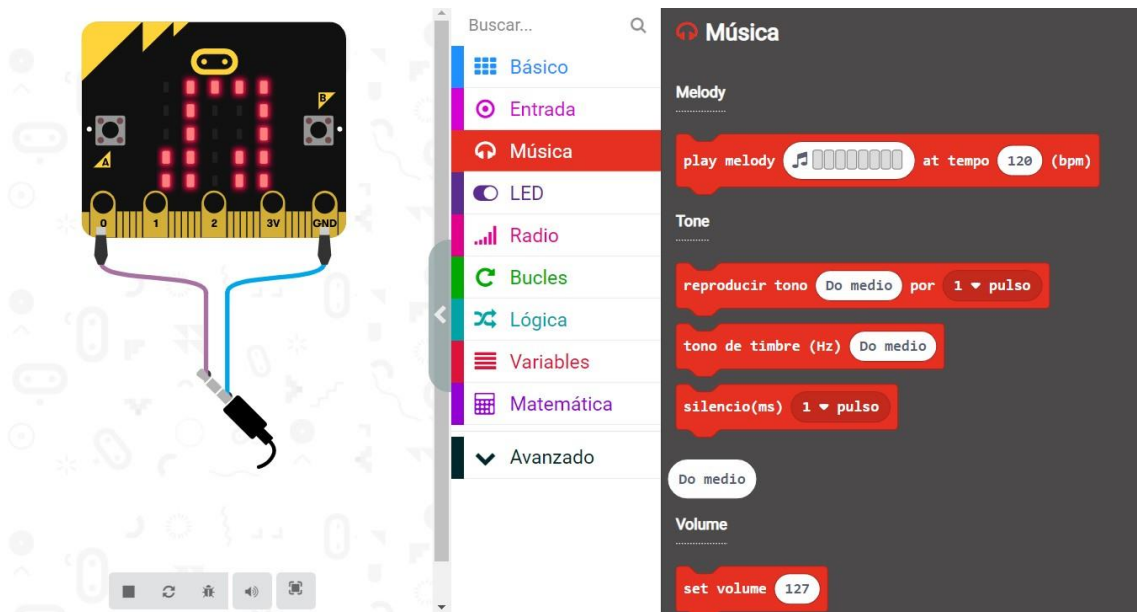
Before downloading the code to the Microbit, or if we do not have the board, we can check how our composition sounds by clicking the "play" button on the simulated board we have on the left side of the screen

Other activities

We can enrich this activity by proposing to the students some modifications. For instance:

- Change the initial button.

- Draw something on the screen while the song is playing.

- Program your favourite melody.