**Making Music with the BBC micro:bit and ScienceScope**

**Description**

Make music with the BBC micro:bit. Attach speakers with the jack cable (provided) or wire in a buzzer. Play your favourite tunes, compose music, add sound to games, create a micro:bit orchestra.

**Learn How To…**

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| C:\Users\David\Dropbox\BBC Project\edited images resized\Music microbit 02.jpg | Difficulty level: Advanced Time to complete: about 20 minutes  This tutorial will introduce you to the following:   * using the Microsoft TD coding language to create new code * Writing code to create and compose music * Creating sequences * Use pause as a way of timing events * Adding sound to events. * What sound is and how musical notation works   **PARTS NEEDED:** BBC micro:bit, cable as shown, speaker or headphones and buzzer (optional). |

**Background Information:**

1. A Western musical scale has 12 notes, at geometric frequency intervals. Every twelfth note is twice the frequency of the first, creating an octave. The micro:bit can create these frequencies by turning the speaker on and off again very fast.
2. The BBC micro:bit has code to produce notes at frequencies from the A below middle C to two Cs above middle C. The table below shows these notes with their associated values.

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| |  |  |  | | --- | --- | --- | | Number | Note | Frequency | | -2 | A3 | 219.6 | | -1 | A3# | 232.7 | | 0 | B3 | 246.5 | | 1 | C4 | 261.6 | | 2 | C4# | 277.2 | | 3 | D4 | 293.6 | | 4 | D4# | 311.1 | | 5 | E4 | 329.6 | | 6 | F4 | 349.2 | | 7 | F4# | 370.0 | | |  |  |  | | --- | --- | --- | | Number | Note | Frequency | | 8 | G4 | 392.0 | | 9 | G4# | 415.3 | | 10 | A4 | 440.0 | | 11 | A4# | 466.1 | | 12 | B4 | 493.8 | | 13 | C5 | 523.2 | | 14 | C5# | 554.3 | | 15 | D5 | 587.3 | | 16 | D5# | 622.2 | | 17 | E5 | 659.2 | | |  |  |  | | --- | --- | --- | | Number | Note | Frequency | | 18 | F5 | 698.4 | | 19 | F5# | 739.9 | | 20 | G5 | 783.9 | | 21 | G5# | 830.5 | | 22 | A5 | 879.9 | | 23 | A5# | 932.2 | | 24 | B5 | 987.7 | | 25 | C6 | 1046.4 | |

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| When you have done the tutorial below, choose a musical tune you wish to play and you are ready to start programming. You can either work from a musical score or by trial and error work out the musical note sequence you know. As an example here is Three Blind Mice.  1. Copied under creative commons license from http://www.8notes.com/scores/6605.asp?ftype=gif |  |

**Getting Started:**

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| Open the Basic Music Script at <https://www.microbit.co.uk/tjdpzj> which plays the first three notes of Three Blind Mice.  (1)  You will see the function ‘Music\_Note’. The first number in brackets is the note number according to the table. In this case the notes E4, D4, C4. The second number is the duration in tenths of a second. The line basic→pause(100) causes a pause of 100 milliseconds.  (2)  You now need to add more notes. To do this click on the line basic→pause(100). You will see two large + signs above and below the line. Click on the + sign below. This creates a new blank line in your code. Start typing with an “m” and the function Music\_Note will appear on the right hand side. Select it. (see (2) right).  (3)  Change the 0,0 to 5,6. You have now added one more note. To add a pause type “basic” and the pause function will appear. Select it and change the delay to the required number. In this case 100. Repeat these additions till you get the following which is the first line of the music. If you have time you can carry on to input all three lines of the music score shown above.  You can simulate your music on the computer by clicking on run main and then clicking on the A button on the image of the micro:bit. The quality of the simulation is not as good as running it on the device itself so to get it to work on your micro:bit compile your piece by clicking on compile. A hex file of your music will appear in your downloads folder. Simply drag and drop onto the BBC micro:bit like a memory stick. Once it has copied over the BBC micro:bit will eject itself from the computer and reconnect.  Connect your phone headphones to the BBC micro:bit using the cable provided. The 4mm plugs should be connected to pin 0 (red) and the gnd pin (black) on your micro:bit. Alternatively you can also connect the micro:bit to a computer microphone or speakers in with a standard 3.5mm jack lead.  Press the reset button on the back and press button A to play your music.  As a further example we have programmed the micro:bit to play the opening few bars of Haydn’s Trumpet Concerto which can be found as a shared program at <https://www.microbit.co.uk/zztzyk>  speakers in with a standard 3.5mm jack lead. | (1)    (2)    (3) |