**Musical micro:bit**

**Lesson 5: Evaluating micro:bit music**

**Introduction**

In this lesson, pupils use their knowledge and understanding to make changes to programs in response to challenges. They decompose their learning from the unit by considering the information that someone will need to make music using a BBC micro:bit and create slides for a presentation based on this idea. Pupils conclude the unit by evaluating the micro:bit as a device for making music.

**Time:** @60 minutes

**Learning objectives**

* To modify programs to meet given criteria
* To decompose learning from the unit
* To evaluate the micro:bit as a music-making device

**Materials needed:** lesson presentation, **starter hex file**, **Musical-challenges-A hex file**, **Musical-challenges-B hex file**, printouts of programing challenges sheet, printouts of slide 9, computers/laptops with access to MakeCode editor and presentation software, large paper for pupils to decompose their learning from the unit on.

**Lesson summary**

1. Introduction: Programming challenges (15 minutes)
2. Creating a guide (35 minutes)
3. Evaluating musical micro:bit (10 mins)

**Introduction: Programming challenges (15 minutes)**

* Display the **starter** program on **slide 3** and explain to pupils that you would like them to modify the program to meet each criterion on the slide. Invite suggestions for how each modification could be made, before using [the link (click on the program image)](https://makecode.microbit.org/#pub:_8saAWkXAk81g) or supplied **starter hex file** to open the program in the MakeCode editor and amend.
* Show the pupils the two programs on **slide 4** and explain that they are going to work with a partner to create challenges for one of the programs. If possible, split the class so that half of the pupils set challenges for [program A](https://makecode.microbit.org/#pub:_11rRjxWiW4Xt), and the other half set challenges for [program B](https://makecode.microbit.org/#pub:_7PE0wMTj11D4) (click code blocks for published project or use hex files supplied with lesson downloads).
* Allow pupils several minutes to set their challenges by recording them on the **programming challenges worksheet** and then ask pupils to team up with a pair creating challenges for the other program. Pupils then work with their partner to modify the given program (using **Musical challenges A & Musical challenges B hex files**) to meet the criteria set by the other group (**slide 5**). As pupils make each modification, they should explain what change they made to the program on the **programming challenges worksheet**. Examples of the challenges pupils may set and how they might be responded to are included on slide 14.

**Creating a guide (35 minutes)**

* Show **slide 6** and invite pupils to think/pair/share some reasons why people might be restricted from playing a musical instrument: fine motor skills, disability, cost of the instrument, etc. You may wish to share this [link](https://www.classicfm.com/music-news/poor-children-miss-out-music-dance/) with pupils that highlights the findings of a recent survey showing that pupils from poorer families are three-times less likely to play a musical instrument than children from wealthier families.
* Display **slide 7** and pose the question to pupils: could the micro:bit allow someone who is restricted from playing a musical instrument a way of making music? Ask pupils to think/pair/share their responses and allow pupils to respond to the ideas of others.
* Use **slide 8** to recap the term decomposition. Invite pupils to explain their understanding of the term and explain that it is the process by which a more complex problem is broken down into smaller problems and by solving these smaller problems the bigger problem is solved.
* Invite pupils to decompose the statement ‘programming the micro:bit to play music’ by asking them to reflect on their learning in the unit (further support could be given by asking what someone else would need to know if they wanted to make music on a micro:bit). Guide pupils’ thinking so they identify that they programmed the micro:bit to play musical phrases, they connected micro:bits to speakers/headphones, they used the micro:bit’s inputs to play the notes in an octave. Ask pupils to discuss their ideas in small groups and record these on a large sheet of paper.
* Use **slide 9** to explain to pupils that they are going to create two slides for a ‘How to make music using the micro:bit’ presentation. One slide should focus on how the micro:bit can be used to play musical phrases. The second slide should focus on how some of the inputs on a micro:bit can be used to play the notes in an octave. Each slide should contain a snapshot of their program (right-click on a blank area next to the program in the MakeCode editor and select snapshot), a brief explanation of parts of the program and a few challenges for a person using the guide to complete using the program as a starting point. Print out copies of this slide for pupils to refer to when creating their slides.
* Use **slide 10** to show pupils an example of what the slide might look like, though if you wish, encourage pupils to be creative. Identify how each part of the criteria on slide 9 has been met by this example.
* Give pupils time to work with a partner to use presentation software to produce two slides for a presentation on ‘How to make music using the micro:bit’that meet the criteria given on slide 9. Pupils should access the programs they have previously written in the unit.

**Evaluating musical micro:bit (10 mins)**

* Display **slide 11** and ask pupils to consider the strengths and weaknesses of programming the micro:bit to play a musical phrase and programing a micro:bit to play individual notes when certain inputs are used.
* Give pupils a copy of the slide and ask them to work with a partner to identify strengths and weaknesses for each (example comments on slide 13).
* After they have had sufficient time to discuss their ideas, invite pupils to share their ideas with the class.
* If you wish, revisit the learning outcomes of the lesson by using **slide 12**.

**Extension ideas**

* Pupils could research UNICEF’s rights of a child and focus on article 31: *every child has the right to relax, play and take part in a wide range of cultural and artistic activities.* Pupils could consider children who are not having this right met, the reasons this might be and how giving access to a micro:bit and the MakeCode editor could help this right to be met.

**Differentiation**

**Support:** Pupils could create a poster to replicate a slide as an adult-led shared writing activity. It would be useful to select the programs that are going to be used prior to the lesson and provide each member of the group with printouts of the program to help them explain the program and enlarged copies to stick on the poster.

**Stretch & challenge:** Pupils can be challenged to create an answer slide which should contain examples of the program after each change has been made in line with the challenges set.

**Opportunities for assessment**

* Informal assessments of pupils’ understanding of decomposition and their understanding of programing through whole class and paired activities.
* More formal assessment of pupils’ slides if you wish.