

Making Music with Code

Grade Level: K-8

Introduction:

Playing an instrument or singing isn't the only way to make music. In this STEM activity, you'll explore how to make music - with code! Much like traditional musicians, you'll have to use your eyes, ears, and fingers to hit the right notes and play the song correctly. Unlike traditional musicians, you'll be doing this with a keyboard and mouse!



Real World Connection:

From audio editing to auto-tuning, computers are fundamental in the modern production process for all types of musicians. With this close relationship in mind, Georgia Tech researchers are creating new ways of using music, a favorite topic of many teenagers, to teach computer coding through the *EarSketch* platform. Students who want to further explore creating music with code can continue their journey at ears sketch.gatech.edu.

Vocabulary to Know:

- Beat - a unit of time in music, indicates how long to play
- Note - describes the sound at which an instrument should be played
- Tempo - describes how quickly notes should be played in a piece of music
- Variable - a value or a number used in coding that can be changed

Activity 1: Making Music

Resources:

- [Microsoft MakeCode example](#)
- Song notes (just the letters works well), example: noobnotes.net
- Computer or tablet with speaker or headphones

Instructions:

1. Open the sample Microsoft MakeCode linked above. The MakeCode simulates the use of a device called an Adafruit Playground Express, however, we are just going to use the simulation. On the simulated device, click "shake" at the top of the circle.
2. Listen closely! Can you figure out which song is being played?
3. Use the structure of the code to play a song you like using simple song notes. If you can read music, then you can use that as well! One sample source of simple music notes is linked above, but feel free to find your own sources.
4. Use the music coding blocks to play the notes as they are indicated for your chosen song. What do you notice? Does it sound exactly the same? Think about what elements may be missing and play around in the code to see if you can recreate them.

Continued.

Activity 2: Changing the Tempo

Resources:

- [Microsoft MakeCode example #2](#)
- Song notes (just the letters works well), example: noobnotes.net
- Computer or tablet with speaker or headphones

Instructions:

1. You may have noticed that the song was too fast or too slow. Maybe you even played around with how long the beats were, or how long to wait before playing the next note. One way to change how quickly or slowly the notes are played is to change the tempo.
2. One way to change the tempo is to set the tempo using the Music block, as shown below. Try changing the tempo by typing in a number into the white space in the block. How does that impact the sound of the music?

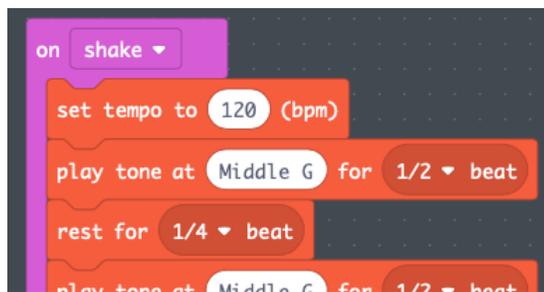


Image from MakeCode. <https://makecode.adafruit.com>

3. Another way to change the tempo is to use a *variable* in the white space of the block. You can control what number the variable represents by using a block from the “Variables” category and a block from the “Input” category”.
4. Examine the example given in the resources above. How does the use of the buttons on the Playground Express change the tempo?
5. Try to come up with other ways to change the tempo or use the tempo to do other things. Maybe make the LEDs light up when the beats are playing at a certain tempo!

Exploration Questions:

- Is there a benefit to using a variable, combined with a way to change that variable, rather than typing the tempo into the code?
- What other things in MakeCode do you think you can control by using a *variable*?
- See how complex you can create a recreation of a song using MakeCode.

Additional Resources:

- [EarSketch](#)