


MISSION 5: Micro Musician		Time: 45 minutes
<p><b>Overview:</b></p> <p>Computers and music go great together! This project brings together coding, electronics, and music. The CodeX has a built-in speaker, and there are lots of built-in tunes to play, so this is a short and sweet project to begin expanding students' view of the possible ways they can use coding.</p>		<p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>I can make the CodeX play music through the speaker or headphones</li> <li>I can add comments to my code to make it readable by all</li> </ul>
<p><b>Standards:</b></p> <p><b>2-CS-03</b> Systematically identify and fix problems with computing devices and their components</p> <p><b>2-AP-16</b> Incorporate existing code, media, and libraries into original programs and give attribution.</p> <p><b>2-AP-19</b> Document programs in order to make them easier to follow, test, and debug.</p>	<p><b>CSP Framework:</b></p> <p><b>Big Idea 2.1 – DAT-1.A</b> Explain how data can be represented using bits.</p> <p><b>Computational Thinking Practices:</b></p> <p>4.C Identify and correct errors in algorithms and programs, including error discovery through testing.</p> <p>6.A Collaborate in the development of solutions.</p>	<p><b>Key Concepts:</b></p> <ul style="list-style-type: none"> <li><b>Program readability</b> is important and can be accomplished by using blank lines and adding comments to the code.</li> <li><b>Batteries</b> in the CodeX can make your code portable.</li> </ul>
<p><b>Preparation:</b></p> <p><b>Make a copy</b> of the assignment or put it in the LMS.</p> <p><b>Prepare</b> any formative assessments you want to use in the wrap-up</p> <p><b>Each student/pair</b> needs</p> <ul style="list-style-type: none"> <li>a computer/ Chrome</li> <li>a CodeX &amp; USB cable</li> <li>assignment guide</li> <li>Batteries (optional)</li> </ul>	<p><b>Links:</b></p> <ul style="list-style-type: none"> <li><a href="#">Assignment</a></li> <li><a href="#">Analog and Digital slides</a></li> <li><a href="#">Adding audio files</a></li> <li><a href="#">Youtube demo</a></li> <li>Daily reflection form</li> <li><a href="#">Review Kahoot #2</a> (after 4)</li> <li><a href="#">Review Kahoot #3</a> (after 5)</li> <li><a href="#">Meaningful Notes</a> (after 4)</li> </ul>	<p><b>Agenda:</b></p> <ul style="list-style-type: none"> <li>Warm-up (5-15 minutes)</li> <li>Mission 5 (15-20 minutes)</li> <li>Wrap-up &amp; Assessment (5 minutes)</li> </ul>
<p><b>Vocabulary:</b></p> <ul style="list-style-type: none"> <li><b>Readability:</b> Making code easy to understand for humans.</li> <li><b>Comments:</b> Notes in code that are ignored by the computer but can explain what the code does</li> </ul> <p>These vocab words are not specifically in the Mission instructions, but are included in the warm-up and can be added either in warm-up or wrap-up. Should be covered for the AP exam.</p> <ul style="list-style-type: none"> <li><b>Analog:</b> Smooth and continuous signals that represent a quantity, like sound waves</li> <li><b>Digital:</b> A numerical representation of an analog signal, represented in increments</li> </ul>		
<p><b>Assessment:</b></p> <ul style="list-style-type: none"> <li>Daily reflection journal or <a href="#">Google form</a></li> <li>Review Kahoot: <a href="https://create.kahoot.it/share/firia-labs-ap-csp-mission-5/534e2027-355c-432d-bd71-c29384bd326c">https://create.kahoot.it/share/firia-labs-ap-csp-mission-5/534e2027-355c-432d-bd71-c29384bd326c</a></li> <li>More suggestions listed below in the Walk-Through Wrap-up</li> </ul>		


## Teaching Guide

### Warm-up (5 - 15 minutes)

The actual coding part of this Mission is much shorter than Mission 4. You should have time to do some coding review, and also introduce analog, digital and music before starting the coding portion of the project. Depending on the length of your warm-up and how quickly students complete the standard Mission, they may have time to do the extension.

 Review concepts from Mission 4 by playing the Kahoot! Especially if you didn't have time to do the Kahoot during the mission. [Review Kahoot #2](#). This mission is a bit shorter than other missions, so you can take some time to review if needed. If not, do a short review and head to the mission. There are extensions to this lesson, and you can do an extended wrap-up instead of extended warm-up. Look over your options and pick what is best for your students.

**NOTE:** This discussion can be used for the wrap-up instead of the warm-up – teacher discretion.


 **Discuss** – Use a discussion strategy, like journaling, working at boards, selecting random students, or a form of think-pair-share.

- Topic: What is analog and digital sound? You can ask students what they already know about these terms and/or music. Use the [slide deck on digital and analog](#) to provide a mental model and definitions. The following youtube video from NBC News Learn about analog and digital sound is referenced in the slide deck: [https://www.youtube.com/watch?v=IP\\_8rIhG-js](https://www.youtube.com/watch?v=IP_8rIhG-js) (approximately 5 minutes)

### Activity – Mission #5 (15-20 minutes; if doing the extension of adding sounds, it could take longer)

 Randomly group students into pairs for pair programming.

Students log in to one computer. Two computers can be used if they want to see instructions on one computer and work on the other computer. However, the assignment document requires snippets, so it will need to be open on the same computer as CodeSpace.

 **Teaching tip – Before they start:**

Review the [Mission Reminders slides](#) from Mission 1.

Remind students that they need to document their errors and how they fixed them. There is a table at the end of the document for this.

Students go to [sims.firialabs.com](https://sims.firialabs.com) and should be at the beginning of Mission 5

 **Teaching tip – Objective 1:**

Students will need to click on the toolbox for information and the sounds collection.


Decimal numbers 0-9, button labels, plus a few songs and surprises await you in the built-in sound collection!

CodeX Sounds sounds/...			
a.mp3	eight.mp3	off.mp3	six.mp3
africa.mp3	five.mp3	okay.mp3	techstyle.mp3
b.mp3	four.mp3	on.mp3	ten.mp3
bohemia.mp3	funk.mp3	one.mp3	three.mp3
button.mp3	led.mp3	power.mp3	two.mp3
codetrek.mp3	left.mp3	right.mp3	up.mp3
codex.mp3	mic.mp3	roll.mp3	welcome.mp3
display.mp3	nine.mp3	seven.mp3	yes.mp3
down.mp3	no.mp3	shire.mp3	zero.mp3

**Example: Play welcome message.**

```
from codex import *
audio.mp3('sounds/welcome')
```

#### Teaching tip – Objective 4:

Students experiment playing different sounds/songs on the CodeX, using the built-in audio files. The examples have the name of the audio file, but it doesn't include sounds/. To play a built-in file, they must include **sounds/** in front of the name, and the entire name needs to be in “. This is in the  *Hint* in case they look there.

**NOTE:** Students may want to stop the play of a long song. At this time, that cannot be done, other than restarting the CodeX or clicking STOP for the program execution. Once it starts, it will play through before anything else happens.


#### Teaching tip – Objective 6:

This objective has students put batteries in the CodeX and run their program “unplugged.” If you don't have batteries, the students can still complete the mission, since the only requirement is to find the BATT switch on the simulator. However, if you have batteries, it is a good experience for the students to try it out here.


#### Teaching tip – Extension:


This mission should take a regular class period with the warm-up and wrap-up. However, if some students finish early, they may have time for an extension. Students can come up with their own idea, or try one of these:

- Create a string variable for the audio file and use it in your code
- Add your own audio files and use them in a program ([follow these instructions](#))
- Program several buttons to play music
- Before the music plays, add one or more of these:
  - Turn on the color of the pixels
  - Display an image
  - Fill the screen with a color

 Assignment is complete and ready to turn in. Both students should include their names on the document.

## Wrap-Up (5 minutes)

 **Discuss** – Use a discussion strategy, like journaling, working at boards, selecting random students, or a form of think-pair-share.

 Discuss real-world applications of digital music. Some examples include:

- Musical gift cards
- Ringtones
- Drum Machines
- Keyboard Synthesizers

### IMPORTANT!!

Students should clear their CodeX by running their ClearCodeX program.

If students haven't created a “clear” program yet, they can follow the steps in this [slide deck](#).

### MEANINGFUL NOTES.

If you have time for an extended wrap-up, this is an excellent time to start [meaningful notes](#) – or notes to their future forgetful selves (note making). Their programming journal has a section for meaningful notes that they have probably skipped up until this point. Meaningful notes can be done in groups of three at white boards, or however you choose for the most student engagement. I don't recommend leaving this as homework (lower



engagement and less participation).

If you have students work collaboratively, standing at white boards, you can take pictures of their notes and assemble them into a shared Google Doc for the students to use and reference as needed.

Also, if you have time, students can return to their seats and write their own notes. I suggest having them do only Quadrant C and D (their own example and things to remember). All groups are doing Quadrant A and B, and it should be the same for everyone, which you can document and share. If you are taking pictures of their notes, you can pick the best Quadrant A and B to post, and then everyone else's C and D.

You can refer to the slide deck on meaningful notes, linked above. This information should be given to the students the first time you do meaningful notes. You can use the slide deck, or just present the information in the slide deck to the group.

✓ If this lesson is completed in one class period, the following can be used as a wrap-up. If you are on a block schedule and continuing to the next lesson, a wrap-up isn't necessary.

Formative Assessment:

- Daily reflection journal or Google form (use your link)
- Completion of assignment and/or mission
- Kahoot (in class or individual):  
<https://create.kahoot.it/share/firia-labs-ap-csp-mission-5/534e2027-355c-432d-bd71-c29384bd326c>
- Exit ticket on vocabulary (many to choose from)
- Group review on vocabulary (many to choose from)
- Students add to their programming journals (vocabulary and debugging chart)

**SUCCESS CRITERIA:**

- Create a program that plays an audio file on the CodeX
- Add readability to your program by adding blank lines and comments
- Debug any errors in the code and keep a debugging table