

Lesson 11: Making Music

Overview

In this lesson students will use the buzzer to its full extent by producing sounds, notes, and songs with the buzzer. Students start with a short review of the buzzer's frequency and duration parameters, then move on to the concept of notes. Notes allow students to constrain themselves to frequencies that are used in Western music and provide a layer of abstraction that helps them to understand which frequencies might sound good together. Once students are able to play notes on the buzzer, they use arrays to hold and play sequences of notes, forming simple songs.

Purpose

This lesson allows students to get more creative with the buzzer by introducing the concept of a "note" and by using arrays to hold sequential collections of notes. Using notes rather than frequencies provides a layer of abstraction that makes it easier for students to identify sounds that can be used to make music. Arrays provide a way to group together sounds in sequence, so that they can be played as music. Using the `playNotes` block to iterate over an array of notes provides a conceptual foundation for working with `for` loops in the next lesson.

Assessment Opportunities

1. Create and modify an array

Code Studio: see rubric on bubble 7

2. Use the buzzer to produce sequences of notes

Code Studio: see rubric on bubble 11

3. Recognize an array as a list of elements that can be operated on sequentially.

Wrap up: Students should recognize that the `playNotes` block operates on each element of the notes array in sequence.

Agenda

Warm-Up (5 minutes)

Color LEDs vs the Buzzer

Activity (35 minutes)

Objectives

Students will be able to:

- Create and modify an array
- Recognize an array as a list of elements that can be operated on sequentially.
- Use the buzzer to produce sequences of notes

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the teachers

- **CSD Unit 6 - Physical Computing**
 - Slides
- **Playing Notes** - Resource
- **Producing Output** - Resource

Introduced Code

- `buzzer.note(note, duration)`
- `buzzer.playNotes(notes, tempo)`
- `list.length`
- `var list = ["a", "b", "d"];`

Making Music

Wrap-Up (5 minutes)

Journal

Teaching Guide

Warm-Up (5 minutes)

Color LEDs vs the Buzzer

Prompt: We've been using the buzzer to make sounds, but those buzzes didn't always sound too great. What do you think you need to make real music on the buzzer?

Discussion Goal

Students may come up with many different ideas, but there are two aspects of this problem that should be highlighted before students move on to the activity. First, specifying frequencies is not the best way to indicate how high or low a buzz should be, since music only uses a limited number of frequencies, and other frequencies are considered "out of tune". Music is usually written down as specific notes on a scale, which makes it much easier to see which sounds will go well together. (Students with a musical background will likely have a much better grasp of this issue.) Second, students will need a way to string sounds, or notes, together to make a song. This second point should be more universally understood.

Activity (35 minutes)

Making Music

Transition: Send students to Code Studio.



1-4

Playing Notes

1

2

3

4



5-7

Musical Arrays

5

6

7

Assessment Opportunity

Level 7: You can use this level as a formative assessment for students. Click inside the level to view a rubric and leave feedback to your students



8-11

Making Songs

8

9

10

11



✓ Assessment Opportunity ▲

Level 11: You can use this level as a formative assessment for students. Click inside the level to view a rubric and leave feedback to your students



12-13

Extra



Wrap-Up (5 minutes)

Journal

Prompt: Today, instead of just choosing one element from an array, we used the `playNotes` block to do something to every element. Think back to the other arrays you have seen. How might doing something to every element in an array be useful there?

✓ Assessment Opportunity ▲

Students should recognize that the `playNotes` block plays each note in the array in sequence, and extend that idea to other times when operating on each element of an array would be useful. This will prepare them to for the next lesson, in which for loops are used to operate on each element of a list in sequence.

Share After giving students time to reflect in their own journals, have them share with a partner or in small groups.