

# RESIDENCY PLAN

## Artist Contact Information

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## Residency Title

**The Science of Sound: Exploring Science Through Musical Instrumentation**

**Led by:** Chris Kahl

**For students in grades:** 3-6

## Scope

**Number of Sessions:** 5

**Time length of Sessions:** 40-50 minutes

**Preferred Timeline:** 1 session per week

**Maximum number of classes that can be served:** 3

## Description

In this residency, students explore the connections between science and music by studying and creating musical instruments. Specifically, students will construct and use instruments to demonstrate their understanding of pitch, frequency, wavelength and timbre. The residency culminates in students undertaking an arts design challenge. Chris Kahl, musician and teaching artist, will lead students through this engaging STEAM arts-integrated residency.

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## Rationale

This STEAM arts-integrated residency engages and motivates students to learn while developing critical thinking and problem solving skills.

Essential Question: How do we explore science through music?

Focus Standards: SC.4.P.10.3, MU.4.F.1.1

Other Standards covered: MU.3.F.3.1, MU.4.H.3.1, MU.5.C.1.2, SC.3.P.8.3, SC.4.P.8.1, SC.5.P.10.1

Marzano Design Question 4 – 22. Engaging students in cognitively complex tasks involving hypothesis generation and testing.

## Expected Results

**The students will know:**

- 1. How musical instruments work.**
- 2. How components of pitch and timbre relate to different instruments.**
- 3. Concepts of sound waves and how they travel.**
- 4. Definition of pitch, frequency, wavelength and timbre.**

**The students will be able to:**

- 1. Construct musical instruments, and identify various components of sound.**
- 2. Compare and contrast different instruments and their sound qualities.**
- 3. Demonstrate physically, and through measurement, how pitch, frequency, and wavelength relates to sound waves.**
- 4. Demonstrate sonically the components of pitch and timbre.**

**The students will appreciate:**

- 1. The process of constructing an instrument.**
- 2. The thought behind choosing an instrument for a specific sound.**
- 3. How sound can be explained through science.**
- 4. Their own ability to demonstrate the scientific qualities of sound.**

## Logistical Factors

**The school must provide:** Classroom space (either a classroom, media center space, or open room). A projector, screen, and laptop. Paper plates, beans (small and lima), rice, staples, crayons, straws, tape, craft sticks, string, rulers, beakers, food coloring.

# RESIDENCY OVERVIEW

SESSION	DESCRIPTION
Artist Performance/ Demo/Exhibit	Chris Kahl – The Science of Sound: Exploring Science Through Musical Instrumentation

## CONTENT KNOWLEDGE STUDENTS NEED BEFORE THE RESIDENCY BEGINS

Students should be familiar with various musical instruments. They should also have an understanding of what a musician does.

SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
Classroom Session #1	<p>Essential Question: How does a musician use different instruments and sounds to create a song?</p> <ol style="list-style-type: none"> <li>1. Preview the residency: Explain what will take place during the sessions.</li> <li>2. Artist will introduce his instruments and folk music style by performing a song.</li> <li>3. Students will compare and contrast the acoustic guitar to the mandolin.</li> <li>4. Students will have a chance to play the lap steel guitar.</li> <li>5. Artist will lead a reflection.</li> </ol>	<ul style="list-style-type: none"> <li>• Observe</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare materials</li> </ul>

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SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
<b>Classroom Session #2</b>	<p>Essential Question: How does sound travel, and how is it measured?</p> <ol style="list-style-type: none"> <li>1. Artist will introduce the concepts of sound (pitch, frequency, wavelength).</li> <li>2. Artist will lead students in the activity titled Stringwaves.</li> <li>3. Students will participate in STEAM-related exercises and activities to demonstrate understanding.</li> <li>4. Artist will lead a reflection.</li> </ol>	<ul style="list-style-type: none"> <li>• Observe</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare materials</li> </ul>

SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
<b>Classroom Session #3</b>	<p>Essential Question: How do the components of an instrument affect pitch?</p> <ol style="list-style-type: none"> <li>1. Artist will lead students in constructing a pan flute made of straws.</li> <li>2. Students will demonstrate their understanding of pitch, frequency, and wavelength using their instrument.</li> <li>3. Artist will lead a reflection.</li> </ol>	<ul style="list-style-type: none"> <li>• Observe</li> <li>• Assist</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare materials</li> </ul>

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SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
<b>Classroom Session #4</b>	<p>Essential Question: How does the material used to make an instrument affect timbre?</p> <ol style="list-style-type: none"> <li>1. Artist will lead students in constructing a percussion instrument.</li> <li>2. Students will experiment in timbre using their instrument.</li> <li>3. Students will participate in a rhythmic activity titled Rainforest Rhapsody.</li> <li>4. Artist will lead a reflection.</li> </ol>	<ul style="list-style-type: none"> <li>• Observe</li> <li>• Assist</li> </ul>	<ul style="list-style-type: none"> <li>• Prepare materials</li> </ul>

SESSION	OVERVIEW	TEACHER ROLE During Sessions	TEACHER ROLE Before Next Session
<b>Classroom Session #5</b>	<p>Essential Question: How do we use our prior knowledge to generate a hypothesis, and solve an arts design challenge?</p> <ol style="list-style-type: none"> <li>1. Artist will lead students in an arts design challenge.</li> <li>2. Students will use their knowledge of prior lessons to solve a STEAM-related music problem working in groups.</li> <li>3. Artist will lead a reflection.</li> </ol>	<ul style="list-style-type: none"> <li>• Observe</li> <li>• Assist</li> <li>• Document activities (photos, written notation)</li> </ul>	<ul style="list-style-type: none"> <li>• Lead A Reflection</li> </ul>

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SESSION	DESCRIPTION
<b>Culminating Session</b>	<p>Artist will lead students in a share-formance.</p> <p>Students will share their knowledge gained in the residency lessons while presenting to administrators and guests.</p>

Optional components for this residency include a Planning Meeting with participating teachers, follow up Reflection Meetings in between Classroom Sessions and a Follow-Up Evaluation Meeting.

## RESUME AND REFERENCES

Pablo Remonsellez – Brevard Cultural Alliance  
Bill Yoh – Stevenson Elementary Music Teacher  
Mary Palmer – Mary Palmer and Associates