



Sounds of STEAM Country

LESSON OBJECTIVES

Students will be able to:

- **engage** in a hands-on exploration to learn about sound energy.
- **discover** how energy is transferred; and
- **apply knowledge** learned about producing sound, wave lengths, patterns, and frequency to create a garage band show/music concert.

GRADE RANGE

3–8

DURATION

One class session (approximately 45–60 minutes)

LESSON OVERVIEW

How do music producers distinguish the different sounds of Country Music?

Drawing on the video, featuring Aaron Farmer, in the CMA Video Topic Series, students will step into the shoes of a musical director, embarking upon the journey of exploring and gathering evidence to understand the unique sounds of Country Music. Students will discover how energy is transferred and will engage in a hands-on exploration to learn about sound energy. Through research of the history and sound of Country Music, students will learn how objects produce sound, wavelengths, patterns, and frequency. Students will connect this to mathematics and be introduced to wave frequency as it relates to decibels, echo, and noise reduction. Throughout this activity, students will practice using the skills needed to be a musical director and work in harmony with other music professionals. These skills include but are not limited to communication, leadership, problem solving, organization, patience, teamwork, and creativity.

KEY STUDENT QUESTIONS

What is sound energy? How is sound energy used to create Country Music?

NATIONAL CONTENT STANDARDS

Next Generation Science Standards

Engineering Design

4-PS4-3

Students who demonstrate understanding can:

Generate and compare multiple solutions that use patterns to transfer information.

PS4-1

Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

MS-PS4-2

Waves and their Applications in Technologies for Information Transfer.

National Literacy Standards

- Identify and explain how illustrations and words contribute to and clarify a text.
- Use information gained from illustrations and the words in a text to demonstrate understanding of a text.
- Prepare for and participate effectively in a range of conversations and collaborations with varied partners, building on others' ideas and expressing one's own ideas clearly and persuasively.
- Integrate and evaluate information presented in diverse media formats, such as visual, quantitative, and oral formats.

NCA General Music Standards

- Demonstrate selected and developed musical ideas for improvisations, arrangements, or compositions to express intent, and explain connection to purpose and context.
- Select, organize, construct, and document personal musical ideas for arrangements and/or compositions within AB or ABA form that demonstrate an effective beginning, middle, and ending, and convey expressive intent.
- Demonstrate and explain how intent is conveyed through interpretive decisions and expressive qualities (such as dynamics, tempo, timbre, and articulation/style).
- Select or choose music for listening and explain the connections to specific interests or experiences for a specific purpose.
- Describe a personal interpretation of how creators' and performers' application of the elements of music and expressive qualities, within genres and cultural and historical context, convey expressive intent.

MATERIALS

- [Sounds of STEAM](#)—video
- Internet device with ability to project video, one per educator
- Device with internet access, one per group
- Preselected Country Music videos
- Calculating Sound Student Capture Sheet, one per group
- Stopwatch
- Measuring tape

BACKGROUND INFORMATION

Sound is energy that travels in waves and helps us to communicate, listen to music, and alerts us to the environment around us. When a drum is struck, a string plucked, or any other object is moved in some way, it vibrates and creates sound. You can both hear and feel sound energy. Sound moves through air, water, and other mediums. The louder a sound, is the more energy being transferred to air particles and the surrounding objects. As sound energy is transferred to the air, it causes molecules to move, compress, and expand. This creates sound waves that move or vibrate at different rates, which is also called frequency. Faster vibrations generate more waves per second, causing a higher frequency. The opposite is also true and contributes to how we hear frequencies, which is known as pitch. Frequency and wavelength are inversely proportional to each other. The wave with the greatest frequency has the shortest wavelength. The shorter the wavelength, the higher the frequency, and the higher the pitch of the sound. The unit we use to measure sound waves is called Hertz (Hz). The faster molecules vibrate, the higher the frequency, and the higher the Hertz. A flute has a high Hertz, while a bass has a low Hertz. To measure sound intensity, we use the decibel.

Music is the combination of instrumental or vocal sounds produced in harmony and is often used to express emotion. Music is universal and cultural. Just as every human culture has a language, every human culture has music. However, from culture to culture music differs in pitch, tempo, and rhythm. According to the [Smithsonian Museum of Natural History](#), humans have been making musical instruments for at least 35,000 years. Music often brings people of various backgrounds together, uniting them in the emotional and artful experience together. There are various genres of music enjoyed by people across the world. One of the many genres people across the globe enjoy is Country Music. The origins of Country Music began in the early 1900s and incorporated elements of blues, bluegrass, folk, and rural dance music. This lesson will explore how sound and specific instruments come together to produce Country Music. Students will have the opportunity to apply and connect real world applications as they discover how sound can differ. Students will explore the characteristics and properties of sound. They will also make career connections and meet the music producer Aaron Farmer, who has a diverse background in music production and creation.

It may be helpful to take a moment to explore <https://www.cmaworld.com/> in order to become more familiar with these characteristics and get a glimpse inside the diverse world of Country Music. Prior to the start of this lesson, it is recommended that you become familiar with the different digital options available to you and your students in order to decide which tools would work best within your learning environment. The suggested tools to create, record, and review sound clips are: [Chrome Music Lab](#), [Garageband](#), [Audacity](#), [Veed](#) or another tool of your choice. Students will use one of these apps to create a short piece of music based on their learning. View a video on how to use the Chrome Music Lab, students will use this app to create a short piece of music based on their learning.

SESSION FLOW

ENGAGE | LISTENING PARTY

- Begin the session by explaining to students that they will be learning about sound and how objects produce wavelengths, patterns, frequency and sound. Divide students into groups of two or three and have them listen to preselected music videos. Share the following guiding questions with the students:
 - What instrument(s) do I hear?
 - How do I know it is that instrument(s)?
- Students will capture their thoughts in a note catcher independently to share with their team and then share out to the whole class.

Assign each group preselected Country Music. Two examples are included below:

- **Song 1:** "Meant to Be"
If another song is selected, ensure that the tempo of the song is similar.
- **Song 2:** "The Git Up"
If another song is selected, ensure that the tempo of the song is similar.
- As students discuss/share their observations and reasoning for the instrument selection, listen to students' responses.
- Using the participation protocol [Whip Around](#), have students share similarities/differences in the sounds and how they connected to the different sounds they heard. Record responses on the board, as students share out.

Teacher Note: *This will help to gauge student knowledge about Country Music.*

LEARN | INVESTIGATE/VIEW: EXPLORING THE SOUNDS OF COUNTRY MUSIC

Inquiry Question

What triggers the meaning: *making* sound?

- Introduce this portion of the activity, by showing students a CMA STEAM Country sound video of Aaron explaining the characteristics of sound and how different the speed, frequency, period, and wavelength of a song affects how a person hears sound. Students will use a thinking routine to record what they:
 - see (evidence)
 - think (opinion); and
 - question (explore)

Teacher Note: *This can be done in student journals by drawing three columns (See example below) with the labels above. This will be used to help students gain a greater understanding of how sound is captured in music.*

What Do You See?	What Do You Think?	What Questions Do You Have?

CAREER CONNECTION | AARON FARMER

Inquiry Questions

- What does a musical director do?
- How do you think sounds come together to create music?
- What makes music universal?
- Students will take a deep dive into the work of Aaron Farmer and how he uses sound to produce music. The goal is for students to use their learning from the previous activity to understand the difference between sound and music, discovering that music is a compilation of different sounds. They will view two or more segments of the video to see how Aaron blends the sounds of the different instruments to produce music (connecting the student learning with how sound patterns, the wavelength, frequency, and properties of sound are important for each individual instrument to produce music).

Teacher note: *Before moving to the next section. Have a conversation about what makes universal and why it brings us together, drawing on a quote from Aaron Farmer: "It is important to bring diversity to music because music is universal. Music is a universal language. We all speak it. We all love it. We all relate to it. We all connect with it. We all cry, laugh, find something in common with it."*

- **Application of Knowledge:** Students will examine and explore the [Aaron Farmer website](#) to discover more about how he produces sound and the work he has done. They will research how Aaron produces different sounds, patterns, wavelengths, and frequencies to create music from the samples on his site. Students will use a [Jigsaw Capture Sheet](#) to complete this activity.

APPLY

- Students will brainstorm and create a sound clip using [Chrome Music Lab](#), [Audacity Music](#) or similar software, drawing from the Aaron Farmer video by effectively producing a series of sounds using the unique sound of Country Music instruments.

Teacher Note: *Another alternative is to connect with your music teacher and have students use instruments to create sound clips and create music.*

CHALLENGE | CALCULATING SOUND

- Collection of Data—Students will utilize the Calculating Sound Student Capture Sheet to create a graph/chart to communicate information gathered during connection activity (see attached Student Capture Sheet).
- Students will work in pairs throughout this activity. For trial 1, Student A will create a sound (e.g clap, etc.) while Student B records the time they hear the sound. Using a stopwatch, students will record the time, in seconds, that the sound traveled in a given distance (in feet). The purpose is to calculate the speed of sound, $s = \text{distance} / \text{time}$ (feet/second, inches/seconds, cm/second). [How to create a graph](#)
- Calculating Sound Student Capture Sheet | [Teacher Resource](#)

Trial	Distance (ft)	T (seconds)	Speed = distance/time
1			
2			

REFLECT

- Students will reflect on key ideas of sound in music. Have students stand in a [Fishbowl Protocol](#) to share out the unique characteristics of Country Music and what excited them the most about today's learning, what inspired them the most about Aaron Farmer, and/or careers in music production. Ask students to share any other careers in Country Music that they noticed throughout the video and activity.
- Exit Ticket (optional): According to your reading and observations today, what changes in an instrument produce different sounds?

Teacher Note: Consider sending students home with the Family Activity: Family Superstar, to allow students to continue their learning at home.

FORMATIVE ASSESSMENTS SUGGESTIONS (OPTIONAL)

- Inquiry Questions
- Traveling Waves Drawing
- Team Collaboration Rubric
- Jigsaw
- Exit Ticket
- Graphic Organizer
- Data Analyses of Sound
- Journal Reflections
- Peer Review

LEARNING EXTENSIONS

Connect with a music teacher and have students observe how different instruments create sound. Have students describe the sound that comes from using various instruments such as a banjo, [piano](#), drums, fiddle, harmonica, mandolin, acoustic guitar, accordion, upright bass, electric guitar, etc.

Teacher Note: *If your school, campus, or district does not have a music teacher, consider using videos that feature various instruments as a replacement. (http://www.musictechteacher.com/music_quizzes/aq_identify_the_instrument_sounds/story_html5.html)*

Experiment with the interactive apps (e.g. [Soundwave](#), [Spectrogram](#) and tools at the [Chrome music lab](#)), then write a brief paragraph explaining what scientific or mathematical principle each tool is based upon.

Jigsaw Activity

Name _____ Date _____

In teams, complete the Jigsaw puzzle below to explore the [Aaron Farmer website](#) to learn more about how he produces sound and the work he has done. Research how Aaron produces different sounds, patterns, wavelengths and frequencies to create music from the samples on his site.

Important Ideas 1. 2. 3.	Try to think of at least two examples from your personal experiences to illustrate your important ideas.
The most important things I learned, that I want to share with my team:	Something new that I learned from my research: (Write a few sentences or draw a visual representation)
At least two questions that I have:	

Calculating Sound

Name _____ Date _____

In pairs, use the chart below to communicate how sound travels. You will complete 3 to 4 trials to collect data. You will need the following materials: measuring tape and stopwatch.

For trial 1, Student A will create a sound (e.g clap, etc.) while Student B records the time they hear the sound. Using a stopwatch, students will record the time (in seconds) that the sound traveled in a given distance (in feet). The purpose is to calculate the speed of sound, $s = \text{distance}/\text{time}$ (feet/second, inches/seconds, cm/second).

Trials	Distance (ft)	T (seconds)	= Speed (ft/s)
1			
2			
3			
4			

Predict	
What did you observe	
Explain/ Summarize	

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Family Activity

Dear Parent/Guardian/Family Member,

Your student has been learning about how sounds come together to create music. During this lesson, students learned about properties of sound: speed, frequency, and wavelengths. They also discovered what a music producer does and why properties of sound are important within this career field.

Continue your student's learning, at home, by joining in and participating in the CMA Family Activity: Family Superstar. This activity can be found at: CMAWorkinginHarmony.com/Activities. We encourage you to have fun and play as a family in order to reinforce learning and encourage your child to continue their curiosity at home.

For more family activities that support your student's learning visit: CMAWorkinginHarmony.com.

We hope you continue learning together about the power of STEAM and the diverse careers available within the Country Music industry.

Have fun learning together!

