

Shonda Baggette

Arts Integrated STEM Lesson

Lesson Title: Sound and Percussion

Targeted Grade Level: K-2

Time: 4 – 5 days (45 minutes per lessons)

NGSS Performance Expectations (for the lesson)

- *1-PS4-1. Plan and conduct investigations to give evidence that vibrating materials can make sound and that sound can make materials vibrate.*
- *1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*

| Science and Engineering Practices | Disciplinary Core Ideas | Crosscutting Concepts: |
|---|---|---|
| <ul style="list-style-type: none">• Planning and Carrying out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1), (1-PS4-3)• Construction Explanations and Designing Solutions Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.• Obtaining, Evaluating, | <p>PS4.A: Wave Properties Sound can make matter vibrate, and vibrating matter can make a sound. (1-PS4-1)</p> <p>*ETS1.B: Developing Possible Solutions ♣ Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)</p> | <ul style="list-style-type: none">• Cause and Effect• Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2), (1-PS4-3)• Scale Proportion and Quantity, The shape and stability of structures of natural and designed objects, are related to their function(s). (K-2- ETS1-2)• Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science, on Society and the Natural World. People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4) |

**and Communicating
Information**

Common Core State Standards:

CCSS.MATH.CONTENT.K.G.A.2

C CCSS.MATH.CONTENT.K.OA.A.1

Represent addition and subtraction with objects, fingers, mental images, drawings¹, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations correctly name shapes regardless of their orientations or overall size

CCSS.MATH.CONTENT.2.G.A.3

Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape

CCSS.MATH.CONTENT.1.G.A.3

Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters* and use the phrases *half of*, *fourth of*, and *a quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Reading : Literature

CCSS.ELA-LITERACY.RL.1.7

Use illustrations and details in a story to describe its characters, setting, or events.

CCSS.ELA-LITERACY.RL.2.7

Use information gained from the illustrations and words in a print or digital text to demonstrate an understanding of its characters, setting, or plot.

CCSS.ELA-LITERACY.RI.1.1

Ask and answer questions about key details in a text.

CCSS.ELA-LITERACY.RI.2.1

Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate an understanding of key details in a text

CCSS.ELA-LITERACY.RL.1.3

Describe characters, settings, and major events in a story, using key details.

Art Standards

MU: CR1.1.1.With limited guidance create musical ideas (such as answering a musical question for a specific purpose.)

Justification

In this lesson, students discover that vibrating matter causes sound and that sound can make matter vibrate. Students will construct drums to discover how

sound can travel and how repeated sound patterns are called rhythms. By relating music with math, students make natural connections with the number of beats, patterns, rhythms and compare fractions and note values. This is a great confidence and motivational experience for some students. Integrating the arts in the classroom is very beneficial. It increases student engagement, enthusiasm, and research shows that it can improve student achievement. For example, I may have a student that struggles in math but do well in music.

Objectives - SWBAT:

- describe key details of a story and identify a setting through a sense of sound
- investigate the properties of sound
- identify basic parts of a drum
- identify repeated sound patterns called rhythms
- explain how drums make sound
- create their rhythms using their handmade drum
- identify equivalent fractions
- compare fractions to musical notes
- instruments to tap and hold notes to $\frac{1}{4}$, $\frac{1}{2}$, and whole musical notes and relate them to equivalent fractions

Materials:

Books:

***Drum Dream Girl: How One Girl's Courage Changed Music** Author: Margarita Engle

***Drum City** Author: Margarita Engle

- World map or globe
- 3 or more different types of drums such as congas, bongos and hand drums(check with music teacher)
- Clean cylindrical containers such: as coffee cans, oatmeal containers, and cookie tins.
- Items for drumsticks such as chopsticks, wooden spoons, and pencils
- For drum sounds (articles stop and try activities): drumstick, drum, large bowl, plastic wrap, large rubber band, one teaspoon of dry rice grains
- For designing a drum: containers and items to use a drumstick from an earlier lesson
- Materials to make drumheads such as duct tape, packing tape, and large rubber bands
- Art supplies to cover and decorate the drum shells such as construction paper, markers, crayons, and stickers
- Websites:
 - Drum Dream Girl (book trailer) www.youtube.com/watch?v=lruQarbUco
 - Chrome Music Lab <https://musiclab.chromeexperiments.com/Experiments>

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| Lesson | Teacher and Student Activities | Key Questions and |
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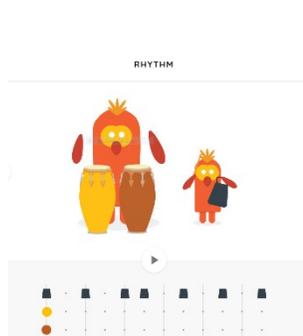
| Section/Time | (Include formative assessment) | Connections to NGSS |
|---|---|---|
| <p>Day 1/ Engage <i>Drum Dream Girl</i> Read- Aloud</p> | <p>TTW: Introduce the book Drum Dream Girl</p> <p>TSW students to make predictions.</p> <p>TSW watch the book trailer from Drum Dream Girl and add to their predictions about the book.</p> <p>TTW- read the subtitle of the book, <i>How One Girl's Courage Changed Music</i> and ask what courage means?</p> <p>TTW- read the book and ask students to listen to examples of how the girl in the book showed courage and how she changed music. As TTW reads book ask questions about the key details of the story.</p> <p>TTW- After reading the story ask how the girl showed courage.</p> <p>TSW turn and talk to answer questions about the girl from the story.</p> <p>(she kept playing drums when she was told not to play them, she persevered and learned to play as well as boys.)</p> <p>TTW- Ask how the girl changed music (She showed that girls could play drums, and that allowed girls to play drums in her country.)</p> <p>TSW turn and talk to answer the questions about the girl from the story</p> <p>TTW formally assess for student understanding of key details by listening to students' discussions.</p> <p>TTW read the Historical Note after reading the book and discuss that this is a true story about a girl named Milla Castro Zaldarriga and that the story took place in Cuba.</p> <p>TSW locate Cuba on the map/globe.</p> <p>TTW discuss how Cuba is known for its lively and rhythmic music and how drums are frequently used.</p> <p>TSW listen to Cuban music.</p> | <p>Reading: Literature Key Ideas and Details K.1, 1.1 and 2.1</p> <p>. * What is a drummer?</p> <ul style="list-style-type: none"> • What is courage? • When have you been shown courage? • How did the girl from the story show courage? • How did the girl from the story change music? |
| <p>Day 1/ Explore TSW explore different drums and sounds.</p> | <p>TTW ask the students to name the different types of drums from the book. (congas, bongos, and tumblers)</p> <p>TSW will discuss what they notice and wonder about the drums from the images.</p> <ul style="list-style-type: none"> - Ask music teacher to bring drums or borrow them from the high school music or band teacher. - Invite the music teacher or drummer to play | <p>NGSS: 1-PS4-1, 1-PS4-4 Art Standard MU:CR1.1.1.a</p> <p>* What are the differences between the drums?</p> <p>* How are the drums shaped?</p> <p>* Why are the drums round and shaped like</p> |

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| | <p>for the class.</p> <ul style="list-style-type: none"> - TSW make observations about the - Drums using different size and shapes. - The pattern in how the size of the drum relates to the sound. (the larger the drum, the lower the sound and the small drums have high sounds) - To make the drum sound louder, you hit it harder and to make it sound softer you hit it lighter. <p>After students explored the different drums, TSW compares sounds by using the containers (coffee cans, canisters, oatmeal containers) as drums. TSW will tap the container at different places to create different sounds.</p> <p>TTW – discuss rhythm by reading the pages from <i>Drum Dream Girl</i>.</p> <p>TTW teach students an easy rhythm.</p> <p>TSW will watch Chrome Music Lab and listen to a different rhythm.</p> <p>https://musiclab.chromeexperiments.com/Experiments</p> <p>TSW practice playing the rhythm on their container.</p> <p>TTW formally assess student understanding by asking:</p> <p>What is rhythm? Do all the containers sound the same and if not why? What is different and the same about the sounds?</p> | <p>a cylinder?</p> <ul style="list-style-type: none"> * What is the pattern in how the size of the drum relates to the sound it makes. * How do you make the drum sound loud and soft? <p>What is rhythm?</p> |
| <p>Day 2/Explore and Explain</p> <p>TSW identify the parts of a drum.</p> <p>This lesson will be during Science and Math on this</p> | <p>TTW ask: What are the parts of a drum?</p> <ul style="list-style-type: none"> - How does a drum make a sound? - What is the difference between noise and making music with a drum? - What is rhythm? <p>TTW explain to the students that they are going to read an article together that will explain the answers to these questions.</p> <p>TSW use a copy of the article “<i>Drum Sounds</i>” and read the article along with the teacher. They will stop at the end of each section and do the Stop and Try activities together.</p> <p>TSW identify the head, rim, and shell of the drum.</p> | <p>Reading: Informational Text: Key Ideas and Details: 1.1, 2.1</p> <ul style="list-style-type: none"> * How do drummers use math skills in their career? -Artists use tools and resources a -How does a drum make a sound? -What is rhythm? <p>Mathematics: Geometry: K.G.2</p> |

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| <p>day</p> | <p>TSW explain how hitting the three parts of a drum make different sounds and that most of the sound comes from the head of the drum.</p> <p>TTW discuss the shapes of the drums and the different sounds they make.</p> <p>TSW recall the different shapes of the drums in the book <i>Drum Dream Girl</i> and complete the Different sounds activity, (Is a conga cylinder or barrel shape; Is a bongo cylinder or cut - off- cone shape; timbale is a cylinder shape)</p> <p>TSW watch Chrome Music Lab Rhythm and listen to the different types of drums. https://musiclab.chromeexperiments.com/Experiments</p> <p>TTW tell the students that most drums are shaped like a cylinder or cut off cone because these shapes help the sound vibrate.</p> <p><i>How Drums Make Sound Activity-</i></p> <p>TTW discuss how you can't see sound vibrations, but you can see how the vibrations can make things move.</p> <p>TTW give groups of 4 students a bowl that is covered with plastic wrap. Rice will be sprinkled on the wrap.</p> <p>TSW take turns hitting the drum lightly and harder. They will record the sounds of the movement of the rice.</p> <p>TSW should notice that the grains of rice vibrate more when the drum is hit harder and less when hit softer.</p> <p>TTW explain that the vibrations are traveling through the air and making the plastic wrap vibrate.</p> <p>TTW assess for student understanding by asking students about the "Drum Sounds "page.</p> | <p>Operations and Algebraic thinking: K.OA.1</p> <p>-What does the shape of the drum affect the sound it makes?</p> <p>How do drums make sound?</p> <p>How do drums make music?</p> |
| <p>Math Lesson</p> | <p>This will be the math lesson during math time.</p> <p>TTW ask the students what the difference between noise and music. They will review the Drum Sounds page and how the drum made noise.</p> <p>TTW instruct the students to tap out the rhythm of a nursery rhyme <i>Mary Had a Little Lamb</i> with their</p> | |

Differentiation

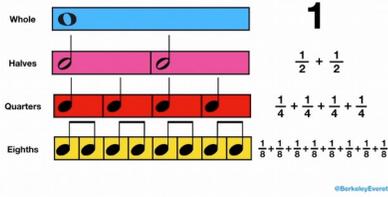
pencil on their desk.
TTW discuss that when you play a rhythm on their drum, it makes music.
TSW work with a partner to create their rhythms and play a song together.
TTW explain that rhythm is a repeating pattern and that it can be a simple pattern or a hard pattern.
TTW demonstrate how by playing a simple song as Hick/o/ry Dick/0/ry Dock. She will repeat the pattern several times and repeat the pattern. You can add the patterns together and create a more complicated rhythm.
TSW design their patterns and create a rhythm and teach it to their partner
TTW instruct assign Chrome Music lab Rhythm on Google Classroom.
<https://musiclab.chromeexperiments.com/Experiments>



The students will explore and listen to each drum page and count the beats and rhythms. They will next click on the grids to build their rhythms. In their math journal, they will write addition sentences with the rhythms that repeat.

Below level math students TTW assist the students and assess that they can identify and count the beats orally to her. She will ask the students to solve addition sentences with the number of beats. She will **assess** for understanding as they illustrate their equations.
Enrichment students- (Usually second-grade students) If they are on ready for fractions...
TTW introduce fractions and discuss how musicians use math to count their notes. She will review, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ and one whole.
TTW introduce the site Musical Fractions

Musical Fractions



<https://musiclab.chromeexperiments.com/Experiments>

TTW will work in Google Classroom to explore and listen to how the fractions make the whole. After they finish, they will go to the Music Lab and create different combinations of tunes using fractions.

Assessment After all students have finished creating their music they will save the assignments in Google Classroom, and I will share their musical creations with the rest of the class.

Day 3 and possible Day 4 /Elaborate

TTW introduce the story *Drum City Read-Aloud*.
TSW predict what the story is about by looking at the cover.
TTW tell the students as she reads the story to look and listen to all the different types of homemade drums used in the story.

TTW use G.R.A.S.P. to assign the project.

Goal- TSW work in groups to create working drums using many different materials from the Maker Space Lab. The drums will be used at the school music festival.

Role- You and your team of musicians will create drums made from different materials. Visitors will test each drum to see how the different materials used will change the sound of the drums.

Audience- Your team will be playing the drums for the Music Festival. You will explain how the different materials were used to make the drums.

Situation- Drums are a very important part of all kinds of bands. Drummers use many types of drums to make different sounds. For example, rock bands use a drum that is usually hit by a stick, so the drum must be sturdy. Determine what kind of band you want your group to be and create drums to play.

Products- Your group will record your band on SeeSaw using your products. The teacher will **assess** the products your group has created. Your group will provide a product description of each drum.

TTW will **assess** project using Rubric.

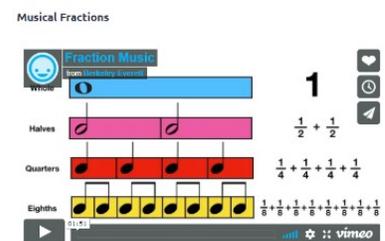
NGSS: 1-PS4-1,
1-PS4-4
Art Stan
Dard MU: CR1.1.1.a
Reading: Literature
Key Ideas and Details
K.1, 1.1 and 2.1

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| Day 5 Evaluate | <p>TSW use My Drum Design student page to sketch their drum.</p> <p>TSW label the parts of the drum (the head, rim, and shell)</p> <p>They will list the materials they used and explain why they chose the materials.</p> <p>They will explain how their drum made the sound using vibrates.</p> | |

Art Integration Paper

The lesson that I would like to use is a unit on fractions. I teach an enrichment second-grade math group. With this group, I incorporate Project Based Learning and STEM activities. Fractions are one of the hardest concepts for students to fully understand. I use as many resources, manipulatives, and visuals as possible and there are still some students that struggle. I'm hoping by integrating Arts; it will help the students grasp the understanding of fractions.

The art form that I would like to integrate into a lesson I teach is Musical Composition. I currently use Visual and Media Arts in my fraction unit. I got this idea from Math Visuals by Berkeley Everett. This is called Musical Fractions, and this is the link. You may have to scroll down the page to see the visual.



<https://mathvisuals.wordpress.com/fractions/> When I saw and listened to this I thought it was so cool. When students compare equivalent fractions to the visual, hear the notes and connect $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, and one whole notes, it will significantly enhance the lesson.

In my opinion, integrating the arts in the classroom is very beneficial. It increases student engagement, enthusiasm, and research shows that it can improve student achievement. For example, I may have a student that struggles in math but do well in music. By relating music with math, they may make a connection with the number of beats, patterns, and rhythms and it would be great confidence and motivational experience for the student. This applies to other art forms as well. Students who are in drama could integrate this skill to increase their writing abilities. Integrating arts into the classroom with other core subjects is an inexpensive and engaging strategy the teacher can utilize to enhance student understanding. I think it's the teacher's responsibility to learn their student's talents and if they enjoy the arts, help the student as much as possible to use this skill to aid in student learning.

Teachers can create interdisciplinary lessons by combining any of the arts to any subject or content area in the daily curriculum. For example, students can act out historical events and practice reading fluency and comprehension in readers theatre. They can create the setting of the event in graphic design. They can discuss the main character's point of view and key details of the historical event. Anytime I've integrated art into other subjects the students almost look at it like it's playing. I can't think of a better way to increase student knowledge. I know from experience, these were the lessons that made a significant impact on me, and I still remember them as an adult.

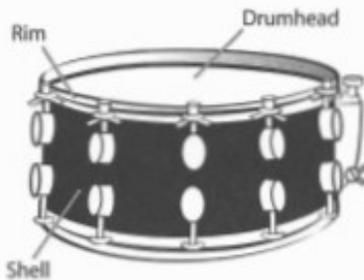
Resources

Drum Sounds

Since the beginning of history, people have been making and playing drums. There are many different kinds of drums, but they all work in the same basic way.

Parts of a Drum

A drum typically has three basic parts: head, rim, and shell. The **head** is the part you hit with your hand or a drumstick. The first drumheads were made out of animal skin, but now they are usually made from some kind of plastic. The **rim** is the edge around the head. Drummers can play the rim of the drum to get a sound that is different from playing on the head. The **shell** is the base of the drum. The size, shape, and material of the shell affect the sound of the drum. Most drum shells are wooden, roughly the shape of a **cylinder**, and hollow inside.



STOP and TRY IT: Identify the head, rim, and shell on a drum. Listen closely as each part is hit with a drumstick, and compare the sounds that are made.

How Drums Make Sound

When you hit a drum, the drumhead

vibrates, or moves back and forth very quickly. These **vibrations** create sound waves that travel through the air in all directions. When they reach your ears, you hear the sound made by the drum. All sounds are caused by vibrations.

STOP and TRY IT:

You can't see sound vibrations, but you can see how sound makes objects vibrate. Cover a bowl tightly with plastic wrap. Sprinkle some grains of rice on the plastic wrap. Observe the rice as a drum is hit near, but not touching, the bowl. What happens when the drum is hit harder?



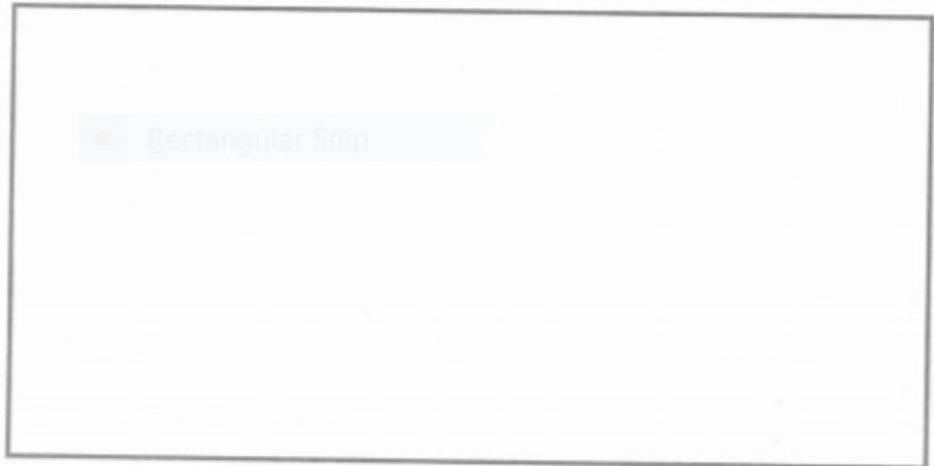
How Drums Make Music

Banging on a drum might just sound like noise. In order to make music with a drum, you play a **rhythm**. A rhythm is a repeated pattern of sounds.

STOP and TRY IT: Try tapping out the rhythm of a simple nursery rhyme with a pencil on your desk, such as "Hickory Dickory Dock" (Hick/o/ry Dick/o/ry Dock). Now, create your own rhythm and teach it to a partner. Play the rhythm together. You're making music!

My Drum Design

Sketch your drum in the box below and label the **head**, **rim**, and **shell**.



1. What materials did you use to make your drum?

2. Why did you choose those materials?

3. How does your drum make sound? Use the word **vibrates**, **vibrating**, or **vibration** in your explanation.

Illustration - Drums And Vibrations

| Achievement Levels | 1 | 2 | 3 |
|----------------------|--|--|--|
| Illustration (x1) | Illustration and title are unclear and are not connected to the concept. | Illustration and title are somewhat clear and demonstrate minimal connection to the concept. | Illustration and title are clear and demonstrate some connection to the concept. |

Model - Drums And Vibrations

| Achievement Levels | 1 | 2 | 3 |
|--|--|--|---|
| Model Development (x1) | Only one drum was developed. | Two drums were somewhat developed but did not use different materials. | Two drums were effectively developed using different materials. |
| Science Connection (x1) | Student shows little understanding that sounds make matter vibrate and vibrating matter can make different sounds. | Student shows some understanding that sounds make matter vibrate and vibrating matter can make different sounds. | Student shows excellent understanding that sounds make matter vibrate and vibrating matter can make different sounds. |
| Participation and Presentation (x1) | Student is not engaged and does not actively participate in class and/or group activity. | Student is somewhat engaged and somewhat participates in class and/or group activity. | Student is very engaged and actively participates in class and/or group activity. |