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Make a Musical Instrument: 5.G.1

How Do Musical Instruments Make Sound?

Grade Level	5
Sessions	1 – approximately 60 minutes
	2 – approximately 60 minutes
Seasonality	N/A
Instructional Mode(s)	Whole class
Team Size	Individuals or pairs
WPS Benchmarks	05.SC.PS.05
	05.SC.PS.06
	05.SC.TE.01
	05.SC.TE.05
	05.SC.TE.06
	05.SC.TE.07
MA Frameworks	3-5.PS.05
	3-5.PS.11
	3-5.TE.1.1
	3-5.TE.2.2
	3-5.TE.2.3
	3-5.TE.2.4
Key Words	pitch, sound, vibration
i	

Summary

Students will be taught basic instruments and examples of them. They will also be taught the relationship between vibration and sound, and the difference between high and low pitch. Finally, the students will be supplied with different materials such as rubber bands and bottles. They will choose from only those materials to make an instrument that can make sound. It will show the students that sound can be produced in many different ways, but that it always has a vibrating source.

Learning Objectives

2002 Worcester Public Schools (WPS) Benchmarks for Grade 3-5

Physical Science

05.SC.PS.05 – Recognize that sound is produced by vibrating objects and requires a medium through which to travel. Relate the rate of vibration to the pitch of the sound.

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05.SC.PS.06 – Use tuning forks to demonstrate the relationship between vibrations and sounds.

Technology/Engineering

- **05.SC.TE.01** Identify materials used to accomplish a design task based on specific property, i.e., weight, strength, hardness, and flexibility.
- **05.SC.TE.05** Describe different ways in which a problem can be represented, i.e., sketches, diagrams, graphic organizers, and lists.
- **05.SC.TE.06** Identify relevant design features (i.e., size, shape, weight) for building a prototype of a solution to a given problem.
- **05.SC.TE.07** Compare natural systems with mechanical systems that are designed to serve similar purposes, i.e., a bird's wings as compared to an airplane's wings.

Additional Learning Objectives

- 1. At the conclusion of this lesson, the students will be able to tell the difference between high pitch sound waves and low pitch sound waves.
- 2. At the conclusion of this lesson, the students will have a better understanding of how natural systems use vibration to produce sound.
- 3. At the conclusion of this lesson, the students will have better developed their engineering skills.

Required Background Knowledge

1. Students should have a basic understanding of the engineering design process

Essential Questions

1. How do instruments make sound?

Introduction / Motivation

Ask the students to explain how instruments make sound. Reinforce the fact that sounds originate from vibrating sources. To demonstrate this, use a tuning fork. Tap the tuning fork so it hums, then have the students touch the fork so they can feel it vibrate. Explain to the students how natural systems, such as crickets using the vibrations of their legs or humans using air to vibrate our vocal chords, use vibrations to

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produce sound. The students will also have to complete the **Procedure** and **Questions** worksheets and build a prototype of the musical instrument they design.

Procedure

Note: Feel free to alter the following lesson as you see fit based on your resources, student needs, and student capabilities.

Session 1 (50-60 minutes)

The instructor will:

- 1. Write on the board the 4 basic types of instrument. The 4 basic types are woodwind, brass, percussion, and string. Ask the students if they know the difference between each of the instruments.
- 2. Show the students the provided pictures of different instruments. Make sure the students can recognize the difference between the instrument types. Ask any of the students if they can tell you how the instruments vibrate to make sound.
- 3. Discuss with students how natural systems also use vibrations to produce sounds. Explain how crickets rub their legs together fast to produce vibrations that create high pitch sounds and how humans blow air over our vocal chords to produce vibrations thus creating sound.
- 4. Using the tuning fork, ask the students what they think would happen if the tuning fork vibrated faster or slower when it is struck. The speed of this vibration is known as pitch and the faster the vibration, the higher the pitch. Sounds with higher pitches, sound higher than those with lower pitches. A flute, with a high sound, has a higher pitch than a tuba, which has a low sound and thus a lower pitch.
- 5. Ask the students how the sound gets from the object to your ears. It travels through the air as a wave. A sound with a higher pitch would have faster waves as compared to a sound with a lower pitch, which would have slower waves.
- 6. Using a slinky, stretch it out while keeping it suspended in the air. Have one student hold one end of the slinky. At the other end, move the slinky up and down slowly. A wave should move from one end to another fairly slowly. Tell the

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- students that sounds move through the air in the same fashion as the wave moves through the slinky from one end to another.
- 7. Start moving the slinky faster so that the wave moves back and forth faster than before. Ask the students if the new wave pattern has a higher pitch or lower pitch than before. Ask the students how you could make the pitch even higher, and how you could make it lower.
- 8. Tell the students that they will now be designing a musical instrument. Hand out the **Procedure** worksheet. Write on the board the materials that will be provided. Tell the students that using only the materials on the board, design an object that can make a sound in the same way that one of the types of musical instruments do. On the worksheet they should identify each material used and how it contributes to the sound it will make. To get the student's imagination going, show them an example that has been made before the class (This is optional depending on the teacher's teaching style).

Session 2 (50-60 minutes)

The instructor will:

- 9. Put the students back into their groups of two or allow the individual students to get the **Procedure** worksheet that they worked on last session.
- 10. Once each student has completed the first worksheet, hand out supplies to the students so they can begin building their instrument. Make sure that the supplies aren't handed out until each group has a design on paper. This emphasizes the design process before building a prototype.
- 11. After the students have built their instrument, they should test it to see how well it makes sound and if time permits, they should redesign their instrument to improve the sound quality. Then they should fill out the **Questions** worksheet. This second worksheet will test the student's knowledge of sound waves, and instruments.

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Materials List

Materials per class	Amount	Location
Slinky	One	Toy Store
Tuning Forks	One high pitch	Craft Store, Music Store, Online
	One low pitch	
Craft sticks or wood	Depends on designs	Craft Store or Supermarket
skewers		
Toothpicks	Depends on designs	Craft Store or Supermarket
Wax Paper	One package	Supermarket
Scissors	One per student	Craft Store, Supermarket or Office Supply Store
Tape	Depends on designs	Craft Store, Supermarket or Office Supply Store
Plastic Wrap	One package	Supermarket
String	Depends on designs	Craft Store, Supermarket or Office Supply Store
Pie Tins	Depends on designs	Craft Store or Supermarket
Paper towel tubes	Depends on designs	Around the Home, Craft Store, Supermarket or
		Office Supply Store
Paper plates	Depends on designs	Craft Store or Supermarket
Beads	Depends on designs	Craft Store or Supermarket
Plastic Bottles	Depends on designs	Craft Store or Supermarket
Rubber bands	Depends on designs	Craft Store, Supermarket or Office Supply Store

Materials per student	Amount	Location		
Craft sticks or wood	Depends on designs	Craft Store or Supermarket		
skewers				
Toothpicks	Depends on designs	Craft Store or Supermarket		
Wax Paper	One package	Supermarket		
Scissors	One per student	Craft Store, Supermarket or Office Supply Store		
Tape	Depends on designs	Craft Store, Supermarket or Office Supply Store		
Plastic Wrap	One package	Supermarket		
String	Depends on designs	Craft Store, Supermarket or Office Supply Store		
Pie Tins	Depends on designs	Craft Store or Supermarket		
Paper towel tubes	Depends on designs	Around the Home, Craft Store, Supermarket or		

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		Office Supply Store
Paper plates	Depends on designs	Craft Store or Supermarket
Beads	Depends on designs	Craft Store or Supermarket
Plastic Bottles	Depends on designs	Craft Store or Supermarket
Rubber bands	Depends on designs	Craft Store, Supermarket or Office Supply Store

Vocabulary with Definitions

- 1. *Brass Instrument* A musical instrument that uses the musicians vibrating lips to produce sound. Does not actually need to be made of brass.
- 2. *Percussion Instrument* Is a musical instrument that produces sound by being struck.
- 3. *Pitch* The way we tell the difference between sounds. High pitch is synonymous with a "high" sound (soprano), while low pitch is synonymous with "low" sounds (bass). High pitch sounds have a higher frequency in their sound waves, while low pitch sound have a lower frequency in their sound waves.
- 4. Sound (Sound Wave) Is a weak pressure wave which moves your eardrum which enables the brain to decode and allow you to perceive it as sound. It moves through the air like a wave does through water.
- 5. String Instrument A musical instrument that uses vibrating strings to produce sound.
- 6. Woodwind Instrument A musical instrument that uses the motion of blown air to produce vibrations, and thus sound. Does not actually need to be made of wood. Flutes and saxophones are woodwinds.
- 7. Vibration The method in which sound is produced.

Assessment / Evaluation of Students

The instructor may assess the students in any/all of the following manners:

- 1. Check the **Questions Worksheet** at the end of lesson to test the student's general knowledge of musical instruments and tests key concepts such as pitch.
- 2. Check the **Procedure Worksheet** and watch students as they work to assess participation and effort.
- 3. Also, a grading rubric is provided to give a guideline to further grading.

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Lesson Extensions
None
Attachments
1. Make Your Own Musical Instrument: Procedure Worksheet
2. Make Your Own Musical Instrument: Questions Worksheet
3. Grading Rubric for Student Assessment
Troubleshooting Tips
None
Safety Issues
None
Additional Resources
http://www.kidport.com/RefLib/Music/Instruments/MusicalInst.htm
Kidport Reference Library Creative Arts
letter//am veilein adia aver/edit/Main Dana
http://en.wikipedia.org/wiki/Main Page Wikipedia, the free encyclopedia
Wikipedia, the free encyclopedia
Key Words
Pitch, Sound, Vibrations

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Making Your Own Instrument

Procedure Worksheet

fame Date:				
Directions: Using the materia	ls listed on the black board, design a musical			
instrument. Write down what	each material does and how it contributes to the wa			
your instrument sounds.				
Material Used	How is it used?			

Draw a picture of your instrument in the space below.

Making Your Own Instrument

Questions Worksheet

Name	Date:
Directions: Match the following J	pictures with the type of instrument. Then
answer the questions.	
	Type of instrument
	A) Wind Instrument
1)	B) Brass Instrument
	C) Percussion Instrument
2)	D) String Instrument
3)	
4)	
1) How could you modify your in	strument to make it have a higher pitch or a
lower pitch?	Ç .
2) How does a drum make sounds	?
3) How does your voice make sou	and?

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Grading Rubric to Evaluate Student Work

Students	Never	Sometimes	Often	Always	Points
Ctudents were able to	(1)	(2)	(3)	(4)	
Students were able to					
design their instrument on					
paper without having the					
supplies.					
Students showed that they					
understood the use of each					
material they used in their					
instrument.					
Students were able to					
build the instrument that					
they had designed on					
paper.					
Students tested their					
instrument and made					
changes to make it better.					
Students understand what					
pitch is and know how to					
change the pitch on their					
instruments					
Students are familiar with					
the vocabulary					
(woodwind, pitch, brass,					
percussion, etc)					
Students answered					
questions concisely in					
their own words.					
				Total	
				Max 28	