Chicken in a Cup

Overview: Students and teachers alike will be delighted by the outrageous and unexpected "chicken" noises produced as they learn about sound waves, vibration, and amplification.

Procedure:
1) Present students with the opportunity to beat a drum, ring a triangle, play a xylophone, strum a guitar, or ring a bell. Ask them to strike or play the instrument one time and ask them what they see, hear and what they feel. In their Science journals, ask the students to describe what their chosen instrument looks like, feels like, and sounds like when they play it.
2) Explain that sounds are made by vibration and what your ear hears is a sound wave. To demonstrate this, ask students to purse their lips together. Note that no vibration occurs, and therefore no sound wave. Next ask the students to hum. Note that there is a vibration and therefore a small sound wave. Lastly, ask them to blow their lips together as if they were blowing bubbles in the water. The vibration has increased, so has the sound wave.
3) Introduce the sound wave vocabulary to the students. Properties of Waves provides a succinct explanation of sound waves.
4) Present the class with the materials for the activity. Note that none of the materials produce sound waves now. Ask the students what sounds the materials might make when they are put together and vibration is added.
5) Have each student gather their own experiment materials: a sturdy plastic party cup, a 24" length of yarn, and a paperclip.
6) Poke a tiny hole into the bottom of the cup and slide the yarn through the hole – the smaller the hole the greater the vibrations. Turn the cup upside down.
7) Tie the string to a paperclip on the outside of the cup. The cup should resemble a bell with the paperclip on top.
8) Hold the cup in one hand, the dry paper towel between your fingers in the other, and tug gently on the yarn with the paper towel in hand. Then do the same with the moist paper towel. The moist towel provides more friction and therefore a better vibration.
9) Let the students experiment with different pressures, tugging patterns, and pull lengths and they learn how different vibration patterns produce different sounds.
10) Explain that noises come from vibration and friction. Have students look up both words using reference materials and together brainstorm how to apply these words to the Chicken in a Cup.

ASOLs Covered in this Activity:
SCIENCE

5S-FME 1c: The student will investigate and understand characteristics and interactions of moving objects. Key concepts include friction is a force that opposes motion.
5S-FME 3: The student will investigate and understand how sound is created and transmitted and how it is used. Key concepts include
a) Compression waves
b) Vibration, compression, wavelength, frequency, amplitude
c) The uses and application of sound waves

Extension Ideas:

Vary the cup size: Ask each student to write a hypothesis in their science journals about what would happen with a bigger cup or a smaller cup. Repeat the construction process again using different sized plastic cups. Does the size of the cup vary the amplitude of the chicken? Ask the students if their hypothesis was correct, if not, give the student the opportunity to revise.

5S-SI 1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

b) objects or events are classified and arranged according to characteristics or properties;

e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;

h) hypotheses are developed as cause and effect relationships;

5S-SI 2 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

d) hypotheses are formed from testable questions;

e) independent and dependent variables are identified;

f) constants in an experimental situation are identified;

g) data are collected, recorded, analyzed, and communicated using proper graphical representations and metric measurements;

h) predictions are made using patterns from data collected, and simple graphical data are generated;

i) inferences are made and conclusions are drawn;

8S-SI 1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations which

a) observations are made involving fine discrimination between similar objects and organisms;

b) precise and approximate measurements are recorded;

e) a method is devised to test the validity of predictions and inferences;

f) one variable is manipulated over time, using many repeated trials;

g) data are collected, recorded, analyzed, and reported using metric measurements and tools;

h) data are analyzed and communicated through graphical representation;

HSS-SI 1 The student will plan and conduct investigations in which

c) scales, diagrams, charts, graphs, tables, imagery, models, and profiles are constructed and interpreted;

e) variables are manipulated with repeated trials.

HSS-SI 2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. Key concepts include

b) evidence is required to evaluate hypotheses and explanations;

c) observation and logic are essential for reaching a conclusion

Extension Idea:

These standards can be addressed through the course of this activity's scientific

process.

READING & WRITING

3E-RW 2a: The student will use newly acquired vocabulary drawn from reading and other content areas.

3E-CN 1g: The student will sequence at least two steps in a procedure or ideas/incidents in an event.

4E-RW 1c: The student will use newly acquired vocabulary drawn from reading and other content areas.

5E-RW 1f: The student will demonstrate understanding of content-specific words.

7E-RW 1e: The student will demonstrate an understanding of word relationships by using synonyms and antonyms.

7E-CN 1e: The student will use content words and phrases from a nonfiction text.

8E-RW 1e: The student will acquire and use content words and phrases.

8E-WP 1a: The student will write to convey ideas and information including facts, details, and other information.

b: The students will write about a personal experience by introducing the event or experience, at least one character, and two or more events in sequence.

d: The student will use content specific vocabulary when writing about a topic.

8E-WP 3b: The student will write to convey ideas and information including facts, details, and other information as well as graphics and multimedia as needed.

HSE-WP 1b: The student will write to convey ideas and information using clear organization and including facts, details, and other information as well as graphics and multimedia as needed.

c: The student will write about an event or personal experience by introducing the event or experience, at least one character, and describing multiple events in sequence.

HSE-RW 2c: The student will acquire and use content words and phrases.

Extension Idea:

After completing the activity, have each student write a how-to text teaching peers to re-create a Chicken in a Cup. Using text, illustrations, content words, technology, and sequence of events, student will have fun creating a book they can share with their peer helpers or family at home. Text can be in the form of a PowerPoint presentation, book, journal entry newsletter, blog, or video recorded and shared. Encourage students to present the books to peers, following the steps so that the whole school in inundated with Chickens!

MATH

3M-PSPFA 1d: The student will interpret data from a variety of graphs to answer questions.

5M-PSPFA 1a: The student will compare two sets of data within a single data display such as a picture graph, line plot, or bar graph.

6M-PSPFA 1a: The student will display data on a graph or table that shows variability in the data.

b: The student will summarize data distributions on a graph or table.

c: The student will answer a question related to the collected data from an experiment, given a model of data, or from data collected by the student.

8M-PSPFA 1b: The student will describe how a graph represents a relationship between two quantities.

HSM-FS 2a: The student will indicate general trends on a graph or chart.

HSM-FS 3a: The student will, given data, construct a simple graph and answer questions about the data.

Extension Idea:

After trying the activity with various sizes of cups, ask the student to put them in order from quietest to loudest. Creating a graph in which x is the size of cup and y is the approximate loudness of the cup, ask students to plot each cup. Discuss any trends that are seen in the relationship between size and amplitude.

Materials Needed:

- **Plastic party cups**
- **Yarn or string**
- **Paper clips**
- **Various musical instruments for lesson intro**

Instructional Setting:

This activity can be completed in the academic setting.

Community Connections and/or Peer Interaction:

-Students can work together in small groups. This activity gives the students a chance to share their work and teach their peers.

-Work with the music teacher to create instruments using similar materials and process.

Functional Activity/Routine:

This activity encourages functional skills such as turn-taking, following instructions, and cleaning up afterward.

Strategies to Collect Evidence:

For collection of evidence, be sure that each student records a hypothesis and data individually.

Specific Options for Differentiating this Activity:

-Allow students to use their preferred "pencil" when writing. This may include a writing utensil, keyboard, alternative pencil, or dictating to a scribe.

-Prepare, as necessary, for each student to make choices and communicate with their preferred method. This may include using augmentative communication.

-For students with poor fine motor skills, encourage to make vibration sounds with their own mouths while you complete the vibration noise with your own mouth. Press the hand of the student against your throat, so the student can feel the vibration.

-Assist students with poor fine motor skills in the creation of the chicken in a cup and tugging on the yarn as needed.