

What Is Science?

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Activities:

Sound Cups – learn to make hypotheses and construct scientific models

Pieces of the Puzzle – learn the importance of data collection and sharing information with the scientific community

What Do Scientists Do?

Que Hacen Cientistas

- Make observations - *Hacer observaciones*
- Collect data - *Acumular datos* (?)
- Analyze data - *Analizar datos* (?)
- Make predictions - *Hacer predicciones* (?)
- Create theories and explanations -
Crear teorías y explicaciones
- Design and conduct experiments
Diseñar y hacer experimentos
- Work in teams - *Trabajar en grupos*
- Publish research results
Publicar resultados de investigaciones

Sound Cups

By Lori Lambertson, based on an activity shared by Karen Wilkinson and Mike Petrich



Materials:

- Opaque plastic drinking cups (3 per student)
- Masking tape
- Small objects to put inside cups (For example: paper, paper clips, pins, coins, marbles, rubber bands, string, cotton balls, cotton swabs, washers, smaller cups)
- Tray for each table

To Assemble Ahead of Time

(about 1 hour of prep for 30 pairs of cups, but you can use them over and over):

Decide if you want students to work in pairs or larger groups. If you want students to work in pairs, you will need to make 2 identical sets of a single type of sound cup – e.g. make 2 pairs of cups containing straws, 2 pairs of cups containing a penny, 2 pairs of cups that contain washers, etc. If you want students to work in groups of 4, you will need to make 4 identical sets of a single type of cup - e.g. make 4 pairs of cups containing straws, etc. Put the item(s) in one cup, place another cup upside down on top of it, and tape them together. Make another one exactly the same way before you start to make a different type of sound cup. As you make the cups, make a small pile of the objects you used on each tray. Make one cup for each student.

To Do and Notice:

You may want students to do the first part of this activity in silence. Pass out one sound cup to each student. Ask students to listen carefully to their cups, and then to find the person who has a cup that sounds the same. Have students listen to each other's cups, and to sit with their sound cup partner when they think they have a match.

Once students have found their partners, they will work together to try to build an identical sound cup using the materials you provide on the trays. Put a tray of materials on each table (or at several stations). Students may talk as they try to make a sound cup that is identical to their own. They may not open their original cups as they try to make a matching sound cup.

Once students have finished building and taping their new sound cup together, have each group present their work. Each group should demonstrate the sound of the original cups, talk about what they noticed and how they decided to make the sound cup that matched their original pair. The process of thinking through this problem is important to share. As each pair shares their stories, make a list of the words they use to describe their sounds as they demonstrate the sound.

Dealing With Answers:

Students will want to know if they “are right”. In science, many times we are not able to appeal to a higher authority, and we must rely on our own observations and experiments to answer our questions. This may be frustrating for your students, but it is important to emphasize this essential part of the scientific process.

Evaluation:

There are three parts to the evaluation of this activity:

- (1) Do the students’ pairs of cups sound alike? In other words, did the students find someone whose cups sounds like theirs?
- (2) How well did the sound cup that the pair created sound like the cups they were given to start with?
- (3) Have each student write about the sound that their cup made: of what did it remind them? Have them include how with their partner they created a similar sounding cup. What did they try? What finally worked?

What’s Going On?

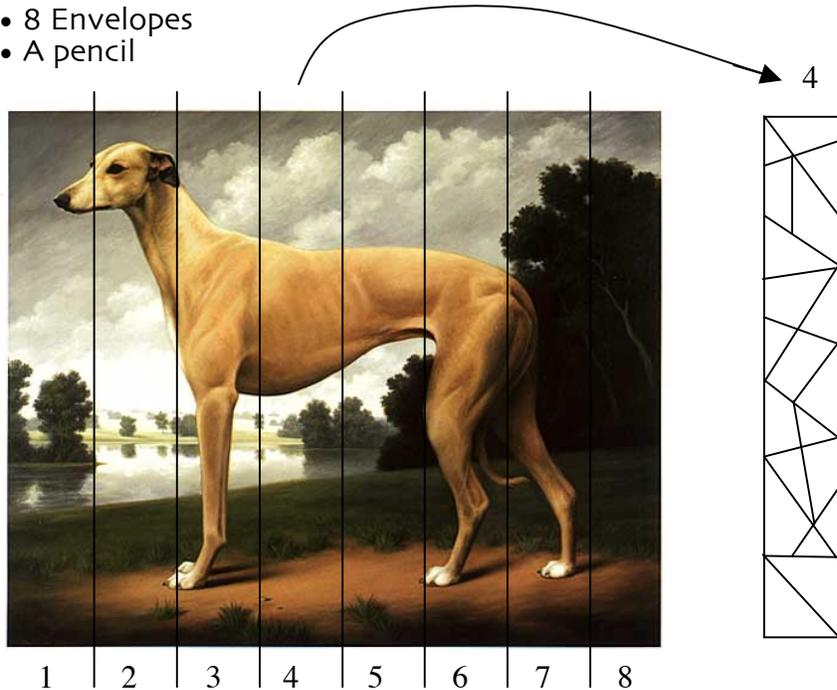
Plastic cups make wonderfully resonant chambers, allowing simple objects to sound very mysterious. Only through careful observations will students be able to make accurate matching sound cups. They may be able to make a matching sound using different objects than those in the original cups.

Pieces of the Puzzle

Here's an activity that demonstrates the importance of getting a lot of data and sharing results with the scientific community.

Materials

- A poster that is a photograph of a landscape, animal, person, or other real object
- Scissors
- 8 Envelopes
- A pencil



Cut each rectangle into at least 20 smaller pieces. Write the number of the poster section on the back of each piece. Place pieces in an envelope.



To Assemble Ahead of Time (30-40 minutes)

Cut the poster into 8 equal size rectangles (see above). Cut each of the rectangular sections into at least 20 randomly shaped pieces (see above). Write the number of the poster section on the back of each piece and place the pieces inside an envelope. Write the number corresponding to the numbers on the pieces on the envelope.

To Do And Notice

Divide your class into eight research groups. Tell each group that they are now part of a research team. Each team will be given an envelope and each envelope contains only a section of a very large photograph. Each team will be allowed to pick 5 pieces out of the envelope and look at them very carefully. Using just the five pieces, each team has to try to figure out what the larger poster might be. They should write down their guess and explain what evidence they have to justify their guess. Once the teams have done this, let them pick *5 more pieces* out of the envelope. Now the team has 10 pieces to examine. Do they want to change their guess or add any more detail? Once again, let the teams write down their new prediction and explain what evidence they have to make their new guess. Lastly, let the teams pull 3 more pieces from the envelope and make their last guess.

Let each of the 8 teams make a presentation explaining what they think the larger photograph might be and describe what evidence they found to help them develop their prediction. Once all the teams have presented their ideas and their evidence, have each team confer and come up with their final guesses.

Pieces of a Poster

Your team has been given one section of a very large photograph. Your team's job is to figure out what the large photograph was.

1. *Pick 5 pieces out of your envelope and look at them very carefully.* What does your team think the larger poster might be? What did you and your team notice that made you make that guess?

2. *Pick another 5 pieces out of your envelope and look at them very carefully along with the first five pieces you picked.* Try again to guess what the larger poster might be. What did you and your team notice in the 10 pieces that made you make that guess?

3. *Pick another 3 pieces out of your envelope and look at them very carefully along with the first ten pieces you picked.* Try again to guess what the larger poster might be. What did you and your team notice in the 13 pieces that made you make that guess.

4. Listen as each team presents what they found and what they believe the poster might be? After seeing all the pieces that all the teams pulled from their envelopes, what does your team think the original photograph was?