

SciGirls Activity 5

Let's Get Loud!



Icebreaker:

How can you make a balloon *speak up*?



You'll need:

- balloons (10-12" when inflated)
- small objects such as a penny, dime, quarter, hex nut, marble, or pea rock

SciGirls Skill: Predicting

Guide your girls as they:

- 1) Stick a penny into an uninflated balloon.
- 2) Blow up the balloon, and tie it off.
- 3) Hold the balloon at the top tied-off piece, and swirl it in a circular motion, so that the penny begins to roll around the inside wall of the balloon.
- 4) Stop swirling. See and hear the penny continue to roll around the balloon. How does it sound?
- 5) Put a quarter into a new balloon, inflate it, and tie it off. What do you think will happen when you swirl this balloon? A little louder, huh?
- 6) Now try a hex nut. It screams, doesn't it?
- 7) Try other objects. Which ones scream and which don't? Why?



SciGirls Suggestion: This activity works well with any size group, because you can distribute the roles of balloon inflator, balloon twirler, recorder, etc. Make sure the girls stay quiet during the spinning portion, so they can actually hear the different sounds made by the various objects.



For more information on this science screamer, visit pbskids.org/dragonflytv/sci_surprise/screaming_balloon.html

Investigation:

Extreme Sounds

How loud is loud? Girls answer by exploring their hometowns.

We're Tarissa and Sabrina, and we live in one of the world's noisiest places, New York City. There's so much going on here that it's hard to hear yourself think. Our SciGirls question: **Are the sounds of the city as loud as we think they are?**



You'll need:

- decibel meter (such as those available from Bruel and Kjaer. See <http://www.bksv.com/2466.htm>. You may be able to rent a similar meter from your local rental company.)
- If you can't get hold of a decibel meter, you can use these three audio "benchmarks" to estimate the loudness of various sounds:
 - 1) Hold your hands together at arm's length, and "shoosh" your palms together. If you can hear this even with other sounds, the place is quiet.
 - 2) Snap your fingers at arm's length. If you can't hear the shooshing, but you can hear the fingersnaps, the place is sort of loud.
 - 3) Clap your hands at arm's length. If you can't hear fingersnaps but can hear claps, the place is loud.
 - 4) If you can't hear your claps where you are, then the place is dangerously loud... cover your ears!



Visit pbskids.org/dragonflytv/show/extremesounds.html to learn more about this noisy investigation! Then surf to pbskids.org/dragonflytv/contact/index.html to tell us about your investigation!



Check out this investigation on Tape 1, Segment 5.



SciGirls Want to Know: Where are the loudest sounds in my city?

Guide your girls as they:

1) Find ten locations to visit, trying to select a wide range of "loudness levels." Tarissa and Sabrina recorded sound levels:

- at a subway station
- at the observation deck of the Empire State Bldg
- near JFK airport runway
- of a marching band
- in an empty library
- in an anechoic chamber (soundproof room)
- near a heliport
- in a video arcade
- of a barking dog
- regular street traffic



SciGirls Secret:

It's difficult for girls to imagine hearing loss at this age, but current research shows that even young ears can be compromised by loud headphone use, public transportation noise, and other sounds common in our everyday world. Have your girls brainstorm the loudest sounds surrounding them, and think together about ways to protect their "aural assets!"

2) Take a reading every 10 seconds for 1 minute in each location and record it in a group or individual notebook. Calculate the average sound level for each place.





SciGirls Synthesize: Data and Analysis

Tarissa and Sabrina found the following results, listed in increasing order of sound pressure level (units of dB):

Locale	dB
Anechoic chamber	15
Library	46
Empire State Bldg	72
Subway station	84
Street traffic	85
Video arcade	86
Airport	87
Heliport	97
Barking dog	106
Marching Band	112

As you can tell, the loudest places weren't always the expected ones. For example, we'd expect that a subway or airport would be two of the loudest places in the city, but it turned out that the video arcade and the marching band were as loud or louder. Also, it was clear that distance from the sound source influenced the reading. For example, since the investigators could not get close to the airplane but could get very close to a barking dog, the airplane decibel level reading was lower than that of the barking dog.

What did you find?

See Appendix A for a graphing example.

Keep Exploring!

Use the decibel meter to study how sound intensity changes with distance from the sound source. Take intensity readings at several distances (example: 1 foot, 2 feet, 4 feet, 10 feet, 20 feet, 30 feet) from a sound source. Make a graph, set up like the one shown below, and add your data.

