Hanger Gong

Problem: How do sounds travel differently through air and solids?

Prediction

Tap the hanger on the table. Describe the sound here. Is the pitch high or low? Is the sound short or does it last for a long time? What other words can you use to describe the sound?

How do you think the tapping of a hanger will sound when the sound travels through a string? Will the pitch be higher, lower, or the same? Will sound last longer, shorter or the same? What else do you think might change?

Investigation

1. Tie the middle of the string on to the triangular part of the hanger.
2. Along with another group member, hold one end of the string and wrap it just one time around your pointer finger.
3. Place your finger (not the string) in your ear.
4. Allow the hanger to hang freely. Do not hold the string or let the string rest against your body or anything else.
5. Allow the hanger to swing back and force so that it hits a hard chair or table. Or have another group member tap the hanger with a pencil.
6. Record your observations below.
7. If there is time and materials are provided, try this with other objects and types of string.

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Observations

Describe the sound of a tapping hanger as heard through the string. Is the pitch high or low? Is the sound short or does it last for a long time? What other words can you use to describe the sound?

How does the sound heard through the air, a gas, compare to the sound heard through the solid string?

What other observations did you make about the sounds made by different materials and strings as it travels through the air and a solid string?

Hypothesis

Based on what you know about sound waves so far, why do you think the sound heard through the string has a different pitch and length than the sound heard through the air?

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Balloon Amplifiers

Problem: How do balloons full of different gases and water held against your ear change how you hear sounds?

Procedure

Start with the balloon full of air and then repeat the procedure for each balloon one at a time. Write your observations in the table below.

1. Tap on the balloon. How does it sound?
2. Place the balloon against your ear. Tap on the balloon again. How does it sound now?
3. Have a partner talk or whisper through the balloon. How does the balloon change the sound?

Observations

In the balloon	Tapping	Tapping with the balloon against your ear	Talking through the balloon
Air			
Carbon Dioxide			
Water			

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Conclusions

1. How do the balloons filled with a gas change the sounds?

2. How do the sounds hear through the balloon filled with a more dense gas, like carbon dioxide, compare to less dense gas like air?

3. How does the balloon filled with water change the sounds?

4. How do the sounds heard through the balloon filled with water compare to the balloons filled with gas?

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Head Harp

Problem: How does the tension in a string change the pitch it makes when plucked?

Procedure

1. Take the loop of string and wrap it around the middle of your head so the knot is in the back and you hold the slack out in front of you with one hand. The string should wrap around your head well above, and not touching, your ears.
2. Pluck the string. Can you hear the sound? Record your observations for each of the following situations below.

Observations

1. Hold the string out in front of you as tight as you can with one hand and pluck the string with your other hand. Gradually reduce the tension, or tightness, of the string as you continue to pluck. What happens to the pitch of the sound?

2. Hold the tension in the string steady and pluck the string in different locations. What happens to the pitch of the sound?

3. Hold the string as tight as you can and pluck the string. Keeping the tension the same, make the string shorter and pluck the string again. What happens to the pitch of the sound?

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4. Put in the earplugs or noise cancelling headphones. Pluck the string. Can you still hear the sound? How does it sound different than when your ears are uncovered?

5. Listen as you partner does the activity. Does the string sound the same when the sound waves travel through air as they do traveling through the bones in your head?

6. How do you think you can hear sounds through your bones without using your ears?

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