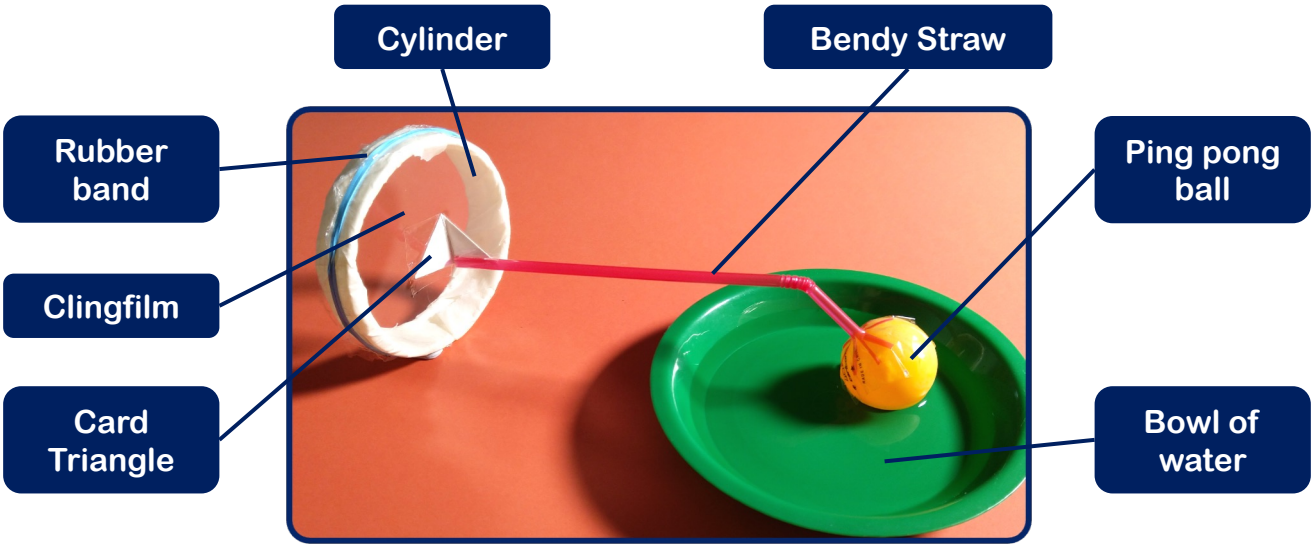
Mission Assignment: Explain how sounds are detected

KS3-18-04

Build a model ear and compare it to a working ear.



Method

1. Stretch cling film tightly over a cylinder (the wider the better) and secure it in place with a rubber band.
2. Fold a small card triangle in half and tape a bendy straw to one half of the triangle. Tape a ping-pong ball to the other end of the straw.
3. Tape the other folded part of the triangle to the centre of the clingfilm.
4. Secure the cylinder to the table with tape or stick tack and rest the ping pong ball in a tray of water.
5. Place a speaker behind the cylinder, play some loud music and observe the surface of the water.

Identify which parts of the model represent the following parts of the ear and then explain your choice.

Ear drum:

The three inner ear bones:

The liquid filled cochlea:

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Build a model ear and compare it to a working ear.

1. Is your ear model descriptive, predictive or explanatory? Explain your choice.

2. Suggest a limitation of the model.

3. Suggest how the model could be improved to create a more accurate representation of the ear.

Challenge: Give two similarities and two differences between an ear and a microphone.

Similarities	Differences

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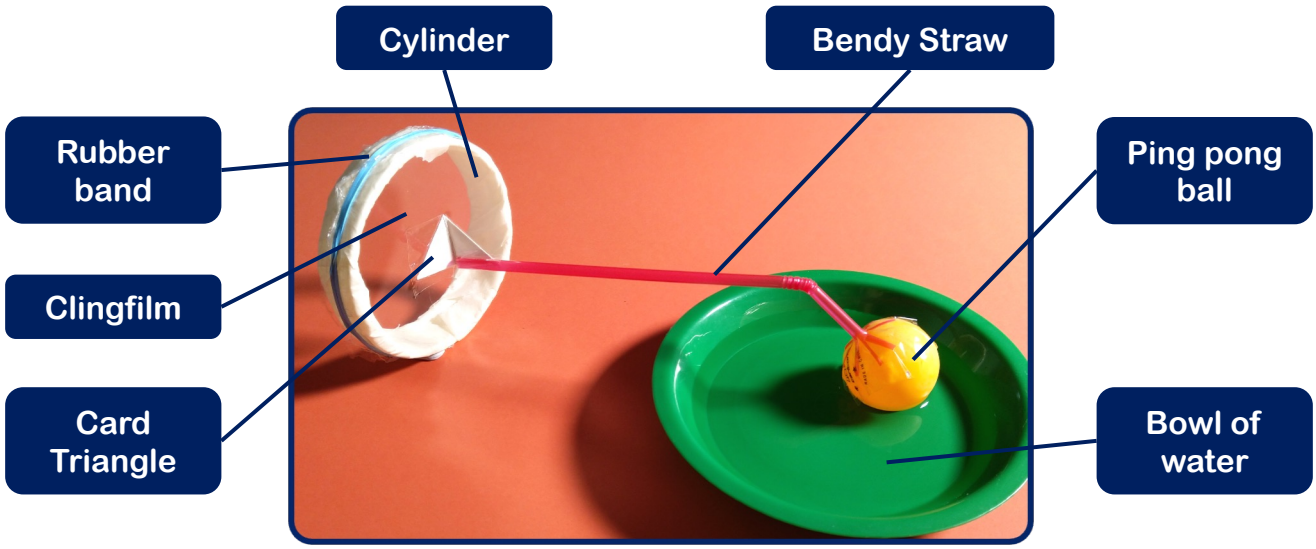

Method

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Identify which parts of the model represent the following parts of the ear and then explain your choice.

Ear drum:
Clingfilm due to the shape position and the fact it moves like the eardrum

The three inner ear bones:
The ping pong ball as it will make vibrations in the water similar to the way the bones do

The liquid filled cochlea:
The water in the bowl as it is liquid

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ANSWERS

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Build a model ear and compare it to a working ear.

1. Is your ear model descriptive, predictive or explanatory? Explain your choice.

An explanatory model because it is designed to explain how the ear works and why it works that way rather than simply describing or predicting.

2. Suggest a limitation of the model.

The parts of the model do not move like the inner ear and cannot respond to changes in loudness and pitch like a real ear.

3. Suggest how the model could be improved to create a more accurate representation of the ear.

Add the ability for parts to more and detect changes to loudness and pitch. This could be connecting it to a computer and oscilloscope.

Challenge: Give two similarities and two differences between an ear and a microphone.

Similarities	Differences
• Convert sound waves into electrical signals • Use diaphragms to detect sound vibrations	• Ears respond to air pressure, microphones to sound pressure • Ears convert signals for neural transmission, microphones for electronic recording

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