

How sound travels and how we hear it

Grade 6 science (Year 7 · Class 6) · Lab

Name: _____ Date: _____ Class: _____

How does the length of an air column change the pitch of a note? In this lab you blow across a cylinder with different water levels and read the frequency with a phone. You look for a pattern and judge how reliable the readings are.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS4-1

Aim

To find how the length of a column of air affects the pitch of the sound it makes when you blow across the top.

Equipment

- Tall plastic cylinder or clear tube about 3 cm wide and 30 cm tall
- Water and a jug
- Ruler
- Smartphone with a free frequency-analysis app
- Paper towels

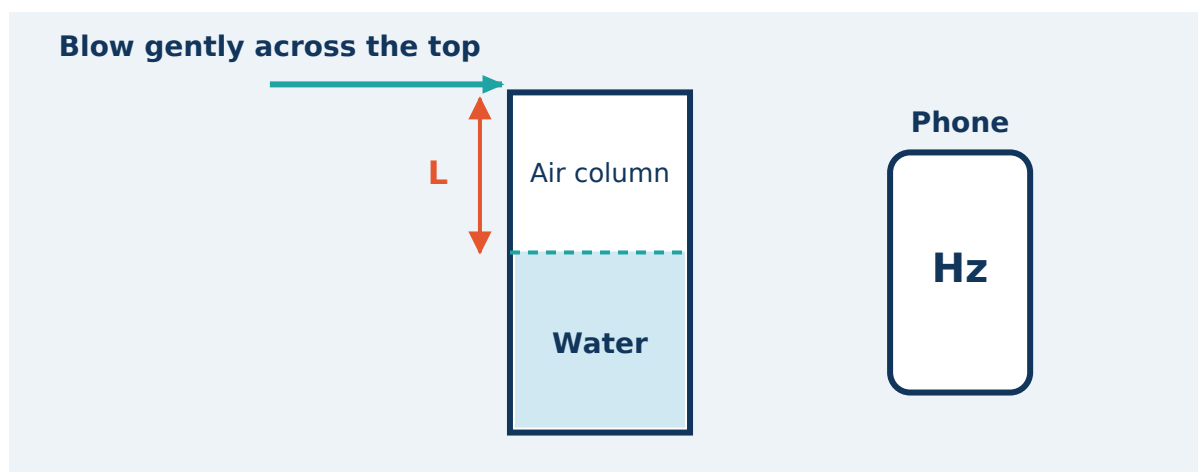
Safety

Safety

Wipe up any spilled water at once so nobody slips. Blow gently and do not hold your breath, to avoid feeling dizzy, and keep the volume of sound moderate to protect your ears.

Method

1. Pour water into the cylinder until the air column above it is 20 cm long, measured from the surface to the top rim.
2. Blow gently across the top rim until you hear a clear note.
3. Use the phone app to read the frequency of the note in hertz.
4. Add water to shorten the air column to 16 cm, 12 cm, 8 cm and 4 cm, and repeat each time.
5. Record the results in the table.



Measure L from the water surface to the top rim and read the frequency on the phone.

Results

Sample measurements:

Air column L (cm)	20	16	12	8	4
Frequency (Hz)	410	510	660	960	1750

Analysis questions

Question 1 Pattern

Describe how the frequency changes as the air column gets shorter.

Question 2 Highest pitch

State the length of the air column that gave the highest pitch and the frequency.

Question 3 Comparing two columns

Calculate how many times greater the frequency is for 8 cm than for 20 cm.

Question 4 Graph

Plot frequency (vertical axis) against air column length (horizontal axis) and describe the shape.

Question 5 Prediction

Predict whether a 24 cm air column would give a frequency above or below 410 Hz and explain.

Question 6 What vibrates

State what vibrates to make the sound, and name two things to keep the same.

Question 7 Uncertainty

The app reads to ± 10 Hz. Calculate the percentage uncertainty for 410 Hz and for 1750 Hz.