Sound Under Test

Use speaker data to investigate pitch and volume.

P.4.6C "Students will demonstrate an understanding of the properties of sound as a form of energy. Plan and conduct scientific investigations to test how different variables affect the properties of sound (i.e., pitch and volume)..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the two sentences that explain how vibrations affect pitch and volume, then circle two table rows that change only one speaker setting.

What Makes a Speaker Sound Different?

1. A speaker cone moves back and forth to make sound. Each full back-and-forth motion is one vibration. When the cone vibrates more times in one second, people hear a higher pitch. When the cone moves farther with each vibration, people hear a louder sound. Pitch and volume tell us different things about the motion.

2. Mina tested a speaker in a quiet room. She listened from the same spot each time. She changed how many times the cone vibrated each second and how far it moved. The table records four tests. To find the effect of just one change, compare tests that match in every other way.

MINA'S SPEAKER TESTS

Test	Vibrations per second	Cone movement	Sound heard
A	100	Small	Low, soft
B	200	Small	High, soft
C	100	Large	Low, loud
D	200	Large	High, loud

3. A fair test changes one thing at a time. Hold movement size steady to study how vibration rate affects pitch. Hold the rate steady to study how movement size affects volume. In the 1600s, Robert Boyle studied how sound travels through air. Sound needs material, such as air, to reach our ears.

2 ANSWER WITH EVIDENCE

Use the passage

1. Compare tests A and B. How did the vibration rate and pitch change?

2. Compare tests A and C. How did cone movement and volume change?

3. Which two tests show that a louder sound does not have to have a higher pitch? Use their results to explain.

4. Why are tests A and D not a fair pair for finding the effect of vibration rate alone?

3 YOUR TURN

Your own words

Plan two new speaker tests at 150 vibrations per second, one with small cone movements and one with large cone movements. In three sentences, state what you keep the same, what you change, and what you predict a listener will hear.

ANSWER KEY # Sound Under Test

PART 1 · READ AND MARK

Underline the two sentences that explain how vibrations affect pitch and volume, then circle two table rows that change only one speaker setting. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Compare tests A and B. How did the vibration rate and pitch change?	**The rate rose from 100 to 200 vibrations per second, and the pitch changed from low to high.**
2	Compare tests A and C. How did cone movement and volume change?	**Cone movement changed from small to large, and the sound changed from soft to loud.**
3	Which two tests show that a louder sound does not have to have a higher pitch? Use their results to explain.	**Tests B and D have the same high pitch, but D is loud and B is soft. Tests A and C also work: both have a low pitch, but C is loud and A is soft.**
4	Why are tests A and D not a fair pair for finding the effect of vibration rate alone?	**Both the vibration rate and the cone movement size changed, so the rate was not the only difference.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

In both tests, I will set the speaker to 150 vibrations per second and listen from the same spot. I will use small cone movements in the first test and large cone movements in the second. I predict the second test will sound louder, but the pitch will stay the same.

For the marking job, accept any pair of rows with either the same vibration rate or the same cone movement size. For Your Turn, look for a controlled listening position, a change in movement size, and a prediction of changed volume but unchanged pitch.