

Name: _____

ALTERNATIVE INSTRUMENTS

In “Frozen Concert” (p. 24), you read about musicians who play instruments made of ice. Read the following passage to learn how and why an engineer designed instruments using plastic. Then answer the questions on the following page.

PLAYING WITH PLASTIC

People have been playing trumpets and trombones for centuries. For most of that time, those instruments have been made out of the same material: a metal called brass. Steven Greenall is an engineer based in England who has played the trombone since he was a kid. About 10 years ago, he had an out-of-the-box idea: Could he make a trombone out of plastic? He decided to give it a try.

Today, Greenall runs a company called Warwick Music Group. The company makes plastic trombones and trumpets, as well as a new instrument for beginners called a pBuzz. The instruments have become wildly popular, especially with young people. More than 250,000 have been sold worldwide.

When creating the instruments, Greenall’s design team faced a challenge: How would they make a plastic instrument sound like a metal one? Instruments make sound by causing air particles to vibrate. For instance, when people buzz their lips into a trombone, the air inside vibrates. The jiggling air particles bump into their neighbors, creating sound waves that travel to the air outside the instrument and to your ear.

One factor that affects the sound waves created by an instrument is the material it is made of. Compared with brass, plastic has less mass packed in the same volume. The material’s lower *density* causes the air to vibrate differently inside a plastic instrument. To make sure their instruments sound the same as brass ones, engineers had to adjust their designs.

One modification the design team made was to change the shape of the long tubes in the trombones. A metal trombone has round tubes, but the plastic pBone instrument has square tubes. That shape causes the air to move through the plastic instrument more slowly, which better replicates the sound made by a brass trombone.

Greenall also made changes to the instruments’ valves. These buttons adjust the volume of air that vibrates, which affects the *pitch*, or how high or low a sound is. When players push on a valve, it allows the air to move through longer tubes on the instrument. That creates a lower sound. The valves of brass trumpets have to be oiled regularly so they slide easily. To build the valves of the pTrumpet, Greenall’s team used a plastic that produces its own oil. “It’s easier for students to maintain,” Greenall says.

One advantage of plastic instruments is they cost less to make. Plastic is also lighter than brass, making the instruments easier for kids to carry around. They’re more durable too. You can drop them on the ground without damaging them. Those qualities have made plastic instruments a popular choice for school music programs around the world.

Greenall’s team will soon add other instruments to their lineup, including a plastic flute and saxophone. Greenall is excited to be giving more young people the opportunity to play music like he did as a boy. “Music transformed my life,” Greenall says.

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QUESTIONS

1. Which of the following statements can you *infer*, or conclude, from the facts in the article?
- Ⓐ Air molecules speed up when moving inside larger spaces.
 - Ⓑ Plastic instruments cause less air to vibrate than brass ones.
 - Ⓒ The sound made by plastic instruments is lower than that from brass ones.
 - Ⓓ Air moves more quickly through rounded tubes than square tubes.
2. Use context clues to determine the best definition for the word *replicates*.
- Ⓐ increases
 - Ⓑ copies
 - Ⓒ improves
 - Ⓓ changes
3. Trumpets come in different sizes. A piccolo trumpet is smaller than a traditional one. How would the sound of a piccolo trumpet compare with a traditional-sized trumpet? Use evidence from the article to support your answer.
4. The author claims that Greenall's plastic instruments have become particularly popular with young people. Describe at least three features of the instruments that may make them appealing to youth. Which do you think is most critical to the instruments' success? Why?
5. In the article "Frozen Concert," you read that ice instruments produce sounds that are different from similar instruments made of traditional materials. Use evidence from the passage to explain at least one factor that causes this difference.