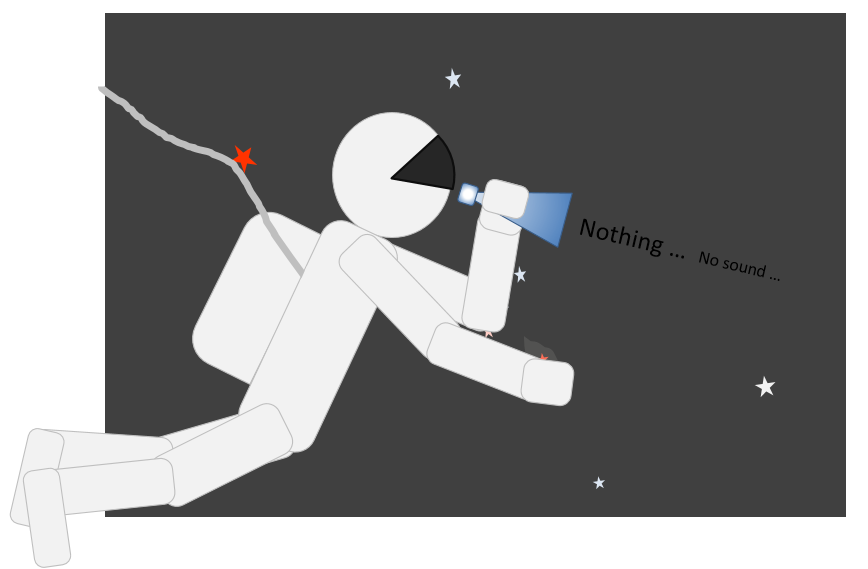
**It’s quiet in space**

Sound cannot be heard through space



Why can’t you hear a sound in space?

Put a tick (✓) in the box next to the best answer.

|  |  |  |
| --- | --- | --- |
| **A** | No air particles to make each other vibrate |  |
|  |  |  |
| **B** | No air particles to push the sound along |  |
|  |  |  |
| **C** | No air particles to pass the sound along |  |
|  |  |  |
| **D** | No gaps in the space suit for sound to get in |  |

*Physics > Big idea PSL: Sound, light and waves > Topic PSL1: Sound and light > Key concept PSL1.1: Production and transmission of sound*

|  |
| --- |
| **Response activity** |
| **It’s quiet in space** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Sound needs a medium to travel through. It radiates out from a source in straight lines in all directions and when it strikes an object or new material it is transmitted, reflected, scattered or absorbed – or a combination of these. |
| Observable learning outcome: | Describe how particles vibrate to transmit sound.  Explain why sound will not travel through empty space (vacuum). |
| Activity type: | Simple multiple choice |
| Key words: | Particles, vibrations, vacuum |

This activity can help develop students’ understanding by addressing the sticking-points revealed by the following diagnostic questions:

* Diagnostic question: Candle sound
* Diagnostic question: Balloon pop!

**What does the research say?**

The transmission of sound is difficult to understand. It is common for students to think of sound a material substance that moves from one place to another (Barman, Barman and Miller, 1996; Whittaker, 2012). Even at degree level Linder (1992) found that some students thought of sound as a ‘lump’ of material travelling through a passive medium, similar to a surfer on a water wave.

In his study of twenty-eight 11-14 year olds Whittaker (2012) found that fewer than 30% used the idea of vibrations to correctly describe how sound travels through air. Half the students believed a gap around the door was necessary for sound to enter a room from the outside, which indicates a view of sound as a material substance.

Caleon and Subramanian (2010) note that students may think that sound is slowed down by physical obstructions and a few students believe that sound can travel through empty space (vacuum). Most students can state that sound does not travel in a vacuum, but the majority cannot explain way using scientific ideas.

In the diagnostic questions ‘Candle sound’ and Balloon pop!’ it is suggested that a student model can be a useful way to address students’ misunderstandings about how sound travels through air. This activity is intended to check that students can apply their scientific understanding to a new situation.

**Ways to use this activity**

Students should complete the question individually. This could be a pencil and paper exercise, or you could use an electronic ‘voting system’ or mini white boards and the PowerPoint presentation.

The answers to the question will show you whether students understood the concept sufficiently well to apply it correctly.

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs.

*Differentiation*

You may choose to read the questions to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answer**

A: No air particles to make each other vibrate

If students give answer B or C they may be adapting the evidence to fit with a view of sound as a material substance. With answer B they may think that sound is transmitted by the ‘surfer model’ with a ‘lump of sound’ being pushed through the air by a wave of air particles. With answer C they are likely to be picturing the air particles passing on ‘sound’ as runners pass on a relay baton.

**Acknowledgments**

Developed by Peter Fairhurst (UYSEG).

Images: UYSEG

**References**

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