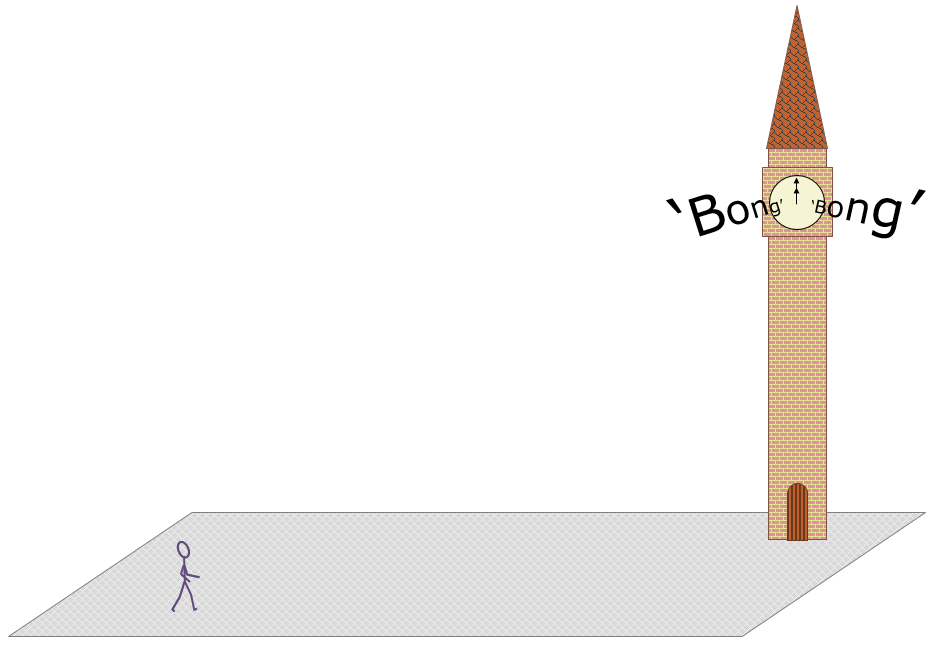
**Long distance sound**



You are walking towards the clock and it strikes twelve.

Every **‘bong’** is louder that the one before.

1. Which is the best reason for the sound getting louder?

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

|  |  |  |
| --- | --- | --- |
| **A** | It is easier for the sound to reach you |  |
|  |  |  |
| **B** | The sound has less time to fade before it reaches your ears |  |
|  |  |  |
| **C** | Your ears get used to the sound |  |
|  |  |  |
| **D** | The sound is less spread out, so more of it gets to your ears |  |

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

|  |
| --- |
| **Diagnostic question** |
| **Long distance sound** |

**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: | Explain why sounds become quieter as the distance from the source increases. |
| Question type: | Simple multiple choice |
| Key words: | Particles, vibrations |

**What does the research say?**

In his study of twenty-eight 11-14 year olds Whittaker (2012) found that 40% of students thought sound got quieter as it travelled further because it ‘faded and died out’ or ran out of ‘energy’. Less than half of this number gave the correct explanation which is that sound spreads out.

Watt and Russell (1990) found that nearly 20% of eleven year olds, from a sample of fifty-seven 8-11 year olds, held an ‘active ear’ model of hearing, in which the most important factor in hearing is that the listener is concentrating on the source of the sound.

This question investigates students’ understanding of why sound gets quieter with distance.

**Ways to use this question**

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**

D

**How to respond - what next?**

Answer A suggests students persisting with the idea that sound is a material substance moving between the air particles.

In answer B sound is described as fading over time – perhaps in the way a glow stick fades.

Answer C highlights students with an ‘active ear’ model of hearing.

If students have misunderstandings about the reason sound gets quieter with distance, it can help to use a model to demonstrate the scientific model. For example ripples on water after a stone has been thrown in. Asking students to work in pairs or small groups to write a shared explanation can encourage social construction of the scientific idea through dialogue.

**Acknowledgments**

Developed by Peter Fairhurst (UYSEG), based on an idea from York Science PLC1.3b (UYSEG).

Images: UYSEG

**References**

Watt, D. and Russell, T. (1990). Sound. *Primary SPACE Project.*

Whittaker, A. (2012). Pupils think sound has substance - well, sort of ... *School Science Review,* 94(346)**,** 3.