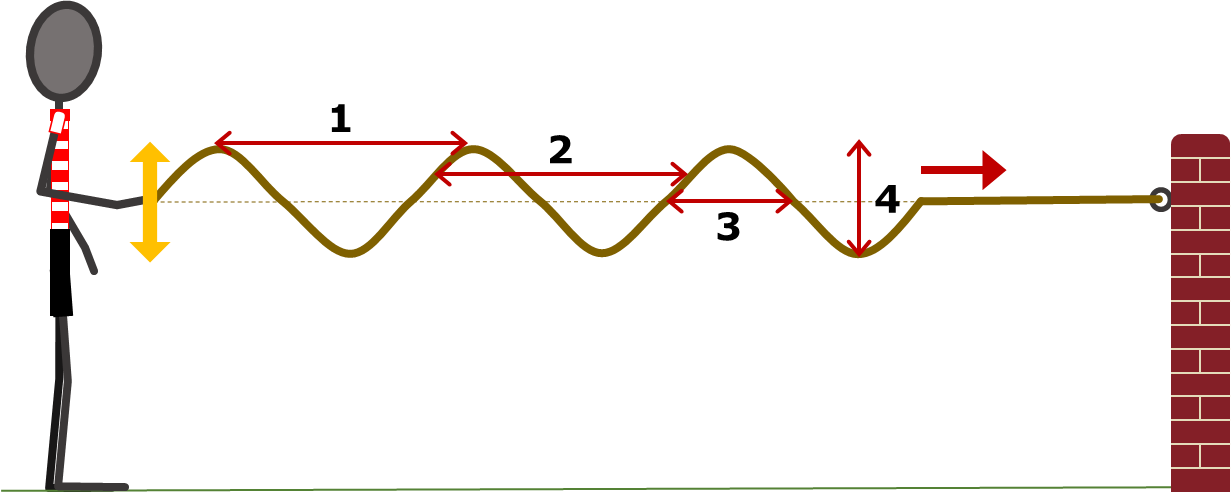
**The right wavelength**

Albert makes a wave with a rope.

He can change the **wavelength** and the **amplitude** of the wave.

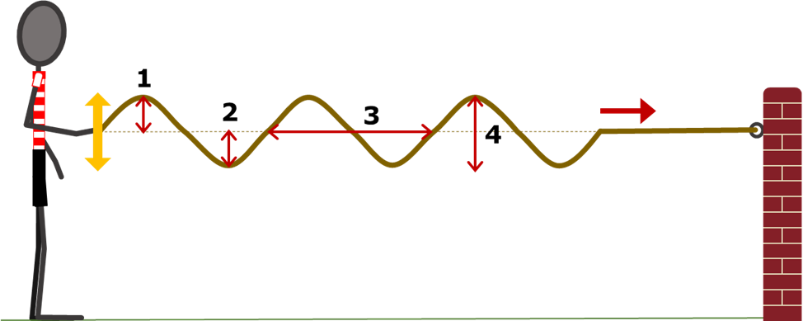
**1.** What shows the **wavelength** of the wave?



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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | Arrow 1 |  |  | **C** | Arrow 3 |  |
|  |  |  |  |  |  |  |
| **B** | Arrows 1 and 2 |  |  | **D** | Arrow 4 |  |

**2.** What shows the **amplitude** of the wave?



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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | Arrow 1 |  |  | **C** | Arrow 3 |  |
|  |  |  |  |  |  |  |
| **B** | Arrows 1 and 2 |  |  | **D** | Arrow 4 |  |

***The symbol for wavelength is the Greek letter lambda: λ***

*Physics > Big idea PSL: Sound, light and waves > Topic PSL5: Measuring waves > Key concept PSL5.1: Visualising waves*

|  |
| --- |
| **Diagnostic question** |
| **The right wavelength** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The motion of particles in a wave can be represented by a displacement-distance or a displacement-time graph, from which the wave’s amplitude and wavelength or time period can be found. |
| Observable learning outcome: | Identify wavelength and amplitude on pictures of transverse waves. |
| Question type: | Simple multiple choice |
| Key words: | Amplitude, wavelength, transverse wave |

**What does the research say?**

Students can usually identify the wavelength of transverse wave as the distance from the peak of one wave to the peak of the next. It is not always obvious to them that the wavelength is the distance between *any* pair of equivalent points on consecutive waves.

The amplitude of the wave is equal to the maximum displacement of a particle from its undisturbed position. It is common for students to identify the amplitude of a transverse wave wrongly as the total height of the wave from trough to peak.

**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 answers**

1. B

2. B

**How to respond - what next?**

1. Most students will identify arrow 1 as the wavelength, although fewer may also identify arrow 2 as correct. For some students, the wavelength is not perceived of as length of each repeated wave pattern, but as the more specific measurement of the distance between the peaks of two consecutive waves.

2. Most wrong answers are likely to be D, because it is common for students to think of amplitude as the total height of the wave from top to bottom. Amplitude is instead the maximum displacement of a part of the wave from its equilibrium position.

If students have misunderstandings about identifying wavelength and amplitude on pictures of transverse waves, it can help to lead a class discussion to review their understanding of each term.

A demonstration of taking measurements from a transverse wave diagram should lead to an understanding that wavelength is the length of each repeating wave-pattern that can be measured between *any* pair of equivalent points on consecutive waveforms.

A water wave is a useful example for explaining amplitude. The amplitude of a water wave can be described as the height of wave peak above calm water.

Small group discussions in which students work together to write the clearest possible definitions of each term, in their own words, can help develop and consolidate understanding.

**Acknowledgments**

Developed by Peter Fairhurst (UYSEG).

Images: Peter Fairhurst (UYSEG).