

4.5 Standing Waves

Question Paper

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| Course | DPIB Physics |
| Section | 4. Waves |
| Topic | 4.5 Standing Waves |
| Difficulty | Medium |

Time allowed: 20
Score: /10
Percentage: /100

Question 1

Which **one** of the following options is **not** possible for longitudinal waves?

- A. Polarisation
- B. Interference
- C. Superposition
- D. Diffraction

[1 mark]

Question 2

Which **one** of the following options is always true regarding the energy transferred along a standing wave and its amplitude?

| | Energy transferred along the standing wave | Amplitude of vibrations along the standing wave |
|----|--|---|
| A. | None | Varies |
| B. | None | Is constant |
| C. | Some energy transferred | Varies |
| D. | Some energy transferred | Is constant |

[1 mark]

Question 3

An open pipe has sound waves sent through it causing it to have a standing wave of the third harmonic occurring within it. What is the nature of oscillations at the centre of the pipe (point X) and at its edge (point Y)?

| | Point X | Point Y |
|----|--------------|--------------|
| A. | A node | A node |
| B. | A node | An anti-node |
| C. | An anti-node | A node |
| D. | An anti-node | An anti-node |

[1 mark]

Question 4

The fundamental frequency for a pipe which is closed at one end, but open at the other, is 380 Hz. What is the frequency of its third harmonic?

- A. 127 Hz
- B. 380 Hz
- C. 760 Hz
- D. 1140 Hz

[1 mark]

Question 5

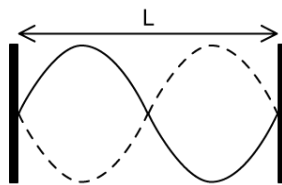
An open pipe has both ends clear and has a standing wave formed within it. Which of the following statements is always true for this standing wave?

- A. The number of nodes added to the number of antinodes is an odd number
- B. There is always a central anti-node in the wave
- C. The number of nodes added to the number of antinodes is an even number
- D. There is always a central node in the wave

[1 mark]

Question 6

A wave of a certain frequency is setup on a string with two fixed ends which act as nodes



If the frequency is doubled, but nothing else is changed, how many nodes will be on the string?

- A. Two
- B. Three
- C. Five
- D. Seven

[1 mark]

Question 7

Organs such as those found in churches often have many different kinds of pipes with both open and closed ends. For a single pipe that has a specific length, what is the ratio of the fundamental frequency with both ends open to the fundamental frequency with one end closed?

- A. 1:2
- B. 1:4
- C. 2:1
- D. 4:1

[1 mark]

Question 8

A pipe with a single closed end has a standing wave set up within it. If the length of the pipe is 2 m, which value below is closest to the wavelength of the seventh harmonic?

- A. 0.345 m
- B. 0.782 m
- C. 0.983 m
- D. 1.14 m

[1 mark]

Question 9

A standing sound wave is set up in an open pipe (both ends open) and the frequency of the first harmonic is 400 Hz. What is the approximate length of this pipe? (Assume the speed of sound is 343 m/s).

- A. 0.14 m
- B. 0.43 m
- C. 1.27 m
- D. 4.81 m

[1 mark]

Question 10

A pipe of length L is open at one end and closed at the other end of the pipe. What is the frequency of the fifth harmonic?
(Assume the speed of sound in air is 343 m s^{-1}).

- A. $150 \div L$
- B. $281 \div L$
- C. $429 \div L$
- D. $611 \div L$

[1 mark]