9.1 Stationary Waves

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	9. Superposition
Topic	9.1 Stationary Waves
Difficulty	Easy

Time allowed: 10

Score: /10

Percentage: /100

Question 1

A student wants to demonstrate a stationary wave.

What could they use to produce this?

    A   passing water waves through a narrow slit

    B   passing monochromatic light through a double slit

    C   making a loud sound near a mountain

    D   blowing air over the top of an empty bottle

[1 mark]

Question 2

A student sets up a sound wave in a long tube, and the tube is closed at one end. The tube length is changed until the sound from the tube is loudest.

Which of the following statements describe the nature of the wave in the tube?

    A   transverse and stationary

    B   transverse and progressive

    C   longitudinal and stationary

   **D**   longitudinal and progressive

[1 mark]

Question 3

A stationary wave is formed when two waves travel in opposite directions through the same space.

Which of the following statements must also be correct?

    A   the waves must have equal speed, frequency and wavelength

    B   the waves must have equal frequency, but a different speed and wavelength

    C   the waves must have equal wavelength, but a different speed and frequency

    D   the waves must have equal speed, but a different wavelength and frequency

[1 mark]
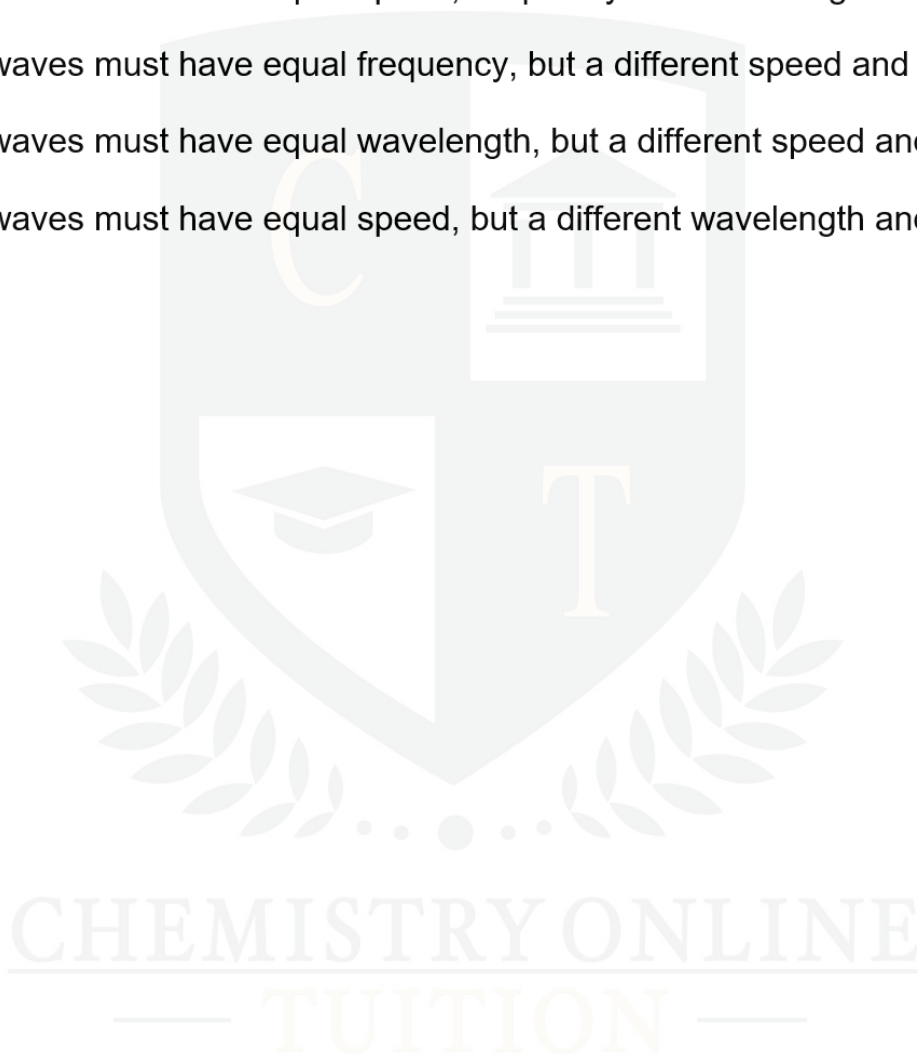
Question 4

A student formed a stationary wave in a tube by blowing over the top as shown in the diagram

Which of the following statements are correct?

A   the stationary wave in the cylinder is polarised

B   the stationary wave will have an antinode at the bottom of the cylinder

C   the fundamental frequency of the stationary wave decreases when some water is added to the cylinder

D   the stationary wave in the cylinder is caused by the superposition of two waves moving in opposite directions

[1 mark]

Question 5

A stationary wave on a string is shown in the diagram below. The standing wave has three nodes Q_1, Q_2 and Q_3

Which of the following statements are correct?
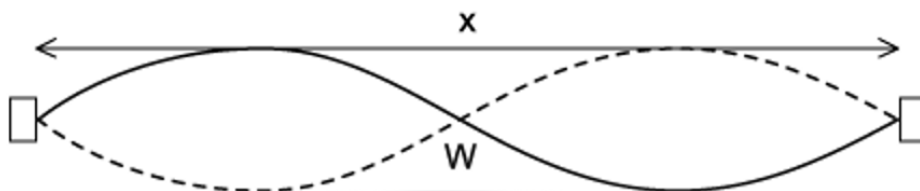
  A   all points on the string vibrate in phase

  B   all points on the string vibrate with the same amplitude

  C   points equidistant from Q_2 vibrate with the same frequency and the same amplitude

  D   points equidistant from Q_2 vibrate with the same frequency and in phase

[1 mark]

Question 6

A stretched string is used to demonstrate a stationary wave, as shown in the diagram.

Which row in the table correctly describes the length of x and the name of W?

	length x	point W
A	two wavelengths	node
B	one wavelength	node
C	two wavelengths	antinode
D	one wavelength	antinode

[1 mark]

Question 7

A stretched string is set up to demonstrate a stationary wave between two points M and Q.
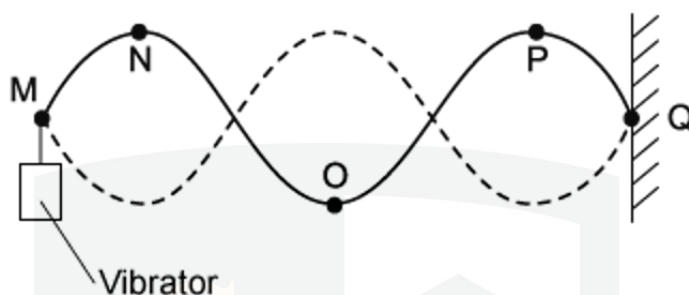
Which of the following statements are correct?

    A   the distance between M and Q is three wavelengths

    B   the wave shown has the lowest possible frequency

    C   points N and P vibrate in phase

    D   point O is at a node

[1 mark]

Question 8

When a stationary wave is produced in a tube, which of the following statements describes the wave speed?

    A it is the speed of a particle at a node

    B it is the speed of one of the progressive waves that are producing the stationary wave

    C it is the speed at which energy is transferred from one antinode to an adjacent antinode

    D it is the distance between two adjacent nodes divided by the period of the wave

[1 mark]

Question 9

The table shows some statements about stationary and progressive waves.

Which row is correct?

	progressive wave	stationary wave
A	particles one wavelength apart vibrate in phase	particles one wavelength apart vibrate in phase
B	particles vibrate in phase with their immediate neighbours	particles in adjacent loops vibrate in antiphase
C	energy is transferred along the wave	energy is transferred along the wave
D	all particles vibrate with the same amplitude	all particles vibrate with the same amplitude

[1 mark]

A stationary wave shown in the diagram was created on a stretched string, it had two instants of maximum vertical displacement.
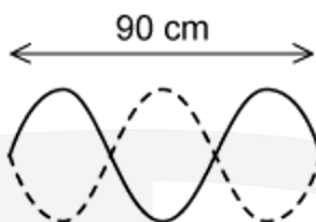
The frequency of the wave is 13 Hz.

What is the speed of the wave?

A 3.9 m s $^{-1}$ **B** 7.8 m s $^{-1}$ **C** 390 m s $^{-1}$ **D** 780 m s $^{-1}$

[1 mark]