A Level · OCR · Physics

8 mins 8 questions

Multiple Choice Questions

Superposition & Stationary Waves

Superposition / Graphical Representation of Superposition / Interference / Two-Source Interference / Young Double-Slit Experiment / Determining the Wavelength of Light / Stationary Waves / Stationary vs Progressive Waves / Nodes & Antinodes / Determining the Speed of Sound in Air in a Resonance Tube / Harmonics

Easy (1 question)	/1
Medium (7 questions)	/7
Total Marks	**/8**

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Easy Questions

1 This question is about a progressive wave and a stationary wave.

Which statement is correct?

A. A progressive wave has at least one node.

B. All progressive waves are longitudinal.

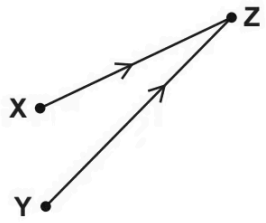
C. All particles oscillating between two adjacent nodes in a stationary wave are in phase.

D. The superposition of two waves travelling in the same direction produces a stationary wave.

(1 mark)

Medium Questions

1 Coherent radio waves from transmitters **X** and **Y** are emitted in phase. The waves interfere **constructively** at point **Z**.



The distance **XZ** is 16.0 m and the distance **YZ** is 20.0 m.

The radio waves have wavelength λ.

Which value of λ is **not** possible?

A. 1.0m

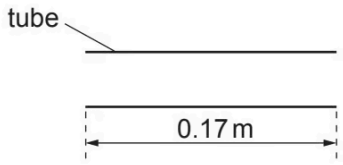
B. 2.0m

C. 3.0m

D. 4.0m

(1 mark)

2 A stationary sound wave, in its fundamental mode of vibration, is formed in a tube open at both ends.



The length of the tube is 0.17 m. The speed of sound in air is 340 m s^{-1}.

Which row for this stationary wave is correct?

	Number of nodes	Frequency of stationary wave / Hz
A	1	500
B	1	1000
C	2	1000
D	2	2000

(1 mark)

3 Monochromatic light from a laser is incident normally on a diffraction grating.

A series of bright dots are formed on a distant screen.

Which **two** terms can be used to explain these bright dots?

A. diffraction, interference

B. reflection, interference

C. refraction, diffraction

D. refraction, reflection

(1 mark)

4 A double-slit is used in an interference experiment to independently investigate the light from two sources **K** and **L**. The light from the sources have different wavelengths.

The table below shows some data.

Light source	Wavelength of light	Separation between adjacent bright fringes	Distance between screen and double-slit
K	λ	1.2 mm	*D*
L	0.80λ		0.50*D*

What is the separation between adjacent bright fringes for source **L**?

A. 0.48 mm

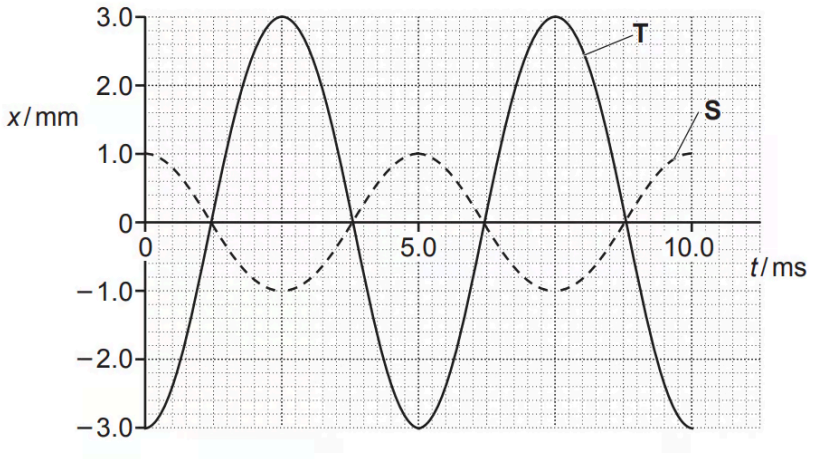
B. 1.2 mm

C. 1.9 mm

D. 3.0 mm

(1 mark)

5 The diagram below shows the graphs of displacement *x* against time *t* for two waves **S** and **T**.



The waves meet at a point in space.

The superposition of these two waves produces a resultant wave.

What is the frequency *f* and the amplitude *A* of the resultant wave?

A. f = 100 Hz, A = 2.0 mm

B. f = 100 Hz, A = 4.0 mm

C. f = 200 Hz, A = 2.0 mm

D. f = 200 Hz, A = 4.0 mm

(1 mark)

6 Stationary waves are produced in a tube closed at one end and open at the other end. The fundamental frequency is 120 Hz.

What is a possible frequency of a harmonic for this tube?

A. 60 Hz

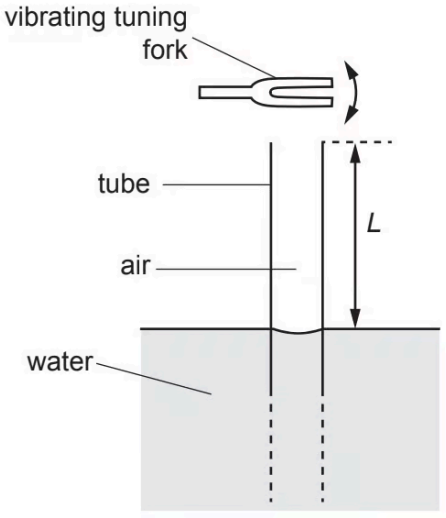
B. 240 Hz

C. 360 Hz

D. 480 Hz

(1 mark)

7 A vibrating tuning fork is held above the open end of a long vertical tube. The other end of the tube, which is also open, is immersed in a tank of water. The length L of the air column within the tube is changed by raising or lowering the tube.



The wavelength of sound from the vibrating tuning fork is 150.0 cm.

What length L of air column will **not** produce a stationary wave within the tube?

A. 37.5 cm

B. 75.0 cm

C. 112.5 cm

D. 187.5 cm

(1 mark)