Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Waves

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Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Q1.

(a) Explain what is meant by a progressive wave.

_____

_____

_____

(2)

(b) **Figure 1** shows the variation with time of the displacement of one point in a progressive wave.

Figure 1

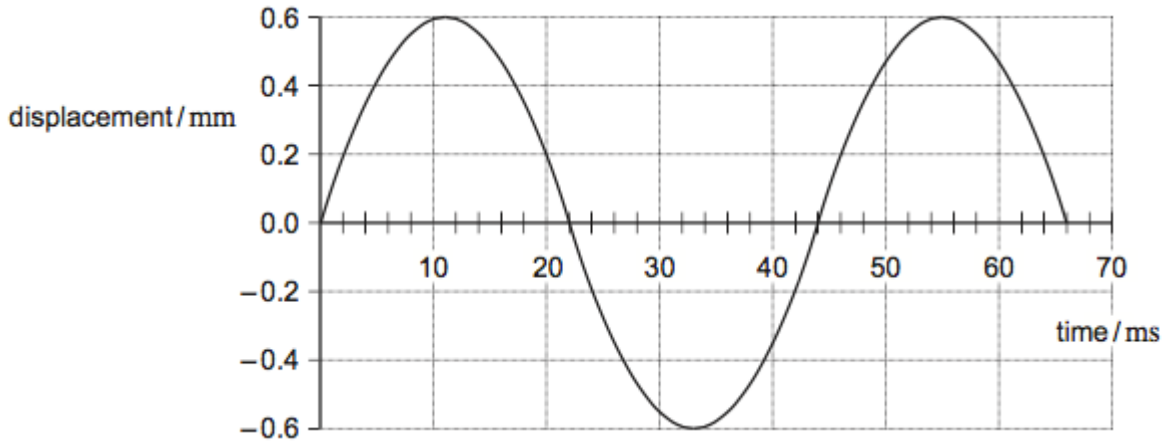
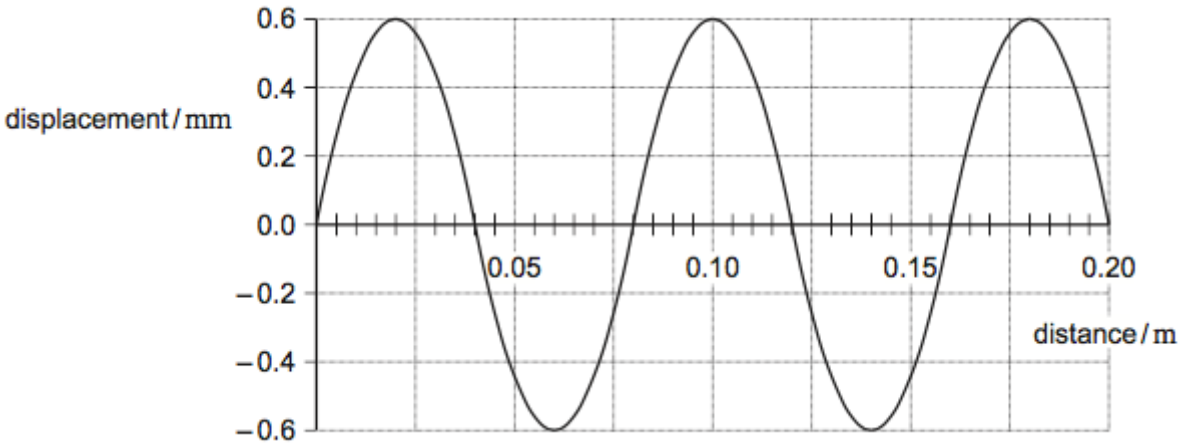


Figure 2 shows the variation of displacement of the same wave with distance.

Figure 2



Use **Figures 1 and 2** to determine

(i) the amplitude of the wave

amplitude = _____ mm

(1)

(ii) the wavelength of the wave

wavelength = _____ m

(1)

(iii) the frequency of the wave

frequency = _____ Hz

(1)

(iv) the speed of the wave

speed = _____ m s^{-1}

(1)

(c) Which of the following statements apply?
Place a tick (✔) in the right-hand column for each correct statement.

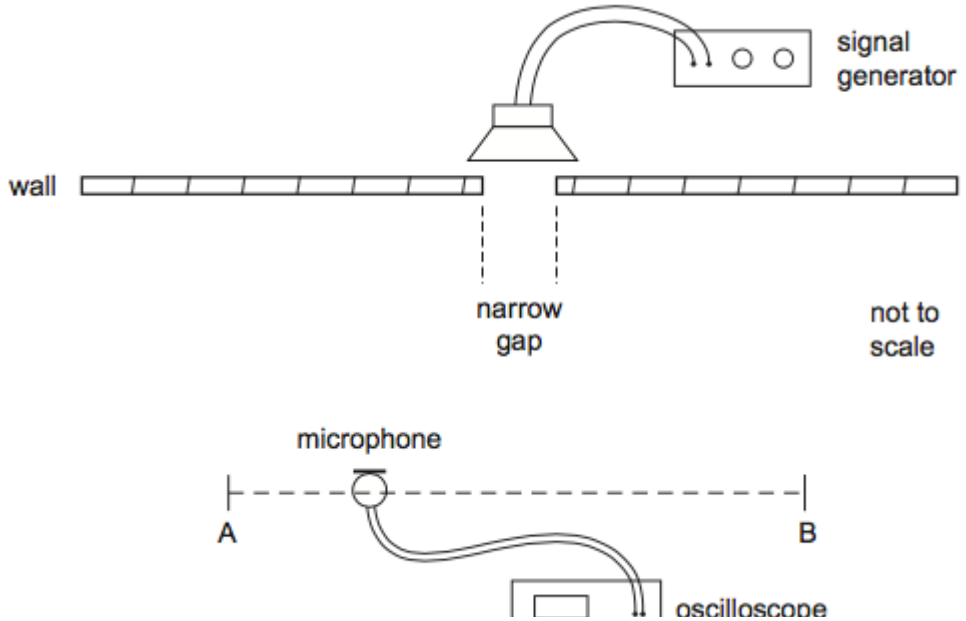
	✔ if correct
sound waves are transverse	
sound waves are longitudinal	
sound waves can interfere	
sound waves can be polarised	

(1)

(d) In an investigation, a single loudspeaker is positioned behind a wall with a narrow gap as shown in **Figure 3**.

A microphone attached to an oscilloscope enables changes in the amplitude of the sound to be determined for different positions of the microphone.

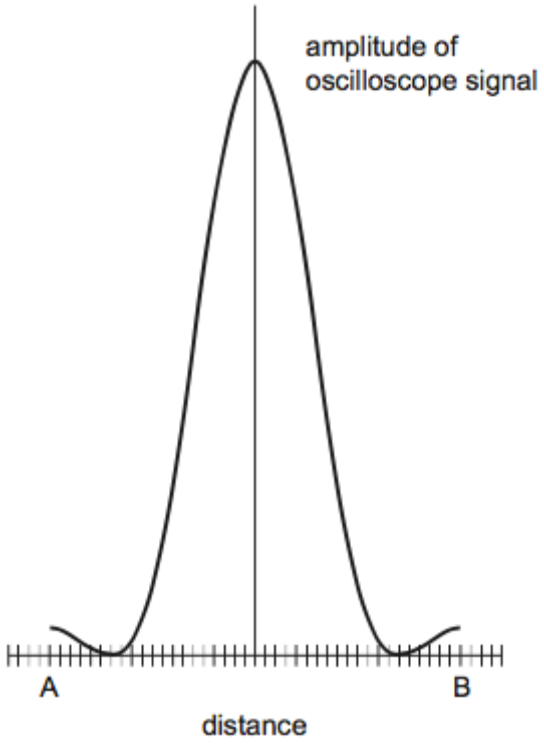
Figure 3



The amplitude of sound is recorded as the microphone position is moved along the line AB a large distance from the gap.

The result of the measurements is shown in **Figure 4**.

Figure 4



The signal generator is adjusted so that sound waves of the same amplitude but of a higher frequency are emitted by the loudspeaker. The investigation using the apparatus shown in **Figure 3** is then repeated.
Explain the effect this has on **Figure 4**.

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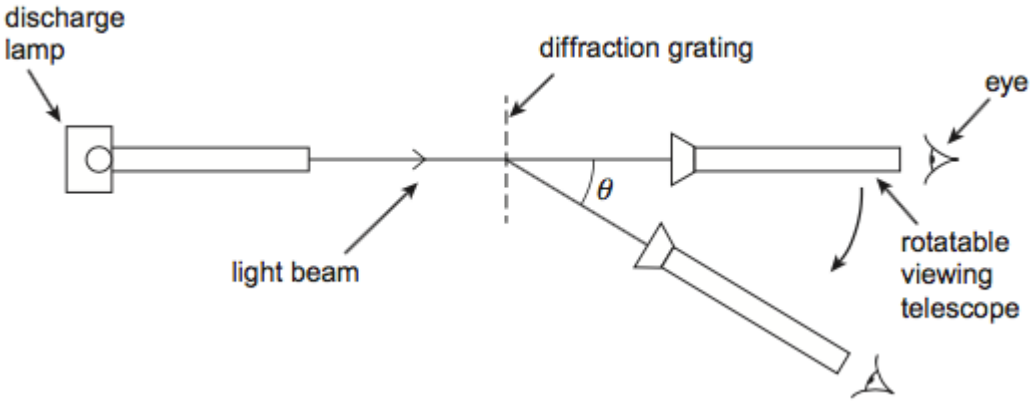
(3)

(Total 10 marks)

Q2.

A discharge lamp emits light of four colours: red, green, blue and violet. The diagram shows light from the lamp incident normally on a diffraction grating with slit separations of 1.8×10^{-6} m. The light is viewed through a telescope which can be rotated as shown.



As the telescope is rotated from the straight-through position, each of the four colours is observed as a bright line at its corresponding first-order diffraction angle.

(a) Which colour would be observed first as the telescope is rotated from the straight-through position?

Place a tick (✔) in the right-hand column to show the correct answer.

	✔ if correct
red	
green	
blue	
violet	

(1)

(b) Explain how a bright line is formed by the diffraction grating at the first-order diffraction angle.

_____

_____

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_____

_____

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_____

(3)

(c) (i) The wavelength of the green light is 5.3×10^{-7} m.

Calculate the first-order diffraction angle for this colour.

angle = _____ degree

(2)

(ii) As the telescope is rotated further, higher-order diffraction maxima are observed. Calculate the highest order observed for the green light.

highest order = _____

(3)

(Total 9 marks)