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

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

Figure 1 and **Figure 2** show a version of Quincke's tube, which is used to demonstrate interference of sound waves.

Figure 1

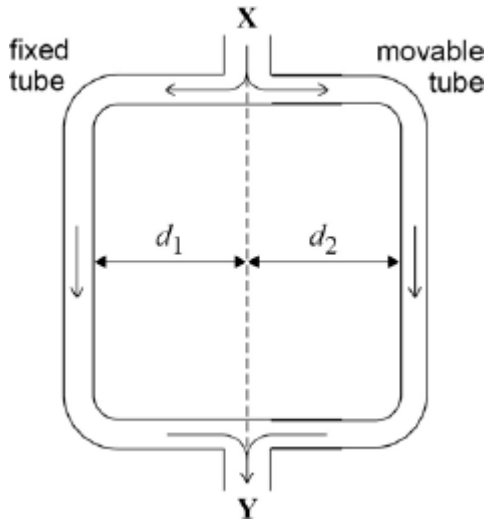
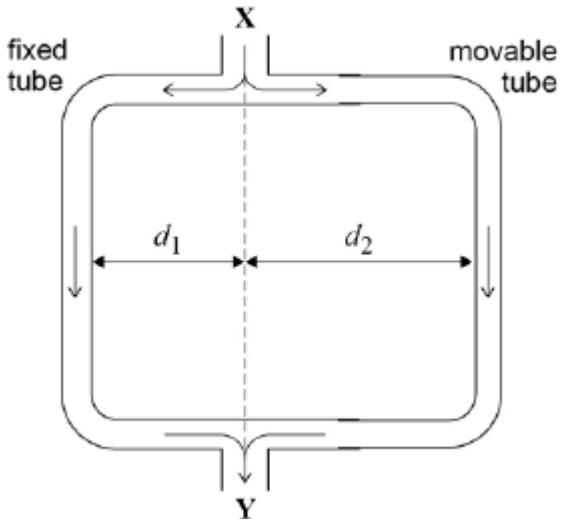


Figure 2



A loudspeaker at **X** produces sound waves of one frequency. The sound waves enter the tube and the sound energy is divided equally before travelling along the fixed and movable tubes. The two waves superpose and are detected by a microphone at **Y**.

(a) The movable tube is adjusted so that $d_1 = d_2$ and the waves travel the same distance from **X** to **Y**, as shown in **Figure 1**. As the movable tube is slowly pulled out as shown in **Figure 2**, the sound detected at **Y** gets quieter and then louder.

Explain the variation in the loudness of the sound at **Y** as the movable tube is slowly pulled out.

_____

_____

_____

_____

_____

_____

_____

(4)

(b) The tube starts in the position shown in **Figure 1**.

Calculate the minimum distance moved by the movable tube for the sound detected at **Y** to be at its quietest.

frequency of sound from loud speaker = 800 Hz
speed of sound in air = 340 m s^{-1}

minimum distance moved = _____ m

(3)

(c) Quincke's tube can be used to determine the speed of sound.

State and explain the measurements you would make to obtain a value for the speed of sound using Quincke's tube and a sound source of known frequency.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 11 marks)

Q2.

A student has a diffraction grating that is marked 3.5×10^3 lines per m.

(a) Calculate the percentage uncertainty in the number of lines per metre suggested by this marking.

percentage uncertainty = _____ %

(1)

(b) Determine the grating spacing.

grating spacing = _____ mm

(2)

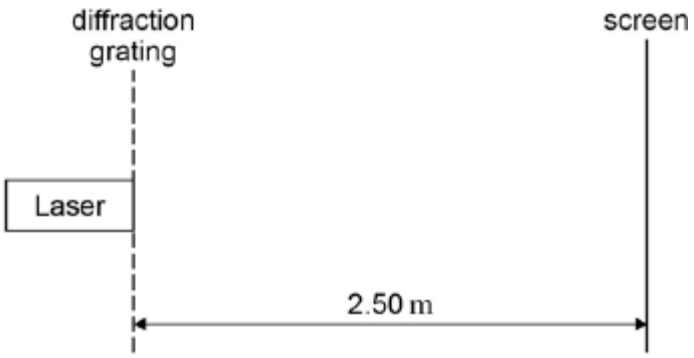
(c) State the absolute uncertainty in the value of the spacing.

absolute uncertainty = _____ mm

(1)

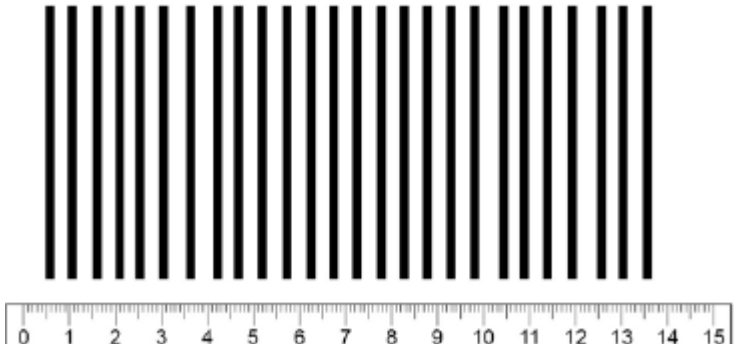
(d) The student sets up the apparatus shown in **Figure 1** in an experiment to confirm the value marked on the diffraction grating.

Figure 1



The laser has a wavelength of 628 nm. **Figure 2** shows part of the interference pattern that appears on the screen. A ruler gives the scale.

Figure 2



Use **Figure 2** to determine the spacing between two adjacent maxima in the interference pattern. Show all your working clearly.

spacing = _____ mm

(1)

(e) Calculate the number of lines per metre on the grating.

number of lines = _____

(2)

(f) State and explain whether the value for the number of lines per m obtained in part (e) is in agreement with the value stated on the grating.

_____

_____

_____

(2)

(g) State **one** safety precaution that you would take if you were to carry out the experiment that was performed by the student.

_____

_____

_____

(1)

(Total 10 marks)