Practice Question Set For A-Level
Subject : Physics
Paper-2 Topic : 13_Oscillations

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Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

The photograph shows an example of a Foucault pendulum.

This is a pendulum that consists of a massive sphere, suspended by a long wire from a high ceiling. Over time the vertical plane through which the pendulum swings appears to rotate because of the rotation of the Earth.

mass of sphere = 28.0 kg

The pendulum makes 8 complete oscillations in 52.2 s.

Show that the length of the wire supporting the sphere is about 10 m.

diameter of sphere = 60.0 cm

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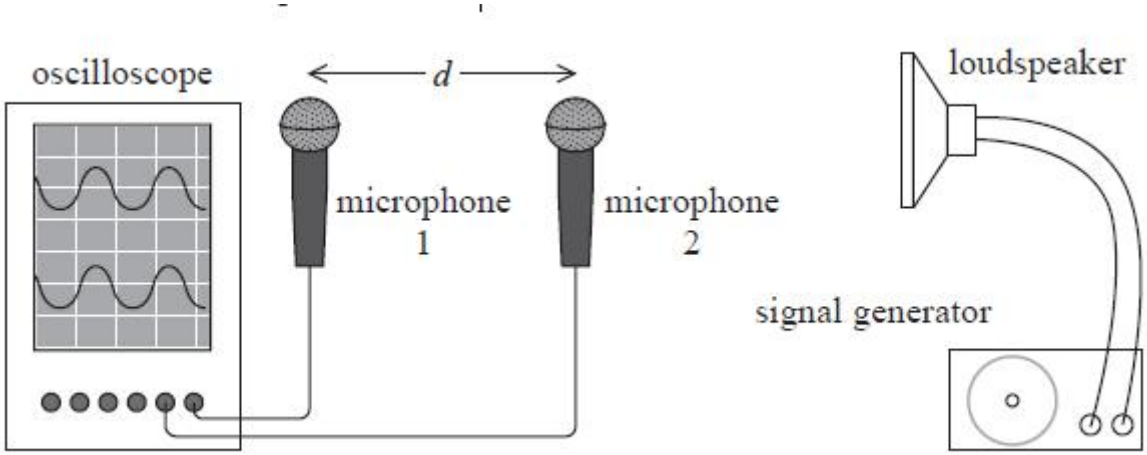
(Total for question = 4 marks)

Q2.

In an experiment to determine the speed of sound in air a student connected two microphones to an oscilloscope, as shown.

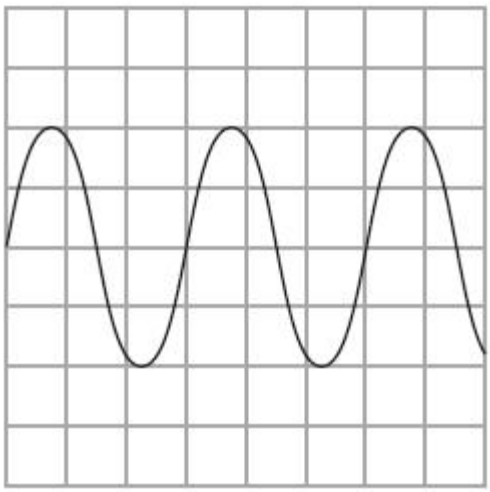


The microphones detect sound from the loudspeaker, converting it to an electrical signal. The signal is displayed on the oscilloscope screen.

Both microphones were initially positioned the same distance from the loudspeaker. The two signals were in phase on the oscilloscope screen. The student slowly moved microphone 2 towards the loudspeaker, until the two signals on the oscilloscope were in phase again. He then measured the distance *d* between the microphones to determine the wavelength λ of the sound waves.

d = 20.5cm

The oscilloscope trace for the signal from microphone 1 is shown below.



The time base of the oscilloscope was set to 0.20 ms div^{-1}.

Determine a value for the speed of sound in air.

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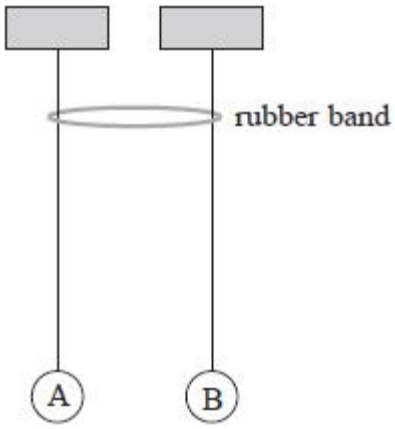
Speed of sound = ...

(Total for question = 5 marks)

Q3.

The diagram shows two identical pendulums, A and B, side by side with a rubber band placed over both strings.



Pendulum A is displaced and starts to oscillate. As pendulum A oscillates, pendulum B starts to oscillate with the same time period, its amplitude increasing as the amplitude of pendulum A decreases. At one stage pendulum A is no longer oscillating and pendulum B has its maximum amplitude. Then pendulum A starts to oscillate again with increasing amplitude, as the amplitude of pendulum B decreases.

The apparatus is adjusted so that the pendulums do not have the same length as each other. When the first pendulum is set into oscillation, the second pendulum starts to oscillate, but with very small amplitude; the first pendulum does not stop oscillating.

* Explain this behaviour.

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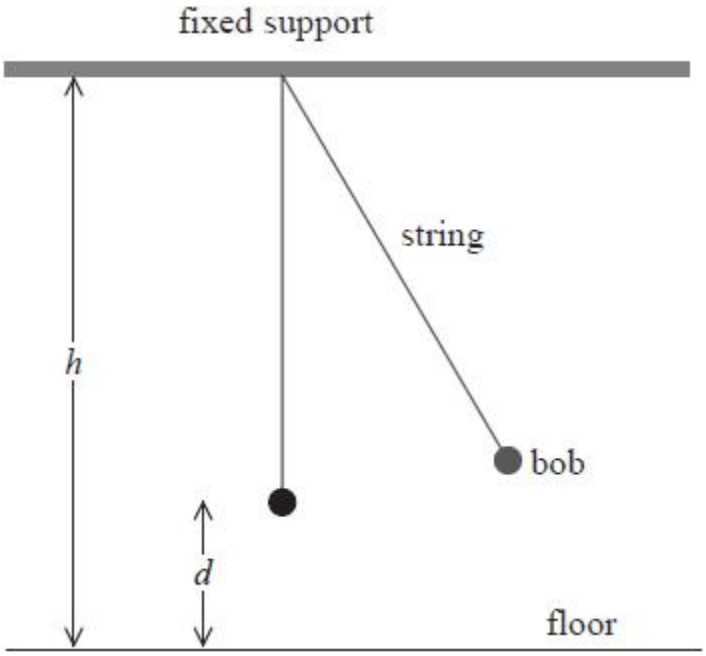
(Total for question = 6 marks)

Q4.

A student carried out an experiment with a pendulum hung from a fixed support. The fixed support was a distance *h* above floor level as shown.



As the student was unable to measure the length of the pendulum directly, she measured the distance *d* from the bob to the floor.

To determine the period *T* of the pendulum, the student used the following method:

- release the bob from its highest position and start a stopwatch
- stop the stopwatch when the bob reaches the same position again.

Criticise the student's method for measuring the period.

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(Total for question = 2 marks)