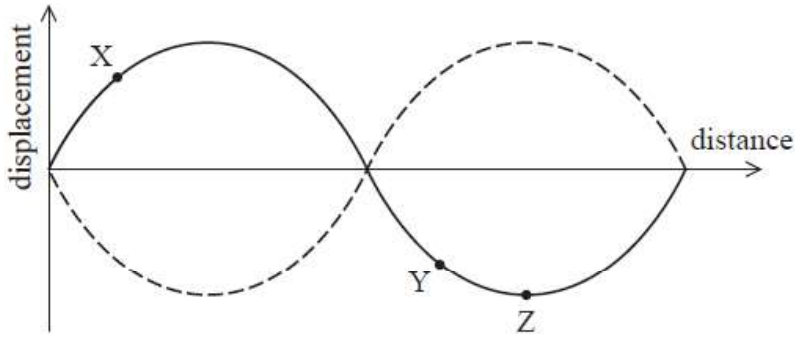
Q1.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The diagram shows how the displacement varies with distance along a stationary wave at two instants of time.



Which of the following statements is **not** correct?

☐ **A** Points X and Z are in antiphase with each other.

☐ **B** Points Y and Z have the same amplitude of vibration.

☐ **C** Points Y and Z have the same frequency of vibration.

☐ **D** Point Z is an antinode.

(Total for question = 1 mark)

Q2.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

A string is stretched between two fixed points and set into oscillation.

The frequency of the vibrating string is **not** dependent on

☐ **A** the amplitude of the string's vibration.

☐ **B** the length of the string.

☐ **C** the mass per unit length of the string.

☐ **D** the tension in the string.

(Total for question = 1 mark)

Q3.

Two waves from the same source travel along different paths and then meet at a point P.
The phase difference between the waves at P is 1.5π radians.

Which of the following is a possible path difference that could result in this phase difference being produced at P?

☐ **A** $\frac{3\lambda}{2}$

☐ **B** $\frac{7\lambda}{4}$

☐ **C** 3λ

☐ **D** $\frac{7\lambda}{2}$

(Total for question = 1 mark)

Q4.

Two waves, of wavelength λ, from a single source diverge and then meet again.
Which of the following situations would cause constructive interference?

☒ **A** a path difference of $\frac{\lambda}{2}$

☒ **B** a path difference of λ

☒ **C** a phase difference of $\frac{\pi}{2}$

☒ **D** a phase difference of π

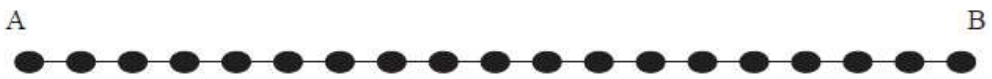
(Total for question = 1 mark)

Q5.

A loudspeaker produces a sound wave in air.

(a) Diagram 1 shows air molecules before the sound wave passes.

Diagram 1



At a particular instant as the sound wave passes, the air molecules are displaced as shown in Diagram 2.

Diagram 2

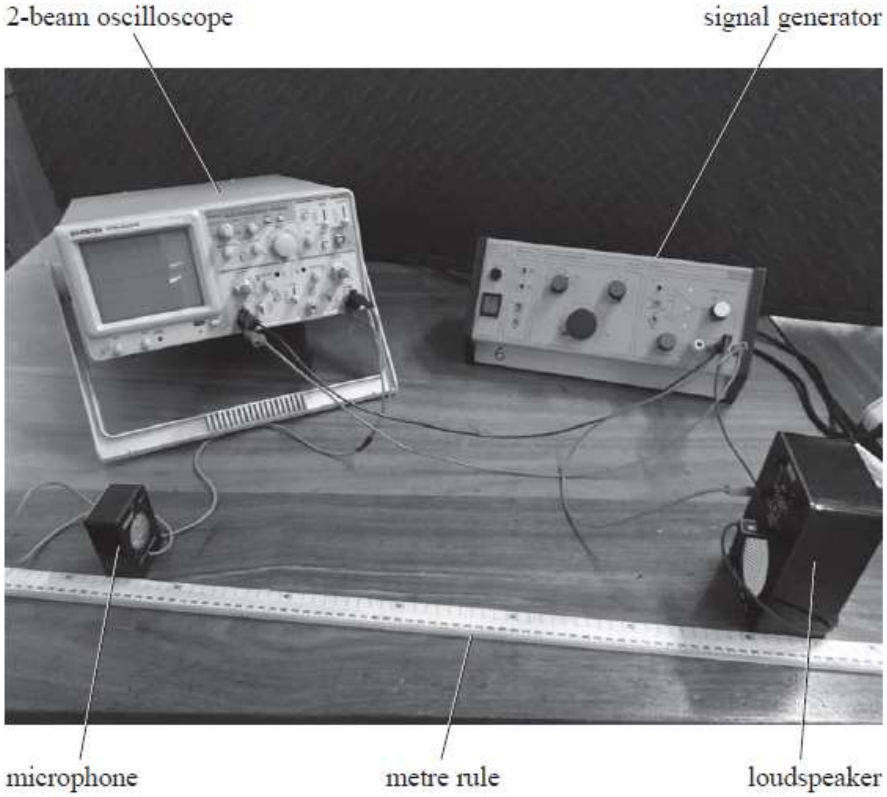
(i) Label a point on Diagram 2 where the pressure of the air is a minimum.

(1)

(ii) Sketch a graph of displacement against distance for the air particles between A and B at this instant on the axes below.

(2)

(b) The speed of sound can be determined using the apparatus shown.



When the loudspeaker is switched on, two traces are produced on the oscilloscope, one directly from the signal generator and the other from the microphone.

(i) Describe how a value for the speed of sound in air can be determined.

(5)

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(ii) Describe how the oscilloscope display can be used to demonstrate that the two traces have the same frequency.

(2)

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(iii) A frequency of 15.0 kHz was used. A student suggested that the experiment would give a more accurate result for the speed of sound if a frequency of 4.0 kHz was used.

Evaluate the student's suggestion. You should use a calculation in your answer.

speed of sound in air = 340 m s^{-1}

(3)

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(Total for question = 13 marks)

Q6.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

When a guitar string is plucked, a sound of constant frequency is heard.

The wave produced on the vibrating guitar string is

☒ **A** longitudinal and progressive.

☒ **B** longitudinal and stationary.

☒ **C** transverse and progressive.

☒ **D** transverse and stationary.

(Total for question = 1 mark)