

3 This question is about sound waves.

(a) Describe an experiment to measure the speed of sound in air.

You may draw a diagram to help your answer.

(5)

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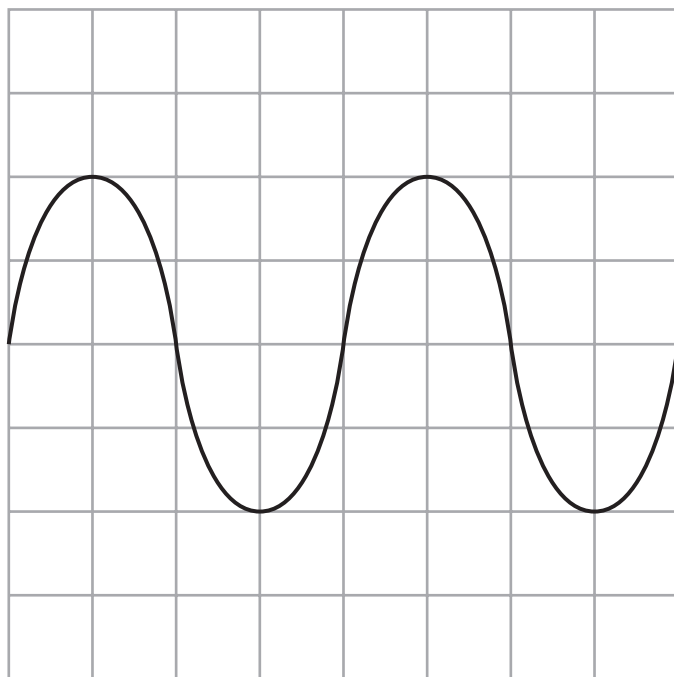
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(b) An oscilloscope can be used to determine the frequency of a sound wave.

The diagram shows an oscilloscope trace of a sound wave.



Oscilloscope settings

y direction: 1 square = 1 V

x direction: 1 square = 0.25 ms

(i) Calculate the period of this sound wave.

(3)

period = s

(ii) Calculate the frequency of this sound wave.

(2)

frequency = Hz

(Total for Question 3 = 10 marks)

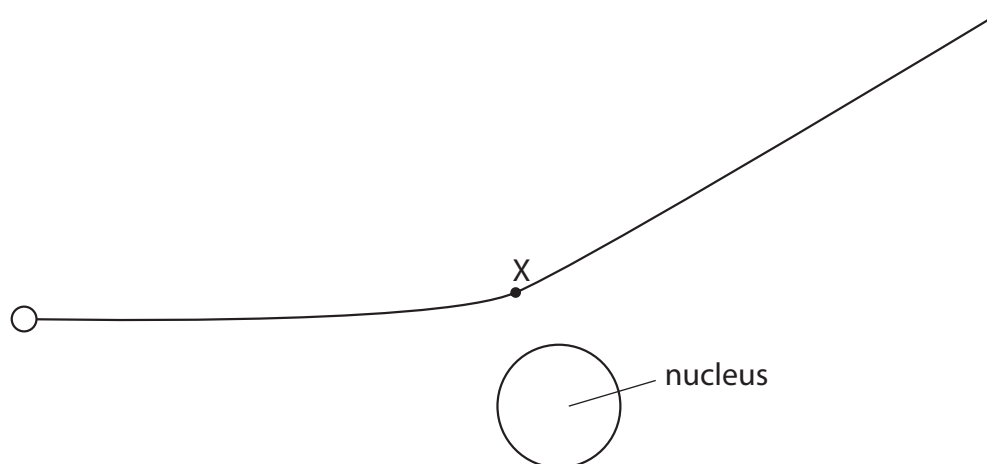


4 This is a question about alpha particles.

(a) Describe the nature of an alpha particle.

(1)

(b) The diagram shows the path of an alpha particle as it passes close to a nucleus.



(i) Draw an arrow from point X to show the force on the alpha particle due to the nucleus.
Label this force Y.

(2)

(ii) Draw an arrow to show the force on the nucleus due to the alpha particle.
Label this force Z.

(2)

(iii) Explain how the path of the alpha particle shows whether the nucleus is positive, negative or neutral.

(3)



(c) The alpha particle experiences a resultant force of 3.6 N and has a mass of 6.6×10^{-27} kg.

Calculate the acceleration of the alpha particle.

(3)

acceleration = m/s²

(Total for Question 4 = 11 marks)

