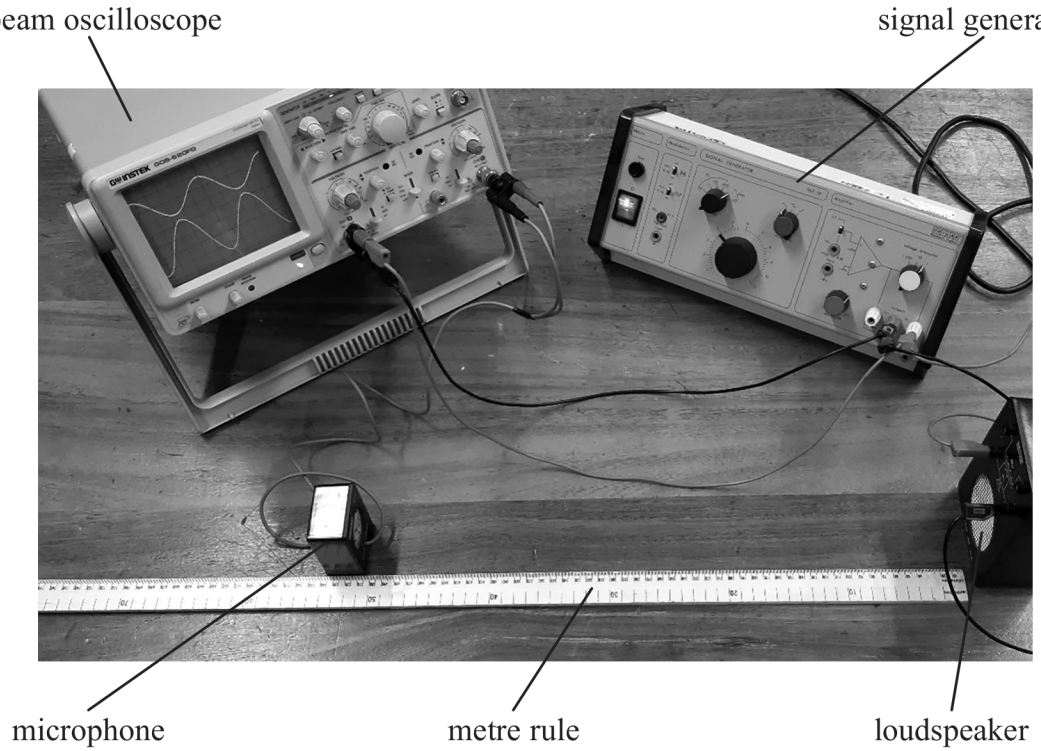
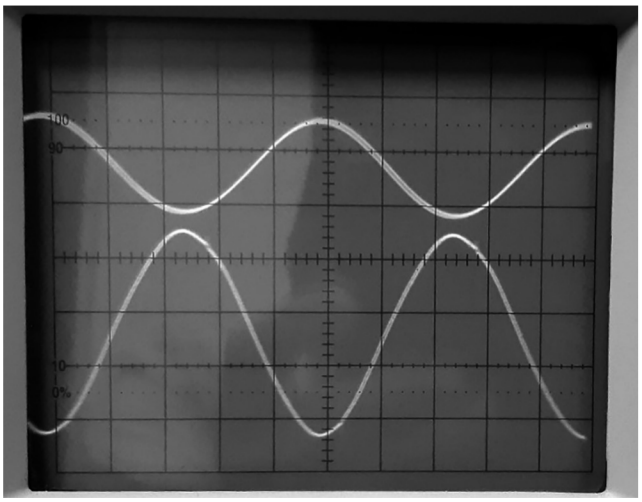
17 A student used the apparatus shown in Photograph 1 to determine the speed of sound in air.



Photograph 1

The student switched on the signal generator. The oscilloscope showed one trace from the signal generator and another trace from the microphone.

Initially the peaks of one trace were directly above the troughs of the other trace, as shown in Photograph 2.



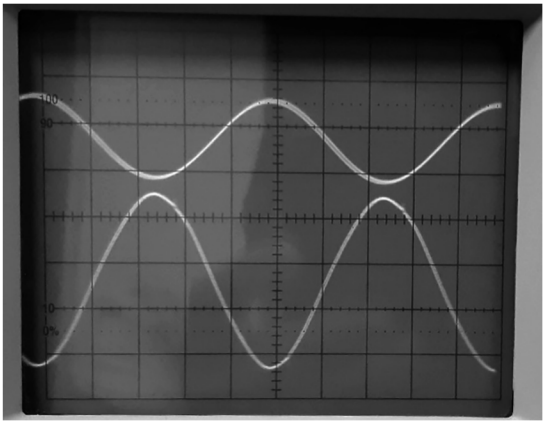
Photograph 2

The horizontal axis of the oscilloscope screen represents time. The number of milliseconds per division on the horizontal scale is known.

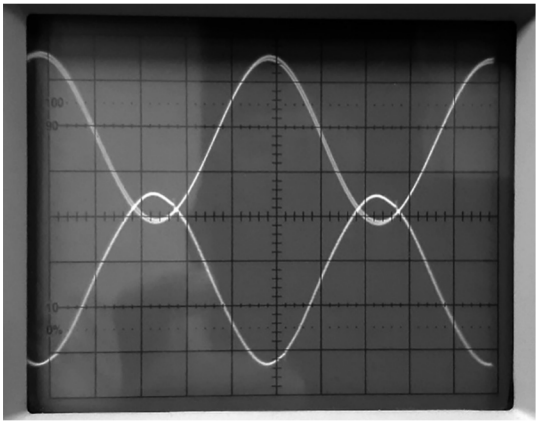
(a) Explain how the apparatus shown in Photograph 1 could be used to determine the speed of sound in air.

(5)

(b) The student changed the position of the microphone. The traces on the oscilloscope screen before and after changing the position of the microphone are shown in Photograph 2 and Photograph 3.



Photograph 2



Photograph 3

Explain what change the student made to the position of the microphone between Photograph 2 and Photograph 3.

(3)

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(Total for Question 17 = 8 marks)

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