2 A signal generator is connected to two loudspeakers L_1 and L_2, as shown in Fig. 2.1.

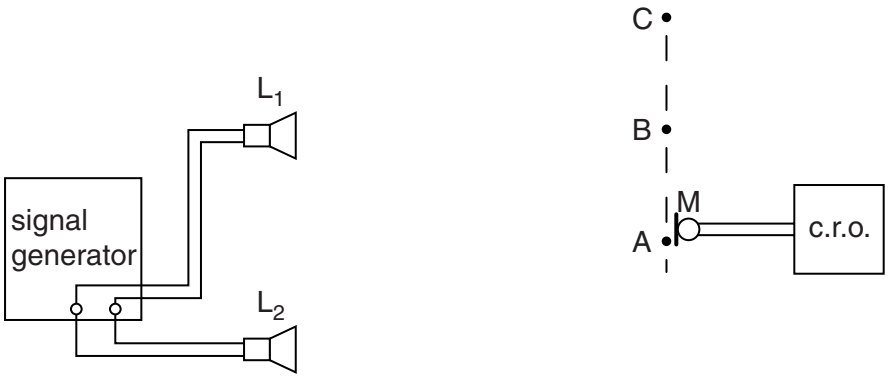

Fig. 2.1

A microphone M, connected to the Y-plates of a cathode-ray oscilloscope (c.r.o.), detects the intensity of sound along the line ABC.
The distances L_1A and L_2A are equal.
The time-base of the c.r.o. is switched off.

The traces on the c.r.o. when M is at A, then at B and then at C are shown on Fig. 2.2, Fig. 2.3 and Fig. 2.4 respectively.

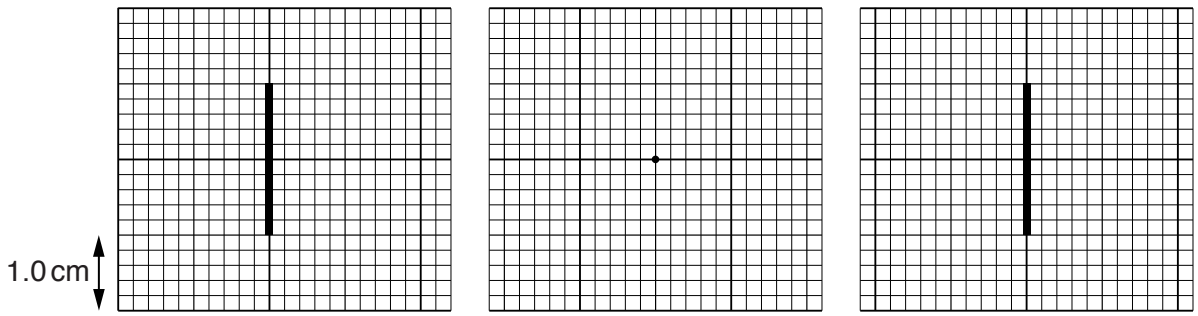

Fig. 2.2 **Fig. 2.3** **Fig. 2.4**

For these traces, 1.0 cm represents 5.0 mV on the vertical scale.

(a) (i) Explain why coherent waves are produced by the loudspeakers.

.....

.....

.....[1]

(ii) Use the principle of superposition to explain the traces shown with M at

1. A,

.....

.....

.....[1]

2. B,

.....

.....

.....[1]

3. C.

.....

.....

.....[1]

(b) The sound emitted from L_1 and L_2 has frequency 500 Hz. The time-base on the c.r.o. is switched on.

The microphone M is placed at A.

On Fig. 2.5, draw the trace seen on the c.r.o.

On the vertical scale, 1.0 cm represents 5.0 mV. On the horizontal scale, 1.0 cm represents 0.10 ms.

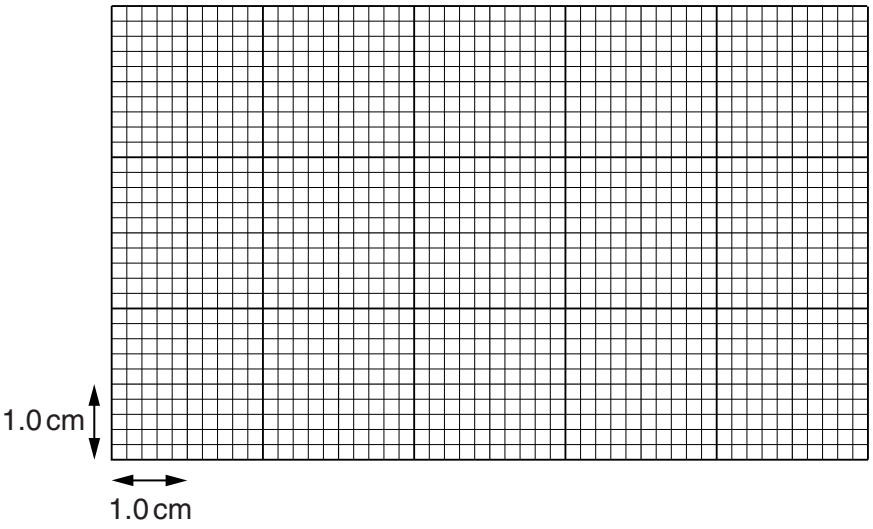

Fig. 2.5

[3]