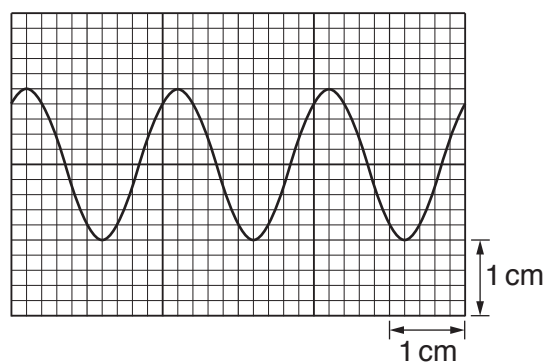


- 5 (a) State what is meant by the *wavelength* of a progressive wave.

.....  
 ..... [1]

- (b) A cathode-ray oscilloscope (CRO) is used to analyse a sound wave. The screen of the CRO is shown in Fig. 5.1.



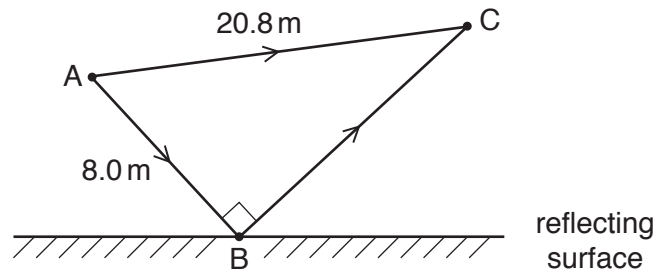
**Fig. 5.1**

The time-base setting of the CRO is  $2.5 \text{ ms cm}^{-1}$ .

Determine the frequency of the sound wave.

frequency = ..... Hz [2]

- (c) The source emitting the sound in (b) is at point A. Waves travel from the source to point C along two different paths, AC and ABC, as shown in Fig. 5.2.



**Fig. 5.2** (not to scale)

Distance AB is 8.0 m and distance AC is 20.8 m. Angle ABC is  $90^\circ$ . Assume that there is no phase change of the sound wave due to the reflection at point B. The wavelength of the waves is 1.6 m.

- (i) Show that the waves meeting at C have a path difference of 6.4 m.

[1]

- (ii) Explain why an intensity maximum is detected at point C.

.....  
 .....  
 ..... [2]

- (iii) Determine the difference between the times taken for the sound to travel from the source to point C along the two different paths.

time difference = ..... s [2]

- (iv) The wavelength of the sound is gradually increased. Calculate the wavelength of the sound when an intensity maximum is next detected at point C.

wavelength = ..... m [1]

[Total: 9]

**[Turn over]**