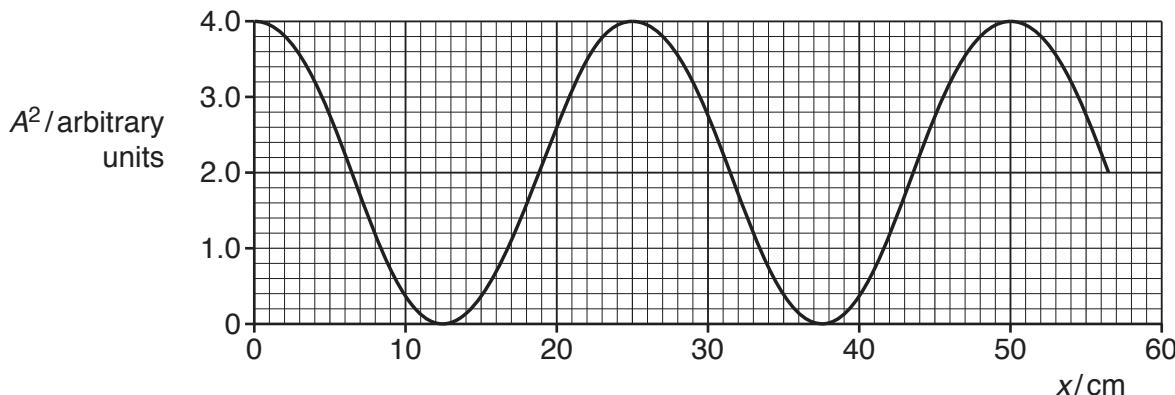


- 4 (a) Sound waves are longitudinal waves. By reference to the direction of propagation of energy, state what is meant by a *longitudinal wave*.
-
.....

[1]

- (b) A stationary sound wave in air has amplitude A . In an experiment, a detector is used to determine A^2 . The variation of A^2 with distance x along the wave is shown in Fig. 4.1.

**Fig. 4.1**

- (i) State the phase difference between the vibrations of an air particle at $x = 25\text{ cm}$ and the vibrations of an air particle at $x = 50\text{ cm}$.

phase difference = ° [1]

- (ii) The speed of the sound in the air is 330 m s^{-1} . Determine the frequency of the sound wave.

frequency = Hz [3]

- (iii) Determine the ratio

$$\frac{\text{amplitude } A \text{ of wave at } x = 20\text{ cm}}{\text{amplitude } A \text{ of wave at } x = 25\text{ cm}}$$

ratio = [2]

[Total: 7]