

- 6 A hollow tube is used to investigate stationary waves. The tube is closed at one end and open at the other end. A loudspeaker connected to a signal generator is placed near the open end of the tube, as shown in Fig. 6.1.

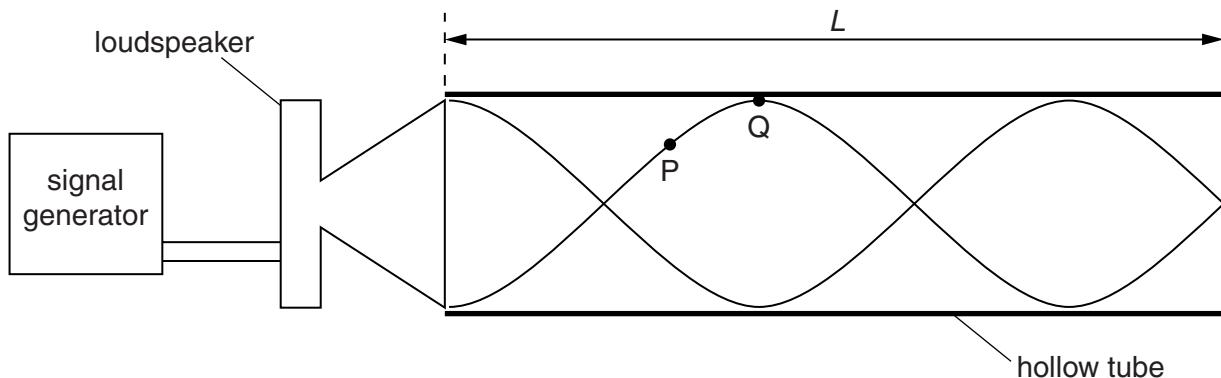


Fig. 6.1

The tube has length L . The frequency of the signal generator is adjusted so that the loudspeaker produces a progressive wave of frequency 440 Hz. A stationary wave is formed in the tube. A representation of this stationary wave is shown in Fig. 6.1.

Two points P and Q on the stationary wave are labelled.

- (a) (i) Describe, in terms of energy transfer, the difference between a progressive wave and a stationary wave.

.....
.....

[1]

- (ii) Explain how the stationary wave is formed in the tube.

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.....
.....

[3]

- (iii) State the direction of the oscillations of an air particle at point P.

.....
.....

[1]

- (b) On Fig. 6.1 label, with the letter N, the nodes of the stationary wave. [1]

- (c) State the phase difference between points P and Q on the stationary wave.

phase difference = [1]

- (d) The speed of sound in the tube is 330 m s^{-1} .

Calculate

- (i) the wavelength of the sound wave,

$$\text{wavelength} = \dots \text{ m} [2]$$

- (ii) the length L of the tube.

$$\text{length} = \dots \text{ m} [2]$$

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