

- 5 A tube is initially fully submerged in water. The axis of the tube is kept vertical as the tube is slowly raised out of the water, as shown in Fig. 5.1.

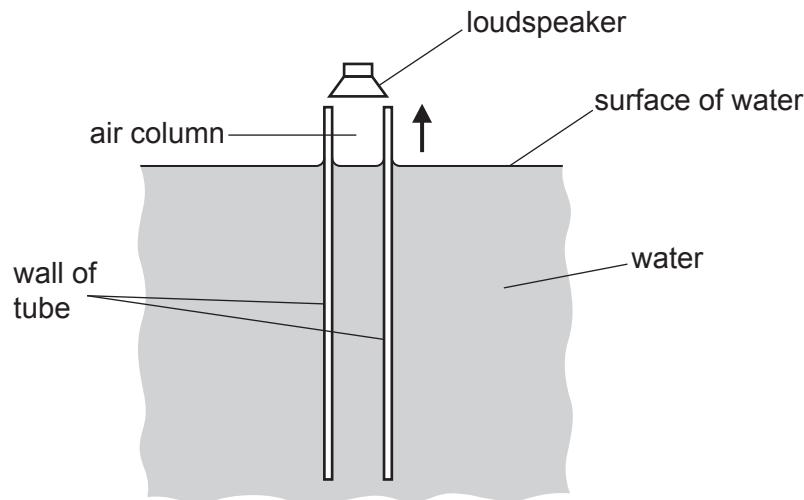


Fig. 5.1

A loudspeaker producing sound of frequency 530 Hz is positioned at the open top end of the tube as it is raised. The water surface inside the tube is always level with the water surface outside the tube. The speed of the sound in the air column in the tube is 340 ms^{-1} .

- (a) Describe a simple way that a student, without requiring any additional equipment, can detect when a stationary wave is formed in the air column as the tube is being raised.

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

- (b) Determine the height of the top end of the tube above the surface of the water when a stationary wave is first produced in the tube. Assume that an antinode is formed level with the top of the tube.

$$\text{height} = \dots \text{ m} \quad [3]$$

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- (c) Determine the distance moved by the tube between the positions at which the first and second stationary waves are formed.

distance = m [1]

[Total 5]