8 A long horizontal tube, containing fine powder, is closed at one end. A loudspeaker connected to a signal generator is positioned at the other of the tube. At a particular frequency, a stationary wave is set up inside the tube and the powder forms heaps as shown in Fig. 8.1.
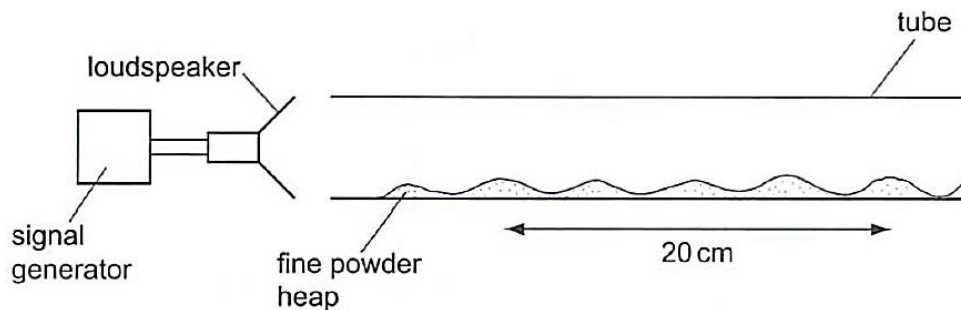

Fig. 8.1

The speed of sound is 330 m s^{-1}.

(a) Explain why, for a stationary wave to form inside the tube, it is usually necessary to adjust either the frequency of the signal generator or the length of the tube.

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.... [2]

(b) With reference to the motion of the air molecules in the tube, explain why the powder heaps form at the displacement nodes.

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.... [2]

(c) Using Fig. 8.1, calculate the frequency of the sound wave in the tube.

frequency = ... Hz [2]

[Total: 6]