4 **(a)** Define *progressive waves.*

……..…….……..…….....

…… [1]

(b) A sound wave is sent from a speaker operating at 1500 W in all directions at a frequency of 850 Hz in a gas.

(i) Fig. 4.1 shows the position of some gas molecules at a particular instant of time. The distance between particles P and Q is 0.600 m.

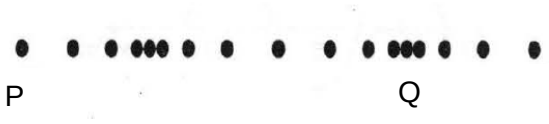

Fig. 4.1

Calculate the speed of sound in this gas.

speed = ... m s^{-1} [2]

(ii) Assume that the sound from the speaker strikes the surface of the ear of an adult perpendicularly which has a surface area of 2.1×10^{-3} m^2.

Determine how much power is intercepted by the ear of an adult standing 80.0 m away from the speaker.

power = ... W [3]