3 A sound wave that is *propagating towards the left* is represented by the two graphs below.
Fig. 3.1 shows the variation with position along the wave of the displacement of the air particles from their equilibrium position at time $t = 0$.
Fig. 3.2 shows the variation with time t of the displacement of an air particle from its equilibrium position.

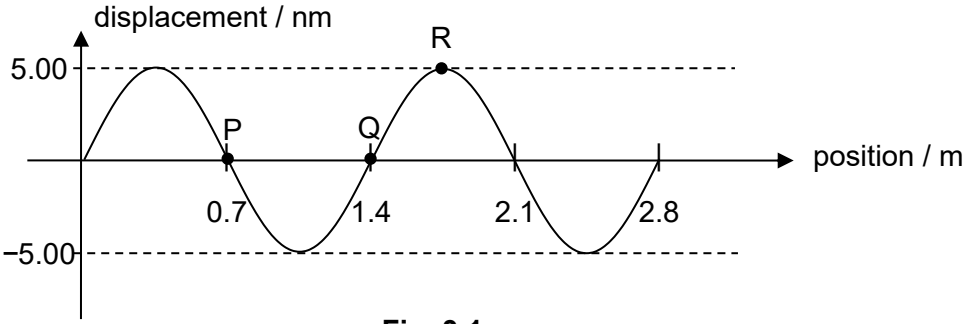

Fig. 3.1

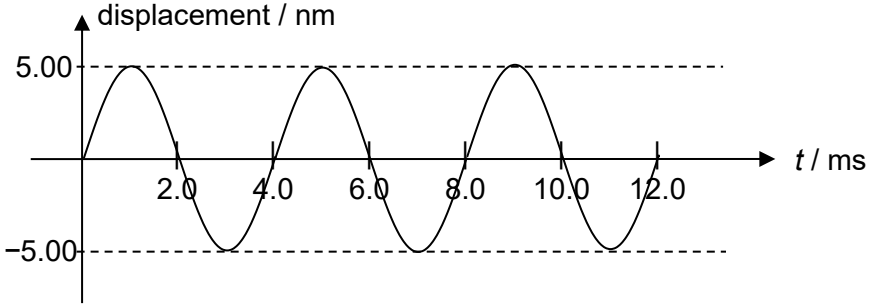

Fig. 3.2

(a) Calculate the speed of the sound wave.

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

(b) Fig. 3.1 shows three particles P, Q and R along the sound wave.
Taking rightwards to be positive, identify the particle that is

(i) instantaneously at rest at $t = 0$,

particle = ... [1]

(ii) at the centre of a rarefaction at $t = 0$.

particle = ... [1]

(iii) Explain why displacement-time graph for particle Q is represented by Fig. 3.2.

..... [1]

(c) **(i)** Sketch in Fig. 3.1 the graph of the wave 1.0 ms later. Label the graph Y. [2]

(ii) Particle S is 0.70 m to the right of particle R. [2]

Sketch in Fig. 3.2, the graph that corresponds to particle S. Label the graph Z.

[Total: 9]