4 A child sits on the ground next to a remote-controlled toy car. At time $t = 0$, the car begins to move in a straight line directly away from the child. The variation with time t of the velocity of the car along this line is shown in Fig. 4.1.

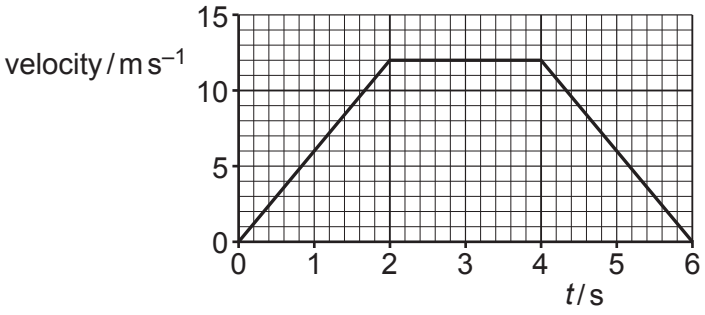

Fig. 4.1

The car's horn continually emits sound of frequency 925 Hz between time $t = 0$ and time $t = 6.0$ s. The speed of the sound in the air is 338 m s^{-1}.

(a) Describe qualitatively the variation, if any, in the frequency of the sound heard, by the child, that was emitted from the car horn:

(i) from time $t = 0$ to time $t = 2.0$ s

..... [1]

(ii) from time $t = 4.0$ s to time $t = 6.0$ s.

..... [1]

(b) Determine the frequency, to three significant figures, of the sound heard, by the child, that was emitted from the car horn at time $t = 3.0$ s.

frequency = ... Hz [2]

(c) Determine the time taken for the sound emitted at time $t = 4.0\,s$ to travel to the child.

time taken = ... s [2]

[Total: 6]