2025 Sec 4 Physics Assignment Answers
Assignment 12b Sound

Note: Show all formulae & working steps! Express answers to 2 or 3 s.f.

1   C   (compression to compression = 1 wavelength)

2(a) $v = \dfrac{d}{t} = \dfrac{300}{0.90}$ = 330 m s⁻¹ (2 s.f.)

(b)   The flash <u>travels instantaneously from shooter to him</u>; the <u>time taken for flash to travel from shooter to him is negligible.</u>

Assumptions:
- *sound is produced at the same time as the flash seen by the student*
- *this is not about human reaction time!*

3(a)   Light from lightning reaches the eye much faster than the sound from the thunder because light travels much faster than sound in air.

(b) $340 = \dfrac{d}{5.0}$ ➔ d = 1700 m (2 s.f.)

(c)   d = v t = 340 x 3.0 = 1020 m = 1000 m (2 s.f.)

(d) $v = \dfrac{(1700 - 1020)}{20 \times 60}$ = 0.567 ≈ 0.57 m s⁻¹   (2 s.f.)

OR 34 m/min or 2.0 km/h

4

(a) $v = \dfrac{2d}{t} = \dfrac{2 \times (17/2)}{50 \times 10^{-3}}$ ≈ 340 m s⁻¹

(b) $v = \dfrac{2L}{t}$ ➔ 2L = vt => $L = \dfrac{vt}{2} = \dfrac{340 \times 160 \times 10^{-3}}{2}$
= 27.2 ≈ 27 m
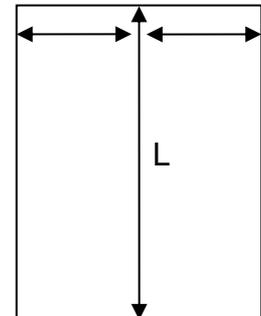
Note: echo, need to take into account twice the distance travelled to and fro

5

(a) $v = \dfrac{2d}{t}$ ➔ d = 1500 x 0.20 / 2 = 150 m

(b)   v = fλ   ➔ $\lambda = \dfrac{v}{f} = \dfrac{1500}{15 \times 10^3}$ = 0.10 m

6	Diagram	Reason
(a) sound of lower pitch	Fig. 6.1	It has a lower frequency
(b) louder sound	Fig. 6.1	It has a larger amplitude

Note: on oscilloscope display, horizontal time axis: longer period T means lower frequency f