



2021 Sec 4 Physics Assignment Answers
Assignment 12 Sound

Total = 20

Note: Show all formulae & working steps!

1(a) $v = \frac{d}{t} = \frac{300}{0.90} = 330 \text{ m s}^{-1}$ (2 s.f.) [1]

(b) The flash travels instantaneously from shooter to him; the time taken for flash to travel from shooter to him is negligible. [1]

Assumptions:

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

2(a) Light from lightning reaches the eye much faster than the sound from the thunder because light travels much faster than sound in air. [1]

(b) $340 = \frac{d}{5.0}$ □ $d = 1700 \text{ m}$ (2 s.f.) [1]

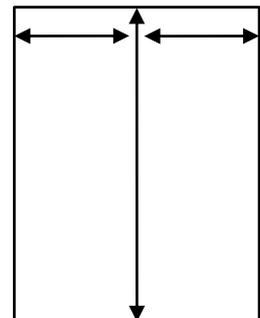
(c) $d = vt = 340 \times 3.0 = 1020 \text{ m} = 1000 \text{ m}$ (2 s.f.) [1]

(d) $v = \frac{(1700 - 1020)}{20 \times 60} = 0.567 \approx 0.57 \text{ m s}^{-1}$ (2 s.f.) [1]
OR 34 m/min or 2.0 km/h

3(a) Show to and fro paths! [2]

(b) $v = \frac{2d}{t} = \frac{2 \times (17/2)}{50 \times 10^{-3}} \approx 340 \text{ m s}^{-1}$ [1]

$2L = vt \Rightarrow L = \frac{vt}{2} = \frac{340 \times 160 \times 10^{-3}}{2}$
 $= 27.2 \approx 27 \text{ m}$ [2]



Note: echo, need to take into account twice the distance travelled to and fro

4	Diagram	Reason
(a) sound of lower pitch	Fig. 4.1 [1]	It has a lower frequency [1]
(b) louder sound	Fig. 4.1	It has a larger amplitude [1]

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

5(a) Peak voltage = height x gain = 2.0 cm x 1.0 V/cm = 2.0 V [2]

(b) Period, $T = \text{length} \times \text{time base}$ = 8.0 cm x 0.5 ms / cm = 4.0 ms [2]

(c) $f = 1/T$ = 1/4.0 ms [1] = 250 Hz

[2]