

**QUESTIONSHEET 1**

(a) Recall of formula:	1
Speed = frequency $\times$ wavelength	
Substitution of figures and correct answer	1
= $1000 \times 0.34$	
= 340 (m/s)	
(b) Correct rearrangement or recall of formula	1
Wavelength = speed/ frequency	
Correct substitution of figures and correct answer	1
= $1300/1000$	
= 1.3 (m)	
(c) Understanding that 0.2s is return so 0.1s is time to shoal	1
Recall of formula      distance = speed $\times$ time	1
Correct substitution of both speed and time	1
= $1300 \times 0.1$	
= 130m	1
(d) Sounds greater than 20,000 Hz (20kHz) higher frequency	1
(e) Monitoring babies/ Cleaning small parts	1
<b>TOTAL / 10</b>	

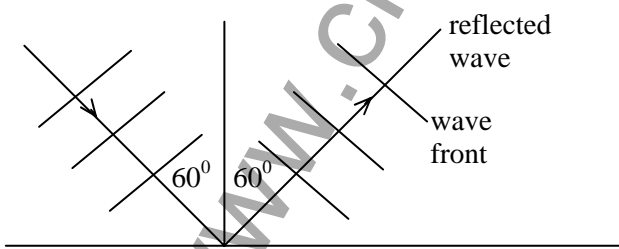
**QUESTIONSHEET 2**

(a) Any two reasons:	
Same speed.	
Travel through a vacuum.	
Only accept transverse waves if also written of electric and magnetic fields.	2
(b) Ultra violet-any value between X-rays ( $5 \times 10^{-10}$ ) and Visible ( $5 \times 10^{-7}$ )	1
Infra red-value between $10^{-4}$ and $5 \times 10^{-7}$	1
Do not accept a value close to microwaves.	
(c) Gamma rays (a small wavelength means a large frequency)	1
(d) Recall and rearrangement of the formula to give	1
Frequency = Speed/Wavelength	
= $6 \times 10^{17}$ (Hz)	1
(e) Recall and rearrangement of the formula to give	1
Distance = Speed $\times$ time	
Conversion of 8½ minutes to seconds = 510seconds	1
= $1.53 \times 10^{11}$ (m)	1
Or = 153,000,000,000 (m)	
<b>TOTAL / 10</b>	

**QUESTIONSHEET 3**

- (a) (i) distance = speed / time  
 =  $340 / 0.7$  1  
 = 485.7 or 486 m / 2 1  
 = 243 m 1
- (ii) time is too short to measure accurately 1  
 difficult to clap and time 1
- (iii) have second person timing 1  
 time several claps and echoes 1
- (b) (i) speed = frequency x wavelength 1  
 =  $150\,000 \times 110$  1  
 = 16 500 000 m/s 1
- (ii)  $16\,500\,000 / 340$  1  
 = 48 529 times 1

**TOTAL / 12****QUESTIONSHEET 4**

- (a) (i) light shining from above 1  
 white screen under tank 1  
 shadows of ripples appear on screen 1
- (ii) by using a stroboscope or slit disk 1  
 waves appear to stop 1
- (b) (i) at right angles to it 1
- (ii)  1
- direction of travel 1  
 wave fronts 1
- (iii)  $60^\circ$  to normal 1
- (c) (i) 2 cm 1
- (ii)  $10 / 4$  1  
 = 2.5 cycles / sec 1
- (iii)  $2.5 \times 2$  1  
 = 5 cm/s 1

**TOTAL / 14**

**QUESTIONSHEET 5**

(a) pitch	1
(b)(i) placing fingers on them	1
(ii) becomes higher	1
(c) using tightening screws at end of neck	1
(d) frequency = velocity / wavelength	1
= 330 / 1.3	1
= 254 Hz	1
(e) they are an octave apart	1

**TOTAL / 8**

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**QUESTIONSHEET 6**

(a)(i) Resonance	1
(ii) Two from Pushing a swing, picking up certain frequencies on radio, increasing sound volume in wind instrument	2
(iii) Two from bridges collapsing in wind, singers shatter glasses, seats rattling on bus	2
(b) higher frequency vibrations in conjunction with main one	1
(c)(i) Increasing the amplitude of a wave causes its volume to increase	1 1
(ii) high pitched notes have high frequency and shorter wavelength	1 1
(iii) main frequency has overtones number & strength of overtones determines quality	1 1

**TOTAL / 12**

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**QUESTIONSHEET 7**

- |                                             |   |
|---------------------------------------------|---|
| (a) sound pulse released by boat hits fish  | 1 |
| returns to ship quicker than hitting bottom | 1 |
| (b) sound passed through mother's abdomen   | 1 |
| reflects from baby and shows shape          | 1 |
| (c) ultrasound causes vibrations            | 1 |
| breaks scale from teeth                     | 1 |
| (d) picture of joint built up               | 1 |
| shape of fault shows up                     | 1 |

**TOTAL / 8**

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**QUESTIONSHEET 8**

- |                                                  |   |
|--------------------------------------------------|---|
| (a) (i) membrane in ear drum                     | 1 |
| vibrates with same frequency as sound            | 1 |
| (ii) fluid filled tube                           | 1 |
| transmits vibrations to nerve endings            | 1 |
| (b) help person to balance                       | 1 |
| by sending reference information to brain        | 1 |
| (c) sound to ourselves transmitted through bones | 1 |
| others hear sounds through the air               | 1 |
| (d) aid picks up vibrations                      |   |
| and passes them through skull bones              | 1 |

**TOTAL / 9**

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**QUESTIONSHEET 9**

(a) Vibrations/ oscillations	1
Squash/ compress and/ or stretch/rarefact air	1
Layers/ Energy travels to ears	1
(b) Recall of formula	
Speed = frequency $\times$ wavelength	1
Substitution of figures and rearrangement	1
=300/400	
=0.75m or	
=75cm	1
(c) (i) Smaller	1
Same frequency (same no. of peaks)	1
(ii) Wavelength reduced	1
Exactly half the wavelength (twice no.of peaks on screen)	1
(d) Loud sounds damage hearing (destroy hairs in cochlea)	1
Long period of time $\Rightarrow$ permanent damage.	1
<b>TOTAL / 12</b>	

**QUESTIONSHEET 10**

(a) (i) 5m	1
(ii) 100m	1
(b) (i) Between 3-5cm	
(ii) Displacement in direction of travel of wave (longitudinal).	1
Squashed up bits and stretched bits	
(compressions and rarefactions).	1
(c) Flicked up and down	
(so displacement at right angles to travel direction).	1
(d) Medium of sound wave is air.	1
Medium of light wave is electric and magnetic field/ electromagnetic.	1
Air molecules vibrate back and forth	
they collide into other molecules.	1
Energy/ message passed on so that the process repeats.	1
<b>TOTAL / 9</b>	

**QUESTIONSHEET 11**

(a) Echo	1
(b) 300m/s	1
(c) 3 seconds	1
(d) Use of formula speed = distance/time to give distance = speed × time. 900m (allow ECF from part 1b).	1 1
(e) (i) Sounds with frequency 20,000 Hz/ above human hearing.	1
(ii) Ultra sound signal transmitted and reflections/ echoes received.	1 1
Bat can calculate the distance to prey from time delay.	1
Wavelength of reflected signal is increased if prey is moving away from bat (or vice versa).	1 1
<b>TOTAL / 9</b>	

**QUESTIONSHEET 12**

(a) A – crust B – mantle C – outer core D – inner core (all correct – 3, 2 correct – 2, one correct - 1)	3
(b) (i) Any two from: - Both need a medium to travel. Both can be reflected of boundaries. Both can be refracted at boundaries. Both have increasing speed with depth/ density.	2
(ii) Any two from:- P waves are longitudinal (or equivalent)/ S waves are transverse (or equivalent). P waves are faster. P waves are more destructive. P waves can travel through all parts of Earth.	2
(c) (i) P and S waves	1
(ii) P waves only. S waves cannot travel through a liquid. The outer core is liquid.	1 1 1
(d) P waves make building vibrate up and down P waves are faster so arrive first. S waves arrive later, shake building from side to side.	1 1 1
<b>TOTAL / 14</b>	

**QUESTIONSHEET 13**

- |                        |       |
|------------------------|-------|
| (a) A – peak           | 1     |
| B – amplitude          | 1     |
| C – wavelength         | 1     |
| D – trough             | 1     |
| <br>(b) (i) hertz      | <br>1 |
| (ii) X – 3 Hz          | 1     |
| Y – 1 Hz               | 1     |
| (iii) X – $5 \times 3$ | 1     |
| = 15 cm/s              | 1     |
| Y – 15 cm/s            | 1     |

**TOTAL / 10****QUESTIONSHEET 14**

- |                                                    |       |
|----------------------------------------------------|-------|
| (a) (i) when he saw the smoke of the gun           | 1     |
| (ii) light travels much faster than sound          | 1     |
| the race will have started when he hears the sound | 1     |
| <br>(b) time = distance / speed                    | <br>1 |
| = $100 / 330$                                      | 1     |
| = 0.303 s or 0.3 s                                 | 1     |

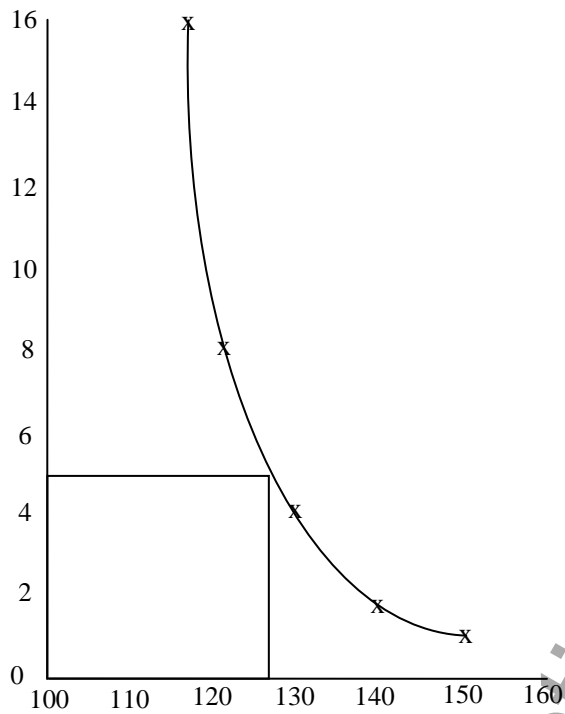
**TOTAL / 6****QUESTIONSHEET 15**

- |                                                 |       |
|-------------------------------------------------|-------|
| (a) speed = distance / time                     | 1     |
| = $750 \times 2 / 1$                            | 1     |
| = 1500 m/s                                      | 1     |
| <br>(b) solids transmit sound better than gases | <br>1 |
| sound transmitted along string                  | 1     |
| <br>(c) sound needs a material to pass through  | <br>1 |
| space is a vacuum                               | 1     |

**TOTAL / 7**

QUESTIONSHEET 16

(a) (i)



sensible scales  
correct plotting  
correct line drawn

1  
1  
1

(ii) 127 dB (+/- 1)

1

(iii) no

1

(b)(i) Two from  
double glazing, curtains, carpets, plant trees

1

(ii) uneven, non-reflecting

1

(iii) ear muffs

1

**TOTAL / 9**



**QUESTIONSHEET 17**

(a) (i) The string	1
(ii) The drum skin/cover	1
(iii) The air inside/ reed	1
(b) (i) Ultrasound	1
(ii) frequency – number of vibrations per sec – hertz	1
amplitude – maximum disturbance – meters	1
wave speed – distance one wave travels per sec – m/s	1
(c) (i) Higher	1
(ii) Louder	1
<b>TOTAL / 9</b>	

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**QUESTIONSHEET 18**

(a) Oscillate / vibrate / move backwards and forwards / side to side.	1
(b) (i) String vibrates / is plucked / made to move/ oscillates	1
(ii) The string is plucked harder / with more energy.	1
(iii) Tighter strings	1
shorten vibrating length (by putting finger along neck)	1
(c) Sound wave travels back & forth, light goes up & down.	1
A sound wave has squashed bits (compression)	1
and stretched bits unlike light	1
<b>TOTAL / 7</b>	

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