Question Number	Answer		Mark
15ai	Divides 2Hz by 880 or 881Hz or 882Hz	(1)	
	0.23% / 0.2% is less than 0.3% (so heard as same frequency)	(1)	
	OR		
	Calculates 0.3% of 880 Hz or 882Hz	(1)	
	879.4 Hz is less than 880 Hz (so heard as same frequency) **Or** 882.6 Hz is greater than 882 Hz (so heard as same frequency) **Or** 2.6 Hz is greater than 2 Hz (so heard as the same frequency)	(1)	**2**
	Example of calculation $\frac{(882-880)\ \text{Hz}}{882\ \text{Hz}} \times 100 = 0.23\%$		

***15aii**

This question assesses a student's ability to show a coherent and logically structured answer with linkages and fully-sustained reasoning. Marks are awarded for indicative content and for how the answer is structured and shows lines of reasoning. The following table shows how the marks should be awarded for indicative content.

IC points	IC mark	Max linkage mark	Max final mark
6	4	2	6
5	3	2	5
4	3	1	4
3	2	1	3
2	2	0	2
1	1	0	1
0	0	0	0

The following table shows how the marks should be awarded for structure and lines of reasoning**.**

	Number of marks awarded for structure of answer and sustained line of reasoning
Answer shows a coherent and logical structure with linkages and fully sustained lines of reasoning demonstrated throughout	2
Answer is partially structured with some linkages and lines of reasoning	1
Answer has no linkages between points and is unstructured	0

Indicative content

- The two sound waves are not coherent (as they have a different frequency)
- As they do not have a constant phase relationship/difference
  Or the phase difference changes
- Loud sounds related to constructive interference/superposition
- Quiet sounds related to destructive interference/superposition
- Constructive/loud sounds when in phase
- Destructive/quiet sounds when out of phase

(IC5 – allow phase difference of $2n\pi$ radians / 0°)
(IC6 – allow antiphase or phase difference of π radians / 180°)
(Do not accept answers in terms of path differences or λ)

6

15b	Use of $v = f\lambda$ (1) $\lambda = 2L$ used (1) Use of $v = \sqrt{(\frac{T}{\mu})}$ (1) Decrease in tension = 2.5 N (1) <u>Example of calculation</u> $(f\lambda)^2 = T/\mu$ $\lambda = 2L = 2 \times 0.187 = 0.374$ m for 882 Hz, $(882 \text{ Hz} \times 0.374 \text{ m})^2 = T / 5.08 \times 10^{-3} \text{ kg m}^{-1}$ $T = 552.8$ N for 880 Hz, $(880 \text{ Hz} \times 0.374 \text{ m})^2 = T / 5.08 \times 10^{-3} \text{ kg m}^{-1}$ $T = 550.3$ N decrease in $T = 2.5$ N		**4**
	Total for question 15		**12**