Question Number	Answer		Mark
13a	Use of $v = f\lambda$ $\lambda = 0.40$ (m) Wave is suitable **OR** Use of $v = f\lambda$ $f = 850$ (Hz) / 0.85 (kHz) Wave is suitable **OR** Use of $v = f\lambda$ $v = 340$ (m/s) Wave is suitable (MP3 by any method is dependent upon awarding both MP1 and MP2) **<u>Example of calculation</u>** $v = f\lambda$ 340 m s^{-1} = 850 Hz × λ λ = 0.40 m	(1) (1) (1) (1) (1) (1) (1) (1) (1)	**3**

***13b**	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. 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** • Sound (from ANR) has to diffract to reach the furthest/right ear • (Sound) cancelled when destructive interference takes place • (Sound) louder when constructive interference takes place • Destructive interference is where waves are in antiphase • Constructive interference is where waves are in phase • When distance between the ears is half a wavelength **Or** distance between the ears is approximately 20cm. (For IC1, do not allow "noise from engine diffracts to reach the right ear") (For IC2 to IC5, interference or superposition are accepted) (For IC2 and IC3 accept correct reference to minimum/maximum amplitude) (For IC4 and IC5, accept answers in terms of path difference. However, path difference must be in terms of λ and phase difference in terms of π or °) Linkage mark 1 – needs at least 2 from IC1-IC3 to consider this. Linkage mark 2 – needs at least 2 from IC4-IC6 to consider this.	**6**
	Total for question 13	**9**