**ARANMORE CATHOLIC COLLEGE**

**YEAR 11 ATAR PHYSICS - 2015**

**TOPIC TEST - SOUND**

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **/50** |

**Instructions:**

* Answer all questions in the spaces provided.
* Show **all working out** to get full marks, shown in brackets after each question.
* Data/Formulae: (At 25°C) Speed of sound in air = 346 ms-1, Speed of sound in water = 1500 ms-1

fbeat = ǀf2-f1ǀ ; L = 10log(I/Io) ; P = IA.

**QUESTIONS:**

1. Draw a neat sketch below of a transverse wave, label the axes, and on it show the following:

[3 marks]

1. The amplitude of the wave (label with an A)
2. The wavelength of this wave (label with a B)
3. Clearly show two points that are in phase (label both C)
4. Indicate a point that is momentarily stationary (label D)
5. Label a particle that is moving up (label E)
6. Label a particle that is moving down (label F) [6 marks]
7. Daniel and Andy are at the swimming pool to conduct an experiment on sound. Daniel hits the metal pool ladder at one end of the pool with a hammer, while Andy records his observations at the other end of the pool. The sound travels through both the air and the water. Estimate the two different times that the sound takes to travel from Daniel to Andy and thus the difference in the times of arrival of the two sounds as recorded by Andy. [6 marks]
8. Kali tunes her guitar by plucking a string at the same time as a tuning fork of frequency 435.0 Hz is struck and 25 beats are heard every 10 seconds. The same guitar string is then sounded at the same time as a second tuning fork of frequency 436.5 Hz and Kali counts 20 beats every 5 seconds. What is the frequency of Kali’s guitar string? [5 marks]
9. While studying physics one evening with some music playing, Lily notices that a small vase begins to rattle and vibrate. However, it only does this when a certain part of the music plays. Explain why the vase vibrates and why it only occurs at particular points in the music. [3 marks]

1. Explain why different musical instruments, for example a violin and a recorder sound different even if they are both played at the same pitch. [3 marks]
2. The fundamental frequency of a closed tube instrument is found to coincide with that of another instrument, which is an open tube. Explain how this is possible, using a diagram to illustrate your answer. [4 marks]
3. A violin, guitar, piano and cello are all stringed instruments; assume one of the strings on such an instrument has a length of 62.5 cm. The speed of the waves in the string is about 375 ms-1.

**a)** Explain using this situation, the conditions necessary for the formation of standing waves in strings. [3 marks]

**b)** Sketch the standing waves for, and determine the frequencies of the first two harmonics of the string. [6 marks]

1. Mayen measures the sound level at the side of a busy road to be 91 dB when eight trucks are passing him at the same time. If the trucks are each contributing about the same level of sound, what would the sound level be if only one truck passed at one time? [5 marks]
2. Patryk records a sound level of 180 dB measured just 10 m from a rocket launch. Ignoring the effects of reflection and absorption of the sound find the sound intensity and hence the sound level in decibels at a distance of 1 km from the launch? [6 marks]

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## END OF TEST