Waves & Sound Assignment

/40

Name: _____ Date: _____

1. [2 marks] List the three general types of waves. What are the two types of mechanical waves? When waves are incident at a boundary; what happens to the energy?

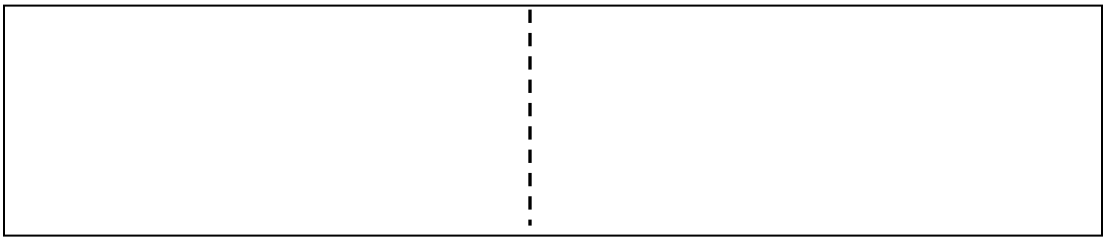
2. [5 marks] A water wave is vibrating up and down 40 times in 3 minutes. A person observing the wave measures that the distance from the top of one crest to the top of another crest with one crest in between was found to be 10 m. Calculate the speed of the waves. Include a labelled diagram.

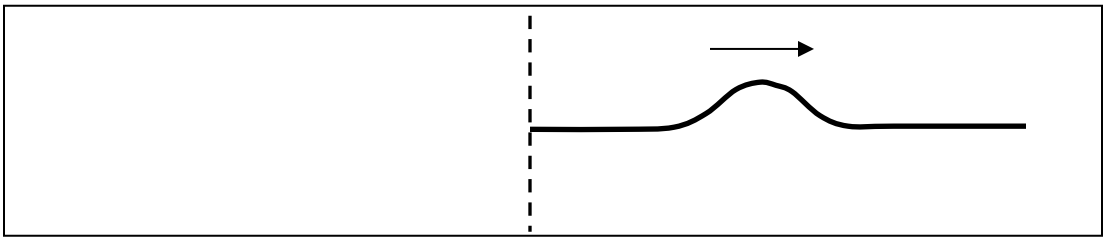
3. [5 marks] Two students run an experiment in an auditorium. They are trying to indirectly measure the air temperature. One student makes a sharp, loud sound at one end of the room. The other student measures that it takes, on average, 0.129 second for the sound to travel the 45 m across the room. Calculate the air temperature of the room.

4. [5 marks] A student observes that an object is moving through the air at Mach 0.2 emitting a frequency of 1024 Hz. The student measures the air temperature to be 19°C. Calculate the perceived frequency if the object is moving away from the student.

5. [5 marks] Two students from question 2 set up another experiment to calculate the speed of sound (I guess they really want to know how fast it is!). They use a new Android App that allows you to measure the frequency of sounds. One student hits a tuning fork, which is vibrating at 512 Hz, and she runs towards the other student at 6.5 m/s. The App measures the incoming frequency to be 522 Hz. Calculate the air temperature of the room.

6. [5 marks] A wave crest is travelling in a light medium hits the boundary of a heavier medium. Draw a "*before*" diagram and finish the "after" diagram. (indicate *relative wave speeds* in each medium and *size of the waves*) Diagram must be neat, clear and accurate!





7. [5 marks] A 12 m rope, fixed at both ends, is vibrating at the 2nd harmonic. The speed of the wave in the string was measured to be 30 m/s. Calculate the frequency of vibration. [include a diagram]

8. [5 marks] A ruler is 100 cm long and is fixed at one end and open at the other. It is vibrating at the 2nd harmonic. Calculate the wavelength. If the wave is vibrating 30 times every 2 seconds calculate the speed of the wave. [include a diagram]

9. [3 marks] What is a standing wave and describe how a standing wave is produced (you must include the terms constructive and destructive interference as well as describe what a node is and what an antinode is)?