Name: DISC: Score: / 20

Instructions:

|  |  |  |  |
| --- | --- | --- | --- |
| Q1 | Q2 | Q3 | Q4 |
|  |  |  |  |
| 10 | 10 | 5 | 5 |

* Do your own work.
* Answer the questions below in the space provided.
* Make sure you show all your work and any equations that you use.
* Please place a box around your answers.
* Remember to give the correct units with all numerical answers

|  |  |  |
| --- | --- | --- |
| **LENGTH OF STRING** | **M (STRING)** |  |
|  |  |  |

1. A pulse travels down a string fixed at one end and free at the other as shown in the diagram (the ring on the end of the string allows the string end to be free).

Table 1: Properties of the System

* 1. The reflected pulse will be
     1. Inverted.

Selection (2 pts):

* + 1. Upright.
  1. Given the parameters in the table above, what is the tension in the string (remember )?

Tension (2 pts):

* 1. If you double the string tension, how much faster will the pulse travel?

New speed (3 pts):

* 1. If at the same time the original pulse was reflected the string is plucked again with a pulse of the same amplitude, what will happen when the pulses meet?

Meeting of Pulses (3 pts):

1. Consider organ pipes with the parameters given in the following table. The pipes are open at both ends.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PIPE** | **LENGTH** | **FIRST HARMONIC** | **WAVELENGTH** | **FREQUENCY** | **ANGULAR FREQUENCY** |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |

* 1. For the first harmonic, what is the value of Explain your reasoning.

First Harmonic (2 pts):

* 1. Find the speed of sound in each pipe. Make sure your answers are clear.

Speeds (3 pts):

* 1. If both pipes are played simultaneously, when the waves meet will the sound waves produced interference?

Interference (2 pts):

* 1. Remembering that a wave can be described as ,
     1. Write down a wave equation for pipe 1 and pipe 2. Use as the amplitude for both waves.
     2. Find an expression for the superposition of the two waves. Can you sketch the result?

Final speed (3 pts):