UNIVERSITY OF TORONTO
Faculty of Arts and Sciences

FIRST YEAR PHYSICS LAB
PRACTICAL TEST

Duration: 50 minutes
Calculators without stored data are permitted
No other aids are allowed

All experimental observations must be recorded in PEN in the exam booklet and data must be plotted (using pen *or* pencil) on the graph paper provided. You are expected to record and analyze your data in the same manner as is normally expected in the lab.

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THE VELOCITY OF SOUND USING STANDING WAVES

A wave moving through a medium with a wave velocity **v** has a wavelength-frequency relationship given by:

$$v = \lambda f \qquad\qquad (1)$$

where **l** is the wavelength and **f** is the frequency of the wave.

Using the apparatus provided∗ and using the standing waves produced with the end of the apparatus closed off, obtain five values of **l** and **f** covering a wide range of frequencies between about 1000 and 3000 Hz.
Notes: the wavelength is twice the distance between successive nodes; use the generator to measure the frequency.
Interpret your results using a straight-line graph, indicating the reasons for choosing the particular plotted variables you use. Obtain a value for the sound velocity in the medium (air) in the tube.

∗This experiment uses the apparatus for either the ***Standing Waves and Acoustic Resonance*** experiment or the ***Velocity of Sound in a Pure Gas*** experiment.

TEST STRATEGY ADVICE: remember to quote units throughout, and use SI units in your final result. You will be given credit for your estimate of errors; however it is more important that you have taken adequate data and produced a graph of the results, so leave your error calculations to the last. It is more important to have your results suitable plotted than to achieve the full set of five points. If one of your points doesn't fit your line or curve, it is advisable to repeat the measurement.