UNIVERSITY OF TORONTO
Faculty of Arts and Science

FIRST YEAR PHYSICS LAB
PRACTICAL TEST

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.

SPECTRA

For the tri-prism optical spectrometers, the relationship between the scale reading, $\mathbf{y}$, and the wavelength, λ, is given by the Hartmann dispersion relation which is:

$$\mathbf{y} = \frac{\mathbf{m}}{\lambda - \lambda_o} + \mathbf{b} \qquad (1)$$

where λ_o, $\mathbf{m}$ and $\mathbf{b}$ are constants. The value of λ_o is indicated on each spectrometer. Obtain five values of $\mathbf{y}$ and λ spread widely across the spectrum, indicating clearly the spectral lines that you use. Obtain a **straight line** calibration curve for your spectrometer, and deduce a value for $\mathbf{m}$.

A Helium spectral source is provided. The Helium spectrum has lines of the following wavelengths (in nanometres), relative intensities, colours (you may assume that the errors in the values of wavelength are negligible).

728.1	2	red	501.6	6	green	416.9	1	violet
706.5	4	red	492.2	5	green	414.4	2	violet
667.8	6	red	485.9	2	green	412.1	3	violet
656.0	1	red	471.3	5	blue	402.6	4	violet
587.6	10	yellow	447.1	6	blue	396.5	1	violet
504.8	4	green	443.8	1	violet	388.9	3	violet
			438.8	4	violet			

TEST STRATEGY ADVICE: Use the five brightest lines to help speed your identification of the wavelengths you are observing. Remember to quote units throughout. 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 suitably plotted than to achieve the full set of five points. If one of the points doesn't fit your line or curve, it is advisable to repeat that measurement.