Appendix D

Useful Forms

This section contains pre-made tables which will save you time when collecting and analyzing your data. Please cut/tear out the relevant sheet and include it with your lab report.

Table D.1: Method of Least Squares Table of Values

	t (s)	v (m/s)	tv	t^2	$t - t_{\text{mean}}$	$(t - t_{\text{mean}})^2$	$\Delta^2(vt)^*$
Sum:							
$N =$							
mean							

$^*\Delta^2(vt) \equiv \left[(v - v_{\text{mean}}) - m(t - t_{\text{mean}})\right]^2$

- acceleration (slope): $a =$ m/s^2

- uncertainty in acceleration (slope): $\delta a =$ m/s^2

Table D.2: Uniformly accelerated linear motion- data table

<table>
<tr><th>Time (s)</th><th>Position (m)</th><th>Velocity = $\frac{x_{i+1}-x_i}{t_{i+1}-t_i}$ (m/s)</th><th>Median Time (s)</th></tr>
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Distance used throughout (including uncertainty) :

Table D.3: Acceleration vs Fan Angle

Fan Angle	Time (s)			$\bar{t}$ (s)	σ (s)	a (m/s^2)
0°						
15°						
30°						
45°						
60°						
75°						
90°						

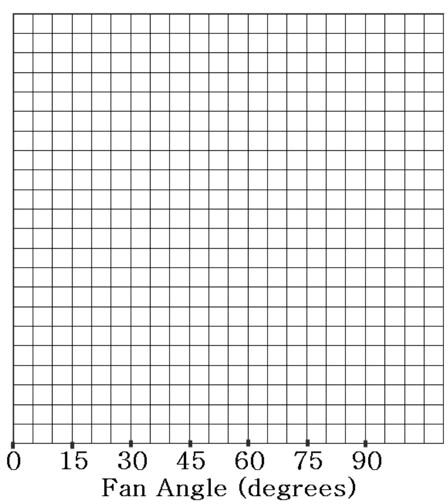

Table D.4: Forces of friction when varying mass

Material:	
Mass of Friction Block (M_{block}):	

Additional Mass M_{added}	Total Mass (kg) $M_T = M_{added} + M_{block}$	Normal Force (N) $N = gM_T$	Max Static Force (N) $f_{s,max}$	Kinetic Friction force (N) f_k

Table D.5: Forces of friction using a different material

Material:	
Mass of Friction Block (M_{block}):	

Additional Mass M_{added}	Total Mass (kg) $M_T = M_{added} + M_{block}$	Normal Force (N) $N = gM_T$	Max Static Force (N) $f_{s,max}$	Kinetic Friction force (N) f_k

Table D.6: Mass on a spring data and analysis

Spring Number:	

i	Time for N=10 oscillations $t_i(s)$	Period $T_i = t_i/N(s)$	Average Period $\overline{T}(s)$	Average Deviation $\lvert T_i - \overline{T}\rvert(s)$
1			-	
2			-	
3			-	
avg	-	$\Sigma T_i =$	$\Sigma T_i/n =$	$\delta T = \frac{\Sigma\lvert T_i - \overline{T}\rvert}{n} =$

$m_i =$	
$m_{added} =$	
$m_{Total} =$	

Table D.7: Conservation of Energy of a Spring-Mass System

Time(s)	Position (m)	Velocity (m/s)	Spring Potential Energy (J)	Gravitational Potential Energy (J)	Kinetic Energy (J)	Total Energy (J)

Show sample calculation here:

Table D.8: Transverse standing waves in a String- Data and Speed Calculation

	Wavelength λ (m)	Frequency f (Hz)	Speed $v = \lambda f$ (m/s)
standing wave 1			
standing wave 2			
standing wave 3			
standing wave 4			

Calculations:

Mean Speed $\overline{v} =$

Average Deviation: $\delta v = \sigma = \sum_i |v_i - \overline{v}|/N =$

Table D.9: Longitudinal Standing waves in a Spring- Data and Speed Calculation

	Wavelength λ (m)	Frequency f (Hz)	Speed $v = \lambda f$ (m/s)
standing wave 1			
standing wave 2			
standing wave 3			
standing wave 4			

Calculations:

Mean Speed $\overline{v} =$

Average Deviation: $\delta v = \sigma = \sum_i |v_i - \overline{v}|/N =$

Table D.10: Acoustic standing waves in a hollow cylinder- data and calculations

Frequency	Resonance Lengths (m)	Difference in Resonance Lengths = $\lambda/2$ (m)	Wavelength λ (m)	Velocity $v = \lambda f$ (m/s)
700 Hz	$L_1 =$	$L_2 - L_1 =$		
	$L_2 =$	$L_3 - L_2 =$		
	$L_3 =$	$L_4 - L_3 =$		
	$L_4 =$	$L_5 - L_4 =$		
	$L_5 =$			
1400 Hz				

Calculations:

Mean Speed $\overline{v} =$

Average Deviation: $\delta v = \sigma = \sum_i |v_i - \overline{v}|/N =$

PreLab Exercise

An electrical schematic diagram of DC circuit with two resistors in parallel is shown on the left of the figure below. Using the pictorial representation of all the components (shown on the right) connect these components together in pencil (easy to erase) by curved lines which will represent your wires.

Do not use more than 9 wires. The battery, switch and three multimeters cannot have more than one wire attached to each terminal. Two or more wires can be connected to ends of resistors.

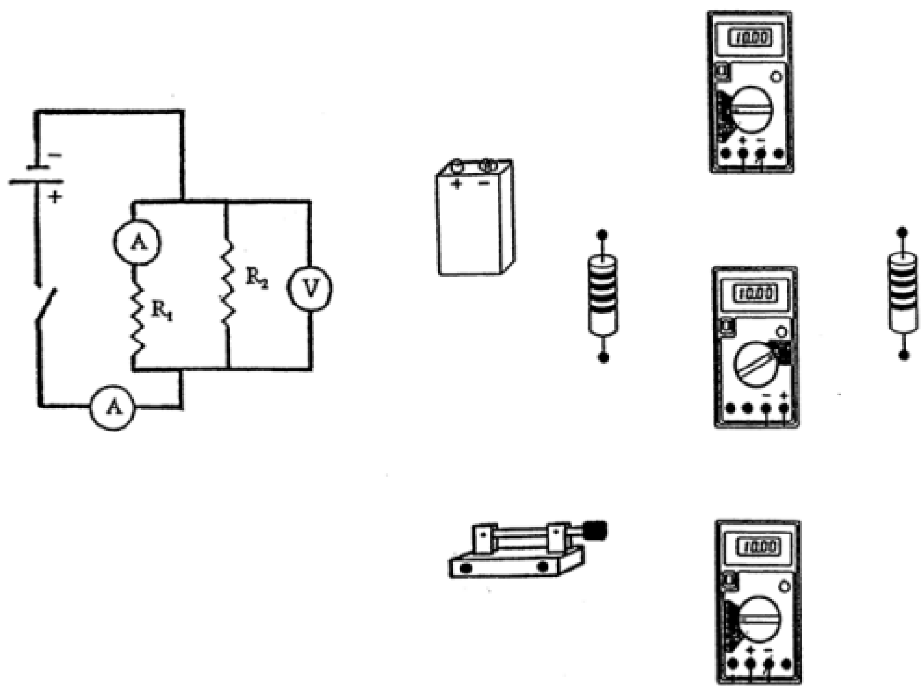

Table D.11: Diffraction of Light from Gas Tube - Data and Calculations

Order	Colour	Angle (° *and* ′)	Angle (° *only*)	$\lambda = dsin(\theta_{1,x} - \theta_0)/n$
n=0			$\theta_0 =$	-
n=1			$\theta_{1,a} =$	
			$\theta_{1,b} =$	
			$\theta_{1,c} =$	
			$\theta_{1,d} =$	
n=2			$\theta_{2,a} =$	
			$\theta_{2,b} =$	
			$\theta_{2,c} =$	
			$\theta_{2,d} =$	
average of n=1 and n=2 values		-	-	
		-	-	
		-	-	
		-	-	

Two character code of cell:

Identification of Gas:

Table D.12: Diffraction of Light from Gas Tube - Data and Calculations

Order	Colour	Angle (° *and* ′)	Angle (° *only*)	$\lambda = dsin(\theta_{1,x} - \theta_0)/n$
n=0			$\theta_0 =$	-
n=1			$\theta_{1,a} =$	
			$\theta_{1,b} =$	
			$\theta_{1,c} =$	
			$\theta_{1,d} =$	
n=2			$\theta_{2,a} =$	
			$\theta_{2,b} =$	
			$\theta_{2,c} =$	
			$\theta_{2,d} =$	
average of n=1 and n=2 values		-	-	
		-	-	
		-	-	
		-	-	

Two character code of cell:

Identification of Gas: