Lab Report Checklist

DP Physics - Mr. Rawson

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Listed below is a concise checklist of things you must do to get a full "complete." The gray tables on the left are the DP requirements taken **directly** from the IB Physics Guide Book; use them as a reference. Please create each "Section" in your lab report as listed. Even if a section is not being graded, such as Design, look through each section to see if it would be appropriate to include. Also be sure to check the DP Lobby for help sheets.

Design		
Aspect 1 – Defining the problem and selecting variables		
Complete	2	Formulates a focused problem/research question and identifies the relevant variables
Partial	1	Formulates a problem/research question that is incomplete or identifies only some relevant variables
Not at all	0	Does not identify a problem/research question **and** does not identify any relevant variables.
Aspect 2 – Controlling Variables		
Complete	2	Designs a method for the effective control of the variables
Partial	1	Designs a method that makes some attempt to control the variables
Not at all	0	Designs a method that does not control the variables.
Aspect 3 – Developing a method for collection of data		
Complete	2	Develops a method that allows for the collection of sufficient relevant data
Partial	1	Develops a method that allows for the collection of insufficient relevant data
Not at all	0	Develops a method that does not allow for any relevant data to be collected.

Sections	Description	Did you do this?
Introduction	Define the title of the lab, describe what the lab pertains to, and how it relates in everyday situations.	
	If there is a law or formulas that apply to this lab theory, include these and explain them. ("Top Marks" reports would use proper formatting for equations; for instance using Equation Editor)	
Research Question	State the research question clearly and succinctly. This assumes you understand which relationships you are experimenting upon.	
Hypothesis	Make a prediction of what you expect to happen. Remember that a hypothesis is a prediction upon the ***data***, and what trend you expect it to follow. Use appropriate relationship terminology, i.e. direct, inverse, square root relationship.	
Variables	Identify and list the independent variable(s). Remember that this is the one that you manipulate.	
	Identify and list the dependent variable(s). Remember that this is the one that is changing, or the quantity that you are measuring.	
	Identify and list the relevant control variables. Remember that these are the ones that are being kept constant, because otherwise they would affect the experimental outcome.	
Materials	List all of the materials used – bulleted list is usually good.	
	"Top Marks" reports often include a diagram of the apparatus, or picture.	
Procedure	List the steps of the experiment	
	Specifically state how you are going to change and measure the independent variable.	
	Specifically state how you are going to measure the dependent variable.	
	Specifically state how you are going to make sure that the control variables do not change.	
	State the range of values of the independent variable that you are going to use.	
	State how many times you are going to repeat the measurements of the dependent variable.	

Aspect 1 – Recording raw data		
Complete	2	Records appropriate quantitative and associated qualitative raw data, including units and uncertainties where relevant
Partial	1	Records appropriate quantitative and associated qualitative raw data, but with some mistakes or omissions
Not at all	0	Does not record any appropriate quantitative raw data **or** raw data is incomprehensible.
Aspect 2 – Processing raw data		
Complete	2	Processes the quantitative raw data correctly.
Partial	1	Processes quantitative raw data, but with some mistakes and/or omissions
Not at all	0	No processing of quantitative raw data is carried out **or** major mistakes are made in processing.
Aspect 3 – Presenting processed data		
Complete	2	Presents processed data appropriately and, where relevant, includes errors and uncertainties
Partial	1	Presents processed data appropriately, but with some mistakes and/or omissions.
Not at all	0	Presents processed data inappropriately or incomprehensively

Sections	Description	Did you do this?
Data	Raw Data: • Draw a table using Excel (or other) with a column for each measurement. Each column should have a heading, units of the quantity, and uncertainty of measurement. • Set data points in an order, ascending or descending. Uncertainties: • List the uncertainty of *measurement* for each column. Default is half the smallest measurement, but it may be more – make your own judgment. • Write a sentence or two on how you arrived at the uncertainty of measurement, usually below the data chart. Decimal Points: • The number of decimal places should be the same for all values in a column. • Decimal places in the data cannot be greater than the decimal places in the uncertainty. Processed Data: • Processed data should be displayed in a table separate to the raw data. • *Processed data uncertainties* -- calculate the uncertainties in the repeated measurements by calculating ½ *(max value – min value) of each trial. Apply these to your error bars in your graph. • Any calculation must be explained.	
Graphs	Processed data should be presented in a graph. The graph should be presented as a straight-line graph if possible (y=mx +b).	
	The graph must have a heading, axis labels and units.	
	Graph must include error bars, based upon *processed data uncertainties* listed in data charts.	
	A best line fit should be plotted automatically. Using uncertainties and error bars, manually fit the max gradient and min gradient lines to the data. Thus you should have 3 lines on your graph. ***See help video***.	
	If you wish to use the Linear Graph Plotter Excel Program, you may do so. ***See help video***.	
	List the *uncertainty in the gradient* by taking (max gradient – min gradient)/2.	

Conclusion and Evaluation		
Aspect 1 – Concluding		
Complete	2	States a conclusion, with justification, based on a reasonable interpretation of the data.
Partial	1	States a conclusion based on a reasonable interpretation of the data.
Not at all	0	States no conclusion or the conclusion is based on an unreasonable interpretation of the data.
Aspect 2 – Evaluating procedure(s)		
Complete	2	Evaluates weaknesses and limitations
Partial	1	Identifies some weaknesses and limitations, but the evaluation is weak or missing.
Not at all	0	Identifies irrelevant weaknesses and limitations.
Aspect 3 – Improving the investigation		
Complete	2	Suggests realistic improvements in respect of identified weaknesses and limitations
Partial	1	Suggests only superficial improvements
Not at all	0	Suggests unrealistic improvements.

Sections	Description	Did you do this?
Analysis	Use ***mathematical analysis*** to analyze whether or not your graph shows a clear relationship. You cannot say that the data "came out well" without explaining ***mathematically*** why. Use percent error, etc to show well the data aligned with theory	
	Comment on whether your trendline clearly passes through the data points/error bars. Do the data points show a weak or strong relationship?	
	Comment on whether intercept goes through the origin (0,0); if it does not go through the there may be a systematic error.	
	Comment on whether you managed to keep the control variables constant	
	Comment on the equipment used and the method in which you used it	
	Comment on the range of values and number of repetitions.	
	Comment on time management	
Conclusion	From your analysis, conclude whether your experimental graph supports theoretical data, and why. You **must** show mathematical / statistical comparisons here.	
	Normally the data will be arranged so that the final data set will give you some value (such as *Experimental Value for Gravity =* $9.81\ m{\cdot}s^{-2} \pm 0.4$) Calculate this value from the graph. Compare this with the theoretical value.	
Evaluation	List realistic ways of improving the investigation (i.e. reducing the uncertainties). Anything you write here must be related to something you mentioned in the analysis. This in turn should be linked to the results. *Think like a detective, look for evidence.*	
	If possible do a calculation or a small experiment to show how the improvement might improve the accuracy of the result.	
	If you had a greater scope of data (wider range or more repetitions) would it improve your result?	
	Is there any modification to the apparatus that would make the results better?	
	Could you make any improvement upon the method that might give more substantial results?	