EXPLORATION Total - D: __ / 6

EXPLORATION Aspect 1 - Defining the problem and selecting the variables

EX 1.1	Clearly communicates a focused title that tells what physical quantity you are changing (independent variable) and what physical quantity you are measuring (dependent variable).	
EX 1.2	Opening paragraph/s clearly states the independent variable along with metric units and range.	
EX 1.3	Opening paragraph/s clearly states the dependent variable along with metric units and range.	
EX 1.4	Clearly controls variables listed in descending order of importance and lists relevant uncontrolled variables. Controls are of proper size if of the essence.	
EX 1.5	Design provides data that can be plotted as a functional relationship rather than a bar graph.	
EX 1.6	Opening paragraph/s clearly gives an overview of your design in sufficient detail that the reader can see exactly what you will do before reading further.	

Mark Awarded	*Not at all = 0* Does not identify a problem or does not identify any relevant variables.	*Partial = 1* Formulates a problem that is incomplete or identifies only some variables.	*Complete = 2* Formulates a focused problem and identifies the relevant variables.

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

EXPLORATION Aspect 2 - Controlling the variables

EX 2.1	Method explains how the independent variable is manipulated. Method clearly provides an appropriate range of values for the independent variable. Method clearly explains how and when the independent variable is measured and recorded. Instrumentation measuring independent variable is clearly described / annotated. This portion of the method clearly is repeatable by peers.	
EX 2.2	Method clearly explains how and when the dependent variable is measured and recorded. Instrumentation measuring the dependent variable is clearly described / annotated. Method will provide data that will produce a function. This portion of the method clearly is repeatable by peers.	
EX 2.3	Method effectively controls / limits the factors listed in EX 1.4. Instrumentation used for control variables is clearly described / annotated. This portion of the method clearly is repeatable by peers.	
EX 2.4	If needed, a diagram of the experimental set-up is provided to clarify the method.	
EX 2.5	An equipment / material list is provided to meet the requirements of the method.	
EX 2.6	Full citation is given for published pictures and diagrams if used.	

Mark Awarded	*Not at all = 0* Designs a method that does not control the variables.	*Partial = 1* Designs a method that makes some attempt to control variables.	*Complete = 2* Designs a method for the effective control of variables.

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

EXPLORATION Aspect 3 – Develop a method for the collection of the data

EX 3.1	Method gathers a minimum of five (5) variations of the independent variable defined in EX 1.2 and explicitly states when to record these variations.	
EX 3.2	Method gathers a minimum of three (3) trials for each variation in EX 3.1 and explicitly states when to record these trials.	
EX 3.3	Method is clear enough that a peer could perform the investigation without coaching.	
EX 3.4	Method clearly gathers data specified in EX 1.1.	
EX 3.5	Data is gathered by real instrumentation, not imaginary devices you must invent that are clearly beyond the scope of a science class.	

Mark Awarded	*Not at all = 0* Develops a method that does not allow for any relevant data to be collected.	*Partial = 1* Develops a method that allows for the collection of insufficient data.	*Complete = 2* Develops a method that allows for the collection of insufficient data.

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

COMMUNICATION Total - CO: __ / 4

COMMUNICATION Aspect 1 – Structuring the presentation			
CO 1.1	Presentation is clear and well-structured.		
CO 1.2	Presentation is easy to follow by reader.		
Mark Awarded	*Not at all = 0*	*Partial = 1*	*Complete = 2*

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

COMMUNICATION Aspect 2 – Focusing the presentation			
CO 2.1	Report facilitates ready understanding of the focus of the investigation.		
CO 2.2	Report facilitates ready understanding of the process of the investigation.		
CO 2.3	Report facilitates ready understanding of the outcomes of the investigation.		
Mark Awarded	*Not at all = 0*	*Partial = 1*	*Complete = 2*

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

ANALYSIS Aspect 1 – Recording raw data

AN 1.1	All raw unprocessed data is attached as the last page of the investigation.	
AN 1.2	Meaningful title is interpretable at a glance.	
AN 1.3	Fully ruled table.	
AN 1.4	Column headings are correct and complete.	
AN 1.5	Units of measurement clearly stated.	
AN 1.6	All presented raw data has uncertainty clearly labeled and justified.	
AN 1.7	All presented raw data has consistent decimal places.	

Mark Awarded	*Not at all = 0* No recording of raw data is carried out or major mistakes are made in recording	*Partial = 1* Records the quantitative raw data, but with some mistakes and / or omissions	*Complete = 2* Records the quantitative raw data correctly

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

ANALYSIS Aspect 2 – Processing raw data

AN 2.1	Correct calculation of dependent variable column.	
AN 2.2	Sample calculation of dependent variable clearly shown and explained.	
AN 2.3	Correct number of significant figures is evident in the dependent variable column.	
AN 2.4	Correct calculation of dependent variable uncertainty.	
AN 2.5	Calculation of dependent variable uncertainty clearly shown and explained.	
AN 2.6	Correct number of significant figures is evident in the dependent variable uncertainty.	

Mark Awarded	*Not at all = 0* No processing of raw data is carried out or major mistakes are made in processing	*Partial = 1* Processes the quantitative raw data, but with some mistakes and / or omissions	*Complete = 2* Processes the quantitative raw data correctly

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

ANALYSIS Aspect 3 – Presenting processed data

	TABLE	
AN 3.1	Processed table has meaningful title interpretable at a glance.	
AN 3.2	Processed data is tabulated and fully ruled.	
AN 3.3	Column headings are clear and correct with *name, symbol / units, uncertainty*.	

	DATA GRAPH	
AN 3.4	Graphs have meaningful titles interpretable at a glance.	
AN 3.5	Graphs chosen are of correct type.	
AN 3.6	Appropriate scale evident with horizontal and vertical grid lines.	
AN 3.7	Vertical axis clearly labeled with variable *name, symbol / units*.	
AN 3.8	Horizontal axis clearly labeled with variable *name, symbol / units*.	
AN 3.9	Points plotted accurately.	
AN 3.10	Vertical error bars are evident and of the correct size.	
AN 3.11	Correct trend line is evident together with its slope and units.	

	UNCERTAINTY GRAPHS	
AN 3.12	Graph clearly shown of maximum and minimum slopes allowed by first and last error bars.	
AN 3.13	Calculation of slope uncertainty is clearly shown on or near the slope uncertainty graph.	
AN 3.14	Slope and slope uncertainty are shown together including correct units on or near the slope uncertainty graphs.	
AN 3.15	Intercept and intercept uncertainty are shown together including correct units on or near the uncertainty graphs.	

Mark Awarded	*Not at all = 0* Presents processed data inappropriately or incomprehensibly.	*Partial = 1* Presents processed data appropriately, but with some mistakes and / or omissions.	*Complete = 2* Presents processed data appropriately.

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

EVALUATION Total - CE: __ / 6

EVALUATION Aspect 1 - Concluding

EV 1.1	Concludes in a balanced tone and does not interpret minor or unclear trends as definite fact.			
EV 1.2	Clearly states the outcome of the investigation.			
EV 1.3	Clearly states and interprets the slope and its uncertainty both symbolically and in words.			
EV 1.4	Clearly states and interprets the intercept and its uncertainty both symbolically and in words.			
EV 1.5	Discusses the reliability of the data with reference to the raw data, calculated values, or graph.			
Mark Awarded	*Not at all = 0* States no conclusion or the conclusion is based on unreasonable interpretation.	*Partial = 1* States a conclusion based on a reasonable interpretation of the data.	*Complete = 2* States a conclusion, with justification, based on a reasonable interpretation of the data.	

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

EVALUATION Aspect 2 – Evaluating procedures

EV 2.1	Limitations of the investigation are listed.			
EV 2.2	Discussion on how each limitation influenced the results.			
EV 2.3	Refers to error bars as visual signal of reliability of particular measurements in the data.			
EV 2.4	Considers sufficiency of variations to expose a trend.			
EV 2.5	Considers measurement errors from instruments.			
EV 2.6	Considers systematic problems that may have influenced the data collection.			
Mark Awarded	*Not at all = 0* Identifies irrelevant weaknesses and limitations.	*Partial = 1* Identifies some weaknesses, but the evaluation is weak or missing.	*Complete = 2* Evaluates weaknesses and limitations.	

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

EVALUATION Aspect 3 – Improving the investigation

EV 3.1	Each limitation listed in EV 2.1 has a suggested improvement.			
EV 3.2	Suggestions in EV 3.1 are realistic for a school laboratory.			
EV 3.3	Suggested improvements are explained.			
EV 3.4	Suggested improvements will rectify the associated limitation.			
EV 3.5	Data is gathered by real instrumentation, not imaginary devices you must invent.			
Mark Awarded	*Not at all = 0* Suggests no realistic improvements to identified weaknesses and limitations.	*Partial = 1* Develops a method that allows for the collection of insufficient data.	*Complete = 2* Suggests realistic improvements to identified weaknesses and limitations.	

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

COMMUNICATION Total - CO: __ / 4

COMMUNICATION Aspect 1 – Structuring the presentation

CO 1.1	Presentation is clear and well-structured.			
CO 1.2	Presentation is easy to follow by reader.			
Mark Awarded	*Not at all = 0*	*Partial = 1*	*Complete = 2*	

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.

COMMUNICATION Aspect 2 – Focusing the presentation

CO 2.1	Report facilitates ready understanding of the focus of the investigation.			
CO 2.2	Report facilitates ready understanding of the process of the investigation.			
CO 2.3	Report facilitates ready understanding of the outcomes of the investigation.			
Mark Awarded	*Not at all = 0*	*Partial = 1*	*Complete = 2*	

Y = Yes, you definitely succeeded.   /   N = No, you are missing this.   /   M = Maybe yes, maybe no, I can't really tell.   /   − = NA.