NAME:

	CRITERIA	Advanced	Proficient	Developing	Beginning
FRAMING	**Title**	Describes the research question, including ***independent*** and ***dependent variables***, as a statement. ***Is engaging.***	Describes the research question, including ***independent*** and ***dependent variables***, as a statement.	Title reflects the ***name of the assignment*** or does not address the variables of the experiment.	Title is generic (i.e. "Lab Report" or "Science Paper") or does not make sense in the context of the experiment or is not relevant.
	Introduction - Background	Background information is accurate and relevant to the topic and sufficient to understand the experiment. Seamlessly ***integrates multiple reliable sources to summarize the main findings*** of **prior research by other scientists on the topic.**	Background information is accurate and relevant to the topic and ***sufficient to understand the experiment.*** Summarizes and cites sources.	Background information is included but ***relevance to the experiment may be insufficient or unclear***. Needs to cite sources.	Needs to include relevant background information. Resources for writing a good introduction - https://goo.gl/giVD6C
	Introduction - Research Questions & Variables	Question is ***precise*** and ***testable***. ***Includes independent and dependent variables.*** Provides a clear explanation for why this research question is important or ***how it will add to scientists' existing knowledge of the topic***.	Question is ***precise*** and ***testable***. ***Includes independent and dependent variables.*** Attempts to explain why this research question is important or ***how it will add to the your knowledge of the topic***.	Question is present. ***May need clarification to identify independent and/or dependent variables.*** Needs to explain why the question is important or how it will add to your knowledge of the topic.	Needs a research question. Resources for writing a good research question - https://goo.gl/gdEHEB
METHODS	**Flowgram Steps**	**Another scholar can use this flowgram to complete the protocol.** Steps are ***accurately*** drawn to show the steps for the protocol and the individual components involved in those steps. Photos are included with text to show how to correctly carry out the procedure.	**You can use this flowgram to complete the protocol in the future.** Steps are ***accurately*** drawn to show the steps for the protocol and the individual components involved in those steps. Photos are included with text to show how to correctly carry out the procedure.	**You need help from outside resources to complete the protocol.** Steps for doing the protocol are drawn to show the steps for the protocol and the individual components involved in those steps.	**You need help from an instructor or mentor to complete the protocol.** Steps for doing a the protocol are drawn.
	Annotations of Flowgram	**Another scholar can use these annotations to understand why you followed specific steps in the protocol.** **-Equipment:** Explain the purpose of the equipment for steps in the protocol **-Materials:** Identify the major materials and explain how they play a role	**You can use these annotations to remember why you followed specific steps in the protocol** **-Equipment:** Explain the purpose of the equipment for steps in the protocol **-Materials:** Identify the major materials and explain how they play a role.	**You need help from outside resources to understand the protocol.** **-Equipment:** Explain the purpose of the equipment for steps in the protocol **-Materials:** Identify the major materials and explain how they play a role.	**You need help from an instructor or mentor to understand the protocol.**
RESULTS	**DATA TABLE and FIGURES**	Data included is relevant to the research question. Organized in a way that shows patterns and relationships between variables. Include appropriate headings with units. Multiple trials are averaged. Includes a caption with a title and ***summary of relationship between variables.***	Data included is ***relevant to the research question***. Organized in a way that ***shows patterns and relationships between variables***. Include appropriate ***headings with units***. ***Multiple trials are averaged.*** Includes a ***caption with a title***.	Data collected is included. Organization of data needs clarification. Needs a caption.	Needs data collected. Resources for organizing results - https://goo.gl/Y8ipc6

RESULTS	**GRAPHS (if applicable)**	***Data in graph is selected in order to answer the research question.*** Graph type selected is ***best suited for showing patterns*** in the data set. Axes are labeled and include units. Includes a caption with a title and ***summary of relationship between variables.***	***Data in graph is selected in order to answer the research question.*** Graph type selected is well suited for the data set. Axes are labeled and include units. Includes a caption with a title.	Graphs of data are included. Data selection is unclear. May contain too much or not enough information. Needs a caption.	Needs graphs. Resources for organizing results - https://goo.gl/Y8ipc6
CONCLUSIONS	**EVIDENCE REASONING CLAIM**	***Evidence*** Summarizes each set of relevant observations and/or data from the experiment. Experimental data selected relates to the research question. ***Reasoning*** Uses science content knowledge to make sense of each piece of data included in the evidence. ***Constructs explanations for the scientific phenomenon being studied.*** ***Claim*** Clear claim connecting the evidence and reasoning back to the research question.	***Evidence*** Summarizes each set of relevant observations and/or data from the experiment. Experimental data selected relates to the research question. ***Reasoning*** Uses science content knowledge to make sense of each piece of data included in the evidence. ***Claim*** Clear claim answering the research question is based on evidence and reasoning from the experiment.	***Evidence*** Makes a general statement, needs to include specific data. ***Reasoning*** May repeat evidence, attempts to explain it. ***Claim*** Contains a claim but it is not fully developed. May be vague, general. Shows limited understanding of the experiment/problem	***Evidence*** Does not provide evidence, or evidence that is not related to the claim. ***Reasoning*** Does not provide reasoning or provides inaccurate, not related reasoning. ***Claim*** No claim or inaccurate claim. Shows no understanding of the experiment/problem. Resources for writing an ERC - https://goo.gl/vCUWgS
	POSSIBLE ERRORS	Evaluates the limitations of the data (e.g., measurement error, sample selection, inadequate trials). ***Evidence of Error*** Provides observations of flaws in the methodology, unexpected controls, or error calculations. ***Reasoning*** Discusses how the error could have affected results obtained (i.e. artificially high, artificially low). ***Claim*** Draws appropriate/valid conclusion about how the data are reliable or unreliable.	***Evidence of Error*** Provides observations of flaws in the methodology, unexpected controls, or error calculations. ***Reasoning*** Discusses how the error could have affected results obtained (i.e. artificially high, artificially low). ***Claim*** Draws appropriate/valid conclusion about how the data are reliable or unreliable.	***Evidence of Error*** Provides a list of possible errors. ***Reasoning*** States that the errors may have affected results obtained. ***Claim*** Needs to discuss whether the data are reliable or unreliable.	Errors provided are vague or generic (human error, calculation error). Resources for writing possible errors - https://goo.gl/xCHLPs
	PRACTICAL APPLICATIONS	Discusses significance of the research (real world application) connected to ***heal the world, feed the world, fuel the world, or restore and protect the environment***; and its future direction/next experiment.	Discusses significance of the research (real world application) and its future direction/next experiment.	Attempts to discuss significance of the research (real world application) and/or its future direction/next experiment.	Needs to discuss significance of research, its future direction, and its future direction/next experiment.

WRITING	**References**	All literature is cited completely and in the correct format	All literature used is cited; there are minor errors in the citation format	Some literature used is cited; however, it is not cited in the correct format	All literature used is not cited
	Spelling, grammar, and sentence structure	All grammar/spelling correct and very well-written. Scientific vocabulary is mostly used correctly. Organized paragraph and complete sentences.	Writing demonstrates some errors. Scientific vocabulary is mostly used correctly. Organized paragraph and complete sentences.	Writing demonstrates many errors Scientific vocabulary used incorrectly or not at all.	Writing errors interfere with meaning Incomplete sentences No use of scientific vocabulary
	Appearance and formatting	All sections in order with headings, well-formatted, very easy to read. May use sub-headings to further organize information. Tables, figures, equations, and graphs are numbered using accepted scientific conventions.	All sections in order with headings, well-formatted, very easy to read. Tables, figures, equations, and graphs are numbered.	Formatting is rough but readable.	Formatting interferes with readability.