

Capstone Written Report Scoring Rubric

<i>Ability to design and conduct an observation experiment</i>					
Scientific Ability	Missing (0)	Inadequate (1)	Needs Improvement (2)	Adequate (3)	Score
The student demonstrates the ability to design a reliable experiment that investigates the phenomenon	No phenomenon is mentioned.	The experiment does not yield any interesting patterns.	Some important aspects of the phenomenon will not be observed.	The experiment might yield interesting patterns and independent and dependent variables are identified.	
The student demonstrates the ability to decide what parameters are to be controlled and identify independent and dependent variables.	The parameters are irrelevant.	Only some of the parameters are relevant	The parameters are relevant. However, independent and dependent variables are not identified.	The parameters are relevant and independent and dependent variables are identified.	
The student is able to describe how to use available equipment to make measurements.	At least one of the chosen measurements cannot be made with the equipment available.	All chosen measurements can be made, but no details are given about how it is done.	All chosen measurements can be made, but the details of how it is done are vague or incomplete.	All chosen measurements can be made and all details of how it is done are clearly provided.	
The student demonstrates the ability to describe what is observed without trying to explain, both in words and by means of a picture of the experimental set-up.	No description is mentioned.	The description is incomplete. No labeled picture is present. Or, observations are adjusted to fit expectations.	A description is complete, but mixed up with explanations or pattern.	Clearly describes what happens in the experiment both verbally and by means of other representations.	
The student demonstrates the ability to identify the shortcoming in an experiment and suggest improvements.	No attempt is made to identify any shortcomings in the experiment.	The shortcomings are described vaguely and no suggestions for improvements are made.	Not all aspects of the design are considered.	All major shortcomings of the experiment are identified and reasonable suggestions for improvement are made.	
The student demonstrates the ability to identify a pattern in the data.	No attempt is made to search for a pattern.	The pattern described is irrelevant or inconsistent with the data.	The pattern has minor errors or omissions.	The pattern represents the relevant trend in the data.	
The student demonstrates the ability to represent a pattern mathematically.	No attempt is made to represent a pattern. No attempt is made to represent the pattern mathematically.	The mathematical expression does not represent the trend.	No analysis of how well the expression agrees with the data s included, or some features of the pattern are missing.	The expression represents the trend completely and an analysis of how well it agrees with the data is included.	
The student demonstrates the ability to devise an explanation for an observed pattern.	No attempt is made to explain the observed pattern.	The explanation is vague, not testable, or contradicts the pattern.	An explanation contradicts previous knowledge or the reasoning is flawed.	A reasonable explanation is given.	

The student demonstrates the ability to identify the assumptions made in devising the explanation.	No attempt is made to identify any assumptions.	The assumptions are irrelevant or incorrect.	Some significant assumptions are not mentioned.	Most significant assumptions are correctly identified.	
<i>Ability to collect and analyze experimental data</i>					
The student demonstrates the ability to identify sources of experimental uncertainty.	No attempt is made to identify experimental uncertainties.	An attempt is made to identify experimental uncertainties, but most are missing, described vaguely, or incorrect.	Most experimental uncertainties are correctly identified.	All experimental uncertainties are correctly identified.	
The student demonstrates the ability to evaluate specifically how identified experimental uncertainties might affect the data.	No attempt is made to evaluate experimental uncertainties.	An attempt is made to evaluate experimental uncertainties, but most are missing, described vaguely, or incorrect. Or only absolute uncertainties are mentioned. Or, the final result does not take the uncertainty into account.	The final result does not take the identified uncertainties into account but is not correctly evaluated.	The experimental uncertainty of the final result is correctly evaluated.	
The student demonstrates the ability to describe how to minimize experimental uncertainty and actually do it.	No attempt is made to describe how to minimize experimental uncertainty and not attempt to minimize is present.	A description of how to minimize experimental uncertainty is present, but there is no attempt to actually minimize it.	An attempt is made to minimize the uncertainty in the final result is made, but the method is not the most effective.	The uncertainty is minimized in an effective way.	
The student demonstrates the ability to record and represent data in a meaningful way.	Data are either absent or incomprehensible.	Some important data are absent or incomprehensible.	All important data are present, but recorded in a way that requires some effort to comprehend.	All important data are present, organized, and recorded clearly.	
The student demonstrates the ability to analyze data appropriately.	No attempt is made to analyze the data.	An attempt is made to analyze the data, but it is either seriously flawed or inappropriate.	The analysis is appropriate, but it contains minor errors or omissions.	The analysis is appropriate, complete, and correct.	
<i>Ability to communicate scientific ideas</i>					
The student demonstrates the ability to communicate in writing the details of an experimental procedure clearly and completely.	Writing is poorly done; too wordy. Diagrams are missing and/or experimental procedure is missing or extremely vague. Document has an unacceptable appearance.	Writing is fair and a bit wordy. Diagrams are present but unclear and/or experimental procedure is present but important details are missing. Document has a poor appearance.	Writing has a few problems and is not as concise as possible. Diagrams and/or experimental procedures are present but with minor omissions or vague details. Document has a marginally acceptable appearance.	Writing is clear and concise. Diagrams and/or experimental procedures are clear and complete. Document has an appearance suitable for publication.	

Total Score _____ out of 45 points of _____ %