

Appendix 11: Assessment Rubrics

Rubric for Assessment of Research Project

		Performance Levels			
		Level 1	Level 2	Level 3	Level 4
Student Name(s) _____	Topic/Title _____				
Criteria					
Source of Information	<input type="checkbox"/> Only one source of information was used.	<input type="checkbox"/> Two sources of information were used.	<input type="checkbox"/> A variety of sources was used.	<input type="checkbox"/> A wide variety of sources was used in a unique manner.	
Information Collected	<input type="checkbox"/> The information collected was not relevant.	<input type="checkbox"/> The information collected was relevant to the topic but was not blended into a cohesive piece of research.	<input type="checkbox"/> The information collected was relevant to the topic and was somewhat organized into a cohesive piece of research.	<input type="checkbox"/> The information collected was relevant to the topic and was carefully organized into a cohesive piece of research.	
Organization of Material	<input type="checkbox"/> The information collected was not organized.	<input type="checkbox"/> The information was somewhat organized.	<input type="checkbox"/> The information was organized and contained recognizable sections.	<input type="checkbox"/> The information was organized and contained recognizable sections that included an introduction, a main body with supporting evidence, and a conclusion that summarized the report.	
Presentation of Material	<input type="checkbox"/> The report was handwritten, contrary to established guidelines.	<input type="checkbox"/> The report was neatly handwritten. <input type="checkbox"/> The report contained a bibliography that was not correctly formatted.	<input type="checkbox"/> The report was typed. <input type="checkbox"/> The report contained graphics. <input type="checkbox"/> The report contained a bibliography that was not correctly formatted.	<input type="checkbox"/> The report was typed and appropriately formatted. <input type="checkbox"/> The report contained a title page. <input type="checkbox"/> The report contained relevant graphics. <input type="checkbox"/> The report contained a complete, correctly formatted bibliography.	

Note: This rubric would vary, depending on the assignment and the presentation format.

Rubric for Assessment of Decision-Making Process Activity

Student Name(s) _____		Topic/Title _____			
Criteria	Performance Levels				
	Level 1	Level 2	Level 3	Level 4	
Identifies STSE Issue	<input type="checkbox"/> Cannot identify an STSE issue without assistance.	<input type="checkbox"/> Shows a basic understanding that an issue could have STSE implications, but does not necessarily differentiate among the areas.	<input type="checkbox"/> Shows a good understanding of a connection between an issue and its STSE applications. <input type="checkbox"/> Shows some awareness of the need for an individual response.	<input type="checkbox"/> Demonstrates excellent depth and sensitivity in connecting an issue with its STSE implications. <input type="checkbox"/> Demonstrates a level of social responsibility.	
Evaluates Current Research on Issue	<input type="checkbox"/> Is able to access a small amount of current research but does not evaluate it.	<input type="checkbox"/> Demonstrates some ability to recognize the positions taken in the research data but makes no clear evaluative statements.	<input type="checkbox"/> Secures an array of research, narrow in its scope, but clearly identifies the positions taken. <input type="checkbox"/> Can offer personal opinions on issue but not necessarily an evaluation.	<input type="checkbox"/> Acquires research that is current, relevant, and from a variety of perspectives. <input type="checkbox"/> Demonstrates insight into the stated positions and can frame an evaluation.	
Formulates Possible Options	<input type="checkbox"/> Is unable to identify the possible options clearly. <input type="checkbox"/> Can formulate options that are not clearly connected to the problem to be solved.	<input type="checkbox"/> Offers at least one feasible option that is connected to the problem. <input type="checkbox"/> Offers other options that may be somewhat related to the problem.	<input type="checkbox"/> Develops at least two feasible options that are internally consistent and directly address the problem. <input type="checkbox"/> Recognizes that some options will fail.	<input type="checkbox"/> Displays a sophisticated understanding of feasible options that is beyond expectations. <input type="checkbox"/> Presents choice of options that demonstrate a reasonable chance of succeeding.	
Identifies Projected Impacts	<input type="checkbox"/> Is unable to foresee the possible consequences of the options selected. <input type="checkbox"/> Appears to have a naive awareness of consequences.	<input type="checkbox"/> Identifies potential impacts of decisions taken in a vague or insubstantial way. <input type="checkbox"/> Views most of the feasible options as having projected impacts.	<input type="checkbox"/> Identifies potential impacts of decisions taken in an organized way. <input type="checkbox"/> Views all the feasible options as having projected impacts: some beneficial, some not.	<input type="checkbox"/> Offers a cost/benefits/risks analysis of each feasible solution. <input type="checkbox"/> Constructs an organized report that clearly outlines the impacts of each option.	

(continued)

Observation Checklist: Scientific Inquiry—Conducting a Fair Test

Names	Demonstrating Safe Work Habits (workspace, handling equipment, goggles, disposal)	Ensuring Accuracy and Reliability (repeating measurements/ experiments)	Observing and Recording (carried out during experiment)	Following a Plan	Showing Evidence of Perseverance and/or Confidence	Comments

Note: A group of students can be selected as a focus for observation on a given day, and/or one or more of the observational areas can be selected as a focus. The emphasis should be on gathering cumulative information over a period of time.

Observation Checklist: Scientific Inquiry—Conducting a Fair Test

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Note: A group of students can be selected as a focus for observation on a given day, and/or one or more of the observational areas can be selected as a focus. The emphasis should be on gathering cumulative information over a period of time.

Lab Report Assessment

Project Title _____ Date _____

Team Members _____

Area of Interest	Possible Points	Self	Teacher
<p>Formulates Testable Questions: Question is testable and focused, and the cause-and-effect relationship is identified.</p>			
<p>Formulates a Prediction/Hypothesis: Independent and dependent variables are identified and the prediction/hypothesis clearly identifies a cause-and-effect relationship between these two variables.</p>			
<p>Creates a Plan: All steps are included and clearly described in a logical sequence. All required materials/equipment are identified. Safety considerations are addressed. Major intervening variables are controlled.</p>			
<p>Conducts a Fair Test and Records Observations: Evidence of repeated trials is presented and all data are included. Detailed data are recorded, and appropriate units are used. Data are recorded in a clear/well-structured/appropriate format for later reference.</p>			
<p>Interprets and Evaluates Results: Patterns/trends/discrepancies are identified. Strengths and weaknesses of approach and potential sources of error are identified. Changes to the original plan are identified and justified.</p>			
<p>Draws a Conclusion: Conclusion explains cause-and-effect relationship between dependent and independent variables. Alternative explanations are identified. Hypothesis is supported or rejected.</p>			
<p>Makes Connections: Potential applications are identified and/or links to area of study are made.</p>			
<p>Total Points</p>			

Rubric for Assessment of Student Presentation

Student Name(s) _____ Topic/Title _____		Performance Levels			
		Level 1	Level 2	Level 3	Level 4
Criteria					
Organization	<input type="checkbox"/> Presentation shows poor organization and lack of preparation. <input type="checkbox"/> Some student preparation is shown.	<input type="checkbox"/> Presentation shows signs of organization, but some parts do not seem to fit the topic. <input type="checkbox"/> A fair amount of student preparation is shown.	<input type="checkbox"/> Presentation is organized, logical, and interesting. <input type="checkbox"/> An adequate amount of student preparation is shown.	<input type="checkbox"/> Presentation is well organized, logical, interesting, and lively. <input type="checkbox"/> A great deal of student preparation is shown.	
Preparation	<input type="checkbox"/> Small amount of material presented is related to the topic.	<input type="checkbox"/> Some material presented is not related to the topic.	<input type="checkbox"/> Almost all material presented is related to the topic.	<input type="checkbox"/> All material presented is related to the topic.	
Language	<input type="checkbox"/> Language used is hard to follow and understand.	<input type="checkbox"/> Some language used is hard to follow and understand.	<input type="checkbox"/> Most language used is easy to follow and understand.	<input type="checkbox"/> Language used is well chosen and is easy to follow and understand.	
Format	<input type="checkbox"/> Poor use of aids and support materials (diagrams, overheads, maps, pictures); few support the topic.	<input type="checkbox"/> Adequate use of aids and support materials; most support the topic.	<input type="checkbox"/> Good use of aids and support materials; almost all support the topic.	<input type="checkbox"/> Excellent use of aids and support materials; all aids support the topic.	
Delivery	<input type="checkbox"/> Many words are unclear or spoken too quickly or slowly; voice is monotonous; no pausing for emphasis; voice is too low to be heard easily.	<input type="checkbox"/> Some words are unclear or spoken too quickly at times; voice is somewhat varied; some pausing for emphasis; voice is sometimes too low to be heard easily.	<input type="checkbox"/> Most words are clear and generally spoken at the correct speed; voice is often varied and interesting; frequent pausing for emphasis; voice is loud enough to be heard easily.	<input type="checkbox"/> Words are clear and generally spoken at the correct speed; voice is frequently varied and interesting; effective pausing for emphasis; voice is loud enough to be heard easily.	
Audience	<input type="checkbox"/> Audience is not involved or interested.	<input type="checkbox"/> Audience is somewhat involved, and sometimes interested.	<input type="checkbox"/> Audience is involved and interested.	<input type="checkbox"/> Audience is very involved and interested.	

Note: The above criteria are suggestions only, and will need to be adapted in collaboration with students according to the purpose of the assignment.

Rubric for Assessment of Class Presentation

Student Name(s) _____		Topic/Title _____			
Criteria	Performance Levels				
	Level 1	Level 2	Level 3	Level 4	
Content	<ul style="list-style-type: none"> <input type="checkbox"/> No understanding of the topic was evident. 	<ul style="list-style-type: none"> <input type="checkbox"/> Basic understanding of the topic was evident. <input type="checkbox"/> No attempt was made to relate material presented to students' own experiences. 	<ul style="list-style-type: none"> <input type="checkbox"/> Good understanding of the topic was evident. <input type="checkbox"/> Knowledge was thorough and detailed. <input type="checkbox"/> Attempt was made to relate material presented to students' own experiences. 	<ul style="list-style-type: none"> <input type="checkbox"/> Excellent depth of understanding was evident. <input type="checkbox"/> Material presented went beyond what was required. Excellent research. <input type="checkbox"/> Material presented related to students' own experiences. 	
Interest and Enthusiasm	<ul style="list-style-type: none"> <input type="checkbox"/> Presenter(s) displayed little interest in and enthusiasm for the topic of the presentation. <input type="checkbox"/> The class conveyed limited attentiveness during the presentation. 	<ul style="list-style-type: none"> <input type="checkbox"/> Presenter(s) showed some interest in and enthusiasm for the topic. <input type="checkbox"/> The class showed some attentiveness during the presentation. 	<ul style="list-style-type: none"> <input type="checkbox"/> Presenter(s) clearly showed interest in and enthusiasm for the topic. <input type="checkbox"/> The class was noticeably attentive during the presentation. 	<ul style="list-style-type: none"> <input type="checkbox"/> Presenter(s) showed exceptional interest in and enthusiasm for the topic. <input type="checkbox"/> The class was keenly attentive during the presentation. 	
Clarity and Organization of Material	<ul style="list-style-type: none"> <input type="checkbox"/> The information presented was confusing. 	<ul style="list-style-type: none"> <input type="checkbox"/> The information presented was somewhat vague. <input type="checkbox"/> The presentation reflected some organization. 	<ul style="list-style-type: none"> <input type="checkbox"/> The information was clearly presented. <input type="checkbox"/> The presentation was well organized. 	<ul style="list-style-type: none"> <input type="checkbox"/> All information was relevant and clearly presented. <input type="checkbox"/> The presentation was exceptionally well organized. <input type="checkbox"/> Main points were emphasized and reinforced with appropriate examples. 	
Use of Visual Aids	<ul style="list-style-type: none"> <input type="checkbox"/> Visual aids were not used. 	<ul style="list-style-type: none"> <input type="checkbox"/> A few visual aids were used. <input type="checkbox"/> Visual aids were not well done. <input type="checkbox"/> Visual aids used were somewhat relevant to the presentation. 	<ul style="list-style-type: none"> <input type="checkbox"/> Visual aids were used. <input type="checkbox"/> Visual aids were quite well done. <input type="checkbox"/> Visual aids were relevant to the presentation. 	<ul style="list-style-type: none"> <input type="checkbox"/> Strong visual aids were used with care. <input type="checkbox"/> Visual aids were clear and exceptionally well done, showing effective use of colour. <input type="checkbox"/> Visual aids were designed to emphasize and strengthen the presentation and were successful. 	

Note: This rubric would vary according to the assignment and the presentation format.

Rubric for Assessment of Research Skills

Research Skills	Performance Levels			
	Level 1	Level 2	Level 3	Level 4
Ability to formulate questions to identify problems for research purposes	<input type="checkbox"/> Shows limited ability	<input type="checkbox"/> Shows some ability	<input type="checkbox"/> Shows general ability	<input type="checkbox"/> Shows consistent and thorough ability
Ability to locate relevant primary and secondary sources of information	<input type="checkbox"/> Unable to locate	<input type="checkbox"/> Somewhat able to locate	<input type="checkbox"/> Generally able to locate	<input type="checkbox"/> Always or almost always able to locate
Ability to locate and record relevant information from a variety of sources	<input type="checkbox"/> Unable to locate and record	<input type="checkbox"/> Somewhat able to locate and record	<input type="checkbox"/> Generally able to locate and record	<input type="checkbox"/> Always or almost always able to locate and record
Ability to organize information related to identified problem(s)	<input type="checkbox"/> Shows limited ability	<input type="checkbox"/> Shows some ability	<input type="checkbox"/> Shows general ability	<input type="checkbox"/> Shows consistent and thorough ability
Ability to analyze and synthesize information related to identified problems	<input type="checkbox"/> Shows limited ability	<input type="checkbox"/> Shows some ability	<input type="checkbox"/> Shows general ability	<input type="checkbox"/> Shows consistent and thorough ability
Ability to communicate results of inquiries using a variety of appropriate presentation forms (oral, media, written, graphic, pictorial, other)	<input type="checkbox"/> Unable to communicate	<input type="checkbox"/> Somewhat able to communicate	<input type="checkbox"/> Generally able to communicate	<input type="checkbox"/> Always or almost always able to communicate

Note: This rubric would vary according to the assignment and the presentation format.

Rubric for Assessment of Scientific Inquiry

Student Name(s) _____ Topic/Title _____

Criteria	Performance Levels			
	Beginning 1	Developing 2	Accomplished 3	Exemplary 4
Position Statement/ Proto-Abstract (Not intended to be an abstract in the style and purpose of scientific journals)	The student <input type="checkbox"/> does not discuss the relevance of the inquiry	The student <input type="checkbox"/> offers some discussion but no clear explanation of the importance or goals of the inquiry	The student <input type="checkbox"/> discusses the importance of the inquiry but not its relationship to the curriculum or to the real world	The student <input type="checkbox"/> clearly summarizes the inquiry, highlights relevant information, and makes critical connections
Objective/Purpose/ Testable Question (Formulation of scientific questions and hypotheses)	<input type="checkbox"/> omits an objective/purpose, or states an objective not relevant to the problem under investigation	<input type="checkbox"/> states an objective that is not a hypothesis or a testable question, but identifies variables to be investigated	<input type="checkbox"/> states a testable question related to the problem, and identifies variables to be investigated	<input type="checkbox"/> clearly states a testable hypothesis that addresses the problem, and clearly delineates the variables to be tested
Procedure (Design of the investigation)	<input type="checkbox"/> does not outline reproducible steps in the procedure <input type="checkbox"/> shows some use of methodology, but no account of experimental or systematic error	<input type="checkbox"/> outlines clear, ordered steps in the procedure <input type="checkbox"/> identifies need for treatment of variables, but does not state how this will be achieved	<input type="checkbox"/> outlines clear, ordered steps in the procedure <input type="checkbox"/> identifies need for treatment of <i>specific</i> variables, and states how this will be achieved	<input type="checkbox"/> outlines clear, ordered steps in the procedure <input type="checkbox"/> identifies need for treatment of <i>specific</i> variables, and states how this will be achieved <input type="checkbox"/> provides a concise summary of the procedure
Data Collection	<input type="checkbox"/> collects some data that can be traced to the investigation itself, but data are inaccurate and incomplete	<input type="checkbox"/> provides reasonably complete data, organized in tabular form (+/- titles) <input type="checkbox"/> gives no indication of use of basic accuracy and precision techniques (e.g., significant figures)	<input type="checkbox"/> provides complete data, organized in tabular form (+/- titles) <input type="checkbox"/> demonstrates some use of basic accuracy and precision techniques (e.g., significant figures)	<input type="checkbox"/> provides complete data with error analysis, organized in tabular form (+/- titles) <input type="checkbox"/> demonstrates use of basic accuracy and precision techniques (e.g., significant figures)

(continued)

Rubric for Assessment of Scientific Inquiry (continued)

Student Name(s)	Topic/Title			
	Performance Levels			
Criteria	Beginning 1	Developing 2	Accomplished 3	Exemplary 4
Analysis and Interpretation of Results	<ul style="list-style-type: none"> <input type="checkbox"/> provides improper, incomplete graphical representation of data <input type="checkbox"/> attempts no "fit" for plotted data <input type="checkbox"/> requires abundance of supervision 	<ul style="list-style-type: none"> <input type="checkbox"/> provides proper graphical representation of data <input type="checkbox"/> attempts to fit a <i>linear</i> regression line to data <input type="checkbox"/> ensures axes are labelled correctly and positioned consistently with identified variables 	<ul style="list-style-type: none"> <input type="checkbox"/> provides proper graphical representation of data in a variety of forms <input type="checkbox"/> shows some evidence of mastery in fitting a <i>non-linear</i> regression line to data, and states <i>slope</i> and <i>y-intercept</i> <input type="checkbox"/> ensures axes are labelled correctly and positioned consistently with identified variables <input type="checkbox"/> demonstrates understanding of how variables relate to a model equation 	<ul style="list-style-type: none"> <input type="checkbox"/> provides proper graphical representation of data in a variety of forms <input type="checkbox"/> shows evidence of mastery in fitting a <i>non-linear</i> regression line to data, and states <i>slope</i> and <i>y-intercept</i> <input type="checkbox"/> ensures axes are labelled correctly and positioned consistently with identified variables <input type="checkbox"/> demonstrates understanding of how variables relate to a model equation
Application/ Discussion of Scientific Results and Concepts	<ul style="list-style-type: none"> <input type="checkbox"/> attempts to explain inquiry results in terms of random error alone ("where I went wrong") <input type="checkbox"/> makes inaccurate, improper, or no conclusions based on data 	<ul style="list-style-type: none"> <input type="checkbox"/> attempts to connect inquiry results with model systems encountered in class experience <input type="checkbox"/> identifies where systematic error may have caused problems 	<ul style="list-style-type: none"> <input type="checkbox"/> draws accurate and detailed comparison between the system under investigation and what could occur in an ideal system <input type="checkbox"/> makes use of introductory statistical analyses <input type="checkbox"/> identifies "outliers" in data set(s) 	<ul style="list-style-type: none"> <input type="checkbox"/> draws accurate and detailed comparison between the system under investigation and what could occur in an ideal system <input type="checkbox"/> uses a range of statistical analyses <input type="checkbox"/> identifies "outliers" in data set(s)
Independence Factors (Reliance on assistance)	<ul style="list-style-type: none"> <input type="checkbox"/> requires extensive assistance from text sources and classmates to do inquiry tasks <input type="checkbox"/> requires constant teacher supervision 	<ul style="list-style-type: none"> <input type="checkbox"/> requires little assistance to complete inquiry tasks <input type="checkbox"/> is able to internalize teacher intervention, and work independently afterward 	<ul style="list-style-type: none"> <input type="checkbox"/> requires no assistance to complete inquiry tasks <input type="checkbox"/> demonstrates cooperation with partners <input type="checkbox"/> resists efforts of others to assist 	<ul style="list-style-type: none"> <input type="checkbox"/> requires no assistance to complete inquiry tasks <input type="checkbox"/> demonstrates cooperation with partners <input type="checkbox"/> seeks opportunities to discuss procedures and results with others