

Identify the Type of Project		
Project Category ( <i>Project must meet 2 of the 4 criteria</i> )		
___ Science	___ Technology	___ Engineering ___ Math
Experiment	Innovation	Case Study
<i>Undertake an investigation to test a scientific hypothesis by the experimental method. At least one independent variable is manipulated; other variables are controlled</i>	<i>Develop and evaluate new devices, models, theorems, physical theories, techniques, or methods in technology, engineering, computing, natural sciences, or social science.</i>	<i>Analysis of, and possibly collections of, data using accepted methodologies from the natural, social, biological, or health sciences. Includes studies involving human subjects. biology field studies, data mining, observation and pattern recognition in physical and/or socio-behavioral data</i>
Level 1 (Working Below)		
Replicate a known experiment to confirm previous findings	Build a model or device or device to duplicate existing technology or to demonstrate a well-known physical theory or social/behavioral intervention.	Existing published material is presented, unaccompanied by any analysis.
Level 2 (Approaching)		
Extend a known experiment with modest improvements to the procedures, data gathering and possible applications	Improve or demonstrate new applications for existing technological systems, social or behavioral interventions, existing physical theories or equipment, and justify them.	Existing published material is presented, accompanied by some modest analysis <b>and/or</b> a rudimentary study is undertaken that yields limited data that cannot support an analysis leading to meaningful results.
Level 3 (Meeting)		
Devise and carry out an original experiment. Identify the significant variables and attempt to control them. Analyse the results using appropriate arithmetic, graphical or statistical methods.	Design and build innovative technology; or provide adaptations to existing technology or to social or behavioral interventions; extend or create new physical theory. Human benefit, advancement of knowledge, and/or economic applications should be evident	The study is based on systematic observations and a literature search. <b>Quantitative studies</b> should include appropriate analysis of some significant variable(s) using arithmetic, statistical, or graphical methods. <b>Qualitative and/or mixed methods studies</b> should include a detailed description of the procedures and/or techniques applied to gather and/or analyse the data (e.g. interviewing, observational fieldwork, constant comparative method, content analysis)
Level 4 (Exceeding)		
Devise and carry out original experimental research in which most significant variables are identified and controlled. The data analysis is thorough and complete	Integrate several technologies, inventions or design and construct an innovative application that will have human and/or commercial benefit.	The study correlates information from a variety of peer-reviewed publications and from systematic observations, and reveals significant new information, or original solutions to problems. Same criteria for analysis of significant variables and/or description of procedures/techniques as for Level 3

<b>Science Concept - Testable Question</b>			
<b><i>Exceeding - 4</i></b>	<b><i>Meeting - 3</i></b>	<b><i>Approaching - 2</i></b>	<b><i>Working Below - 1</i></b>
Testable and measurable/observed using specific language	Testable (VT) and measurable/observed (VM) form but not specific (may use "better" or "improve")	Scientific question that includes the variable to test	Any other answer
Achievement Indicators: - Write questions using language that suggest an investigation - Develop testable question that indicate the variable to test (independent variable) - Develop testable question that indicate the variable to measure (dependent variable)			

<b>Science Concept - Identifying Variables</b>			
<b><i>Exceeding - 4</i></b>	<b><i>Meeting - 3</i></b>	<b><i>Approaching - 2</i></b>	<b><i>Working Below - 1</i></b>
Depending on the complexity of the investigation, most or all of the necessary variable are controlled and described in detail	Depending on the complexity of the investigation, most or all of the necessary variables are controlled	Only controlling some of the relevant variables	Any other answer
		Controlling variables that are not relevant to the investigation	
	Students identify on Variable to test (independent) that fits the question	Students identify on Variable to test (independent) not relevant to the question	Any other answer
	Students identify on Variable to measure (dependent) that fits the question	Students identify on Variable to measure (dependent) not relevant to the question	Any other answer
Achievement Indicators: - Distinguish between what is tested, what is measured/observed and what is controlled - Identify one variable to test (independent), one variable to measure/observe (dependent) with all other variables controlled - Collect evidence relevant to the relationship of the independent and dependent variable			

<b>Science Concept - Prediction</b>			
<b><i>Exceeding - 4</i></b>	<b><i>Meeting - 3</i></b>	<b><i>Approaching - 2</i></b>	<b><i>Working Below - 1</i></b>
Make a prediction which is: - relevant to the question - Testable - Includes a reason and is explained in detail	Make a prediction which is: - relevant to the question - Testable - Includes a reason	Make a prediction including a reason which may be relevant but is not clearly expressed	Make a prediction but the justification is missing or irrelevant
			Any other answer
Achievement Indicators: - Write a prediction statement that is testable; may be general and not specific enough to measure (e.g., better, bigger) - Write a prediction statement with a reason, based on an observed pattern (may come from personal experiences outside school)			

## Science Concept - Designing Investigations

<i><b>Exceeding - 4</b></i>	<i><b>Emerging - 1</b></i>	<i><b>Developing -2</b></i>	<i><b>Proficient - 3</b></i>
<p>Students can independently:</p> <ul style="list-style-type: none"> <li>- procedures have a set of steps to test a single question</li> <li>- procedural design minimizing experimental bias</li> <li>- procedural design uses multiple trial to increase accuracy (if appropriate)</li> <li>- procedures are detailed enough to be repeated by someone else</li> <li>- procedure identifies needed equipment and materials</li> <li>- procedure identifies relevant measurements and/or observations to be made</li> <li>- procedure has one variable to test and one variable to measure and is written in a way that controls other major variables</li> </ul>	<p>Students can independently:</p> <ul style="list-style-type: none"> <li>- procedures have a set of steps to test a single question</li> <li>- procedures are detailed enough to be repeated by someone else</li> <li>- procedure identifies needed equipment and materials</li> <li>- procedure identifies relevant measurements and/or observations to be made</li> <li>- procedure has one variable to test and one variable to measure and is written in a way that controls other major variables</li> </ul>	<p>Students can independently:</p> <ul style="list-style-type: none"> <li>- procedures have a set of steps to test a single question</li> <li>- procedures are detailed enough to be repeated by someone else</li> <li>- procedure identifies needed equipment and materials</li> <li>- procedure identifies relevant measurements and/or observations to be made</li> <li>- procedure has one variable to test and one variable to measure and is written in a way that controls other major variables</li> </ul>	<p>Any other answer</p>
<p>Student may require support with:</p> <ul style="list-style-type: none"> <li>- procedural design uses multiple trial to increase accuracy (if appropriate)</li> </ul>		<p>students require support with other achievement indicators</p>	
<p>Achievement Indicators:</p> <ul style="list-style-type: none"> <li>- Plan procedures with a set of steps to test a single question</li> <li>- Plan procedures with enough detail they can be repeated by someone else</li> <li>- Plan procedures identifying needed equipment and materials</li> <li>- Plan procedures with one variable to test and one variable to measure and write it in a way to control other major variables</li> <li>- Plan procedures identifying relevant measurements and/or observations to be made</li> <li>- Plan procedures to use multiple trials to increase accuracy, if appropriate</li> </ul>			

## Science Concept - Displaying Relevant Data

<i><b>Exceeding - 4</b></i>	<i><b>Meeting - 3</b></i>	<i><b>Approaching - 2</b></i>	<i><b>Proficient - 3</b></i>
<p>Charts and graphs having all appropriate titles and labels and information correctly plotted including proper X and Y axis (convention in science is for IV on X axis and DV on Y axis)</p>	<p>Charts and graphs having all appropriate titles and labels and information correctly plotted</p>	<p>Data or information needed to be plotted correctly but a minor error in the labels may occur</p>	<p>Any other answer</p>

Sample bar graph:



### Science Concept - Displaying Relevant Data

Achievement Indicators:

-Use of charts or graphs

- a. Graphs require data to be correctly displayed, correct scale, appropriate labels (x and y axis), and an overall title
- b. charts include all necessary headings and units

### Science Concept - Drawing Conclusions

<b>Exceeding - 4</b>	<b>Meeting - 3</b>	<b>Approaching - 2</b>	<b>Working Below - 1</b>
<ul style="list-style-type: none"> <li>- Is relevant to initial question and prediction</li> <li>- States whether data supports or refutes initial prediction</li> <li>- Conclusion states a relationship between variables and supporting evidence</li> <li>- Demonstrates analysis of data trends and relationships</li> <li>- Must include suggestions to improve experimental design</li> <li>- Compares findings to other similar investigations</li> </ul>	<ul style="list-style-type: none"> <li>- Is relevant to initial question and prediction</li> <li>- States whether data supports or refutes initial prediction</li> <li>- Conclusion states a relationship between variables and supporting evidence</li> <li>- Demonstrates analysis of data trends and relationships</li> <li>- May include suggestions to improve experimental design</li> </ul>	<ul style="list-style-type: none"> <li>- Is relevant to initial question and prediction</li> <li>- States whether data supports or refutes initial prediction</li> <li>- Restates only the recorded results or is a result of flawed reasoning</li> </ul>	Any other answer

Achievement Indicators:

- Make a conclusion that answers the initial question
- Include a statement that their data either support or refutes their initial prediction
- Justify this claim by providing evidence from collected data

### Oral Presentation

<b>Exceeding - 4</b>	<b>Meeting - 3</b>	<b>Approaching - 2</b>	<b>Working Below - 1</b>
Student gives a clear, logical, enthusiastic presentation about the topics. Student is able to respond to high level thinking questions related to the topic	Student gives a clear, logical, enthusiastic presentation about the topic. Student is able to answer general questions related to the topic	Student gives a somewhat clear/logical presentation about the topic. Student is able to answer rudimentary questions about the topic	Student gives a rehearsed presentation but cannot elaborate much on questions related to the topic.

### Visual Display

<b>Exceeding - 4</b>	<b>Meeting - 3</b>	<b>Approaching - 2</b>	<b>Working Below - 1</b>
The layout of the display flows in a logical manner. The exhibit is attractive and self-explanatory. The most relevant information is what is keyed on.	The layout of the display flows in a logical manner. The exhibit is attractive and self-explanatory	All elements of the scientific method related to the project type are present but display is convoluted. Physical demonstrations distract from key findings	A standard scientific method is displayed but may not include all key science skills and/or a physical demonstration is the focus