

Rubrics



Experimental Project Rubric (4th-12th grade)

All projects must clearly distinguish between your work and thoughts and the work and thoughts of others. Students participating in a research opportunity in industry, a university, hospital, or institution other than their school, must explain what is their research in the log book vs. information given by professionals. Higher points will be awarded for depth of scientific thinking and thoroughness of descriptions. **Rubric is 56 points total.**

| | Exemplary | Accomplished | Developing | Beginning |
|---|---|---|---|---|
| Research Question and Hypothesis 8 total points | RQ is descriptive and relates to a unique or original contribution to the field of study. RQ is testable. | RQ is descriptive and contributes to the field of study. RQ is testable. | RQ is identified and may contribute to the field of study. RQ may be answered with or without testing (i.e. observational study) | RQ is identified. RQ may be answered without testing (i.e. observational study). |
| | 4 | 3 | 2 | 1 |
| | Hypothesis is testable and proposes a tentative explanation for the RQ based on research and/or prior knowledge. A prediction is made about the experimental outcome. | Hypothesis proposes a tentative explanation for the RQ. A prediction is made about the experimental outcome. | A prediction is made about the experimental or study outcome based on research and/or prior knowledge. | A prediction is made about the study outcome. |
| | 4 | 3 | 2 | 1 |
| | Notes: Depth and breadth of research question (RQ) and hypothesis should take into consideration the students grade level. A hypothesis is an idea about how something works (tentative explanation) that can be tested using experiments. A prediction says what will happen in an experiment if the hypothesis is correct. | | | |
| Experimental Design 12 total points | Imaginative and/or unique design identifies and defines variables and controls and should yield valid, reliable, and accurate data. Controls are relevant to experiment. | Design identifies and defines variables and controls and should yield accurate data. Controls are relevant to experiment. | Design identifies variables and controls and may yield accurate data. | Design identifies an experimental group or groups and may yield accurate data. |
| | 4 | 3 | 2 | 1 |

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| Experimental Design (continued) | Number of trials is considered and explained . Data collected will serve as a basis for evidence to answer RQ. | Number of trials is considered. Data collected will serve as a basis for evidence to answer RQ. | Number of trials is considered. Data collected relates to the answer RQ. | Data collected relates to the RQ. |
| | 4 | 3 | 2 | 1 |
| | Methods are systematic and can be replicated, are step by step, and easy to understand. Methods include explanation of data analysis. | Methods can be replicated, are step by step, and/or easy to understand. Methods include a description of data analysis. | Methods are generally described and outlined. Methods focus on data collection and may mention data analysis. | Methods are generally described. Methods focus on data collection. |
| | 4 | 3 | 2 | 1 |
| | Notes: <i>Variable sampling techniques, data collection, and data analysis methods are appropriate for the problem and grade level of the student. Any level of assistance that a student receives should be clearly identified by the student. Data analysis can include logical reasoning, mathematics, or computation.</i> | | | |
| Conclusion 12 total points | Data is interpreted and logical conclusions are drawn and justified using evidence (relevant data) from the study. | Data is interpreted and logical conclusions are drawn using evidence (relevant data) from the study. | Data is described . Conclusions, if drawn, generally relate to data in study. | Data may be identified . Conclusions, if drawn, simply relate to data in the study or to the field of study in general. |
| | 4 | 3 | 2 | 1 |
| | Conclusions directly address the RQ and hypothesis. | Conclusions connect to the RQ and hypothesis | Conclusions generally relate to RQ and hypothesis or prediction. | Conclusions connect to the field of study or other areas of interest |
| | 4 | 3 | 2 | 1 |
| | How conclusions relate to the field of study and/or real world applications is explained and described . Learning from project completion is explained and described . | How conclusions relate to the field of study and/or real world applications is described . Learning from project completion is described . | How conclusions relate to the field of study and/or real world applications is identified . Learning from project completion is identified | How conclusions relate to the field of study or real world application <i>may be simply identified</i> . Learning from project completion <i>may be identified</i> . |
| | 4 | 3 | 2 | 1 |
| Note: <i>Students interpret data after data analysis to identify patterns or relationships especially related to the RQ. Interpretation of data is appropriate for a student's grade level (i.e. middle and high school students may consider limitations in their data analysis such as measurement error, but this is not expected of younger students). A data description would be restating data rather than finding patterns or meaning (interpretation).</i> | | | | |

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| Display (Communicating Scientifically) 12 total points | Study sections are identified and logically organized. Text is appropriate for communicating scientifically and vocabulary is specific to the field of study. | Study sections are identified and organized. Text is appropriate for communicating scientifically and vocabulary is specific to the field of study. | Study sections are identified. Text is descriptive and errors do not detract from meaning or understanding. | Study sections are included. Text is general and errors do not detract from meaning or understanding |
| | 4 | 3 | 2 | 1 |
| | Patterns and relationships are revealed from data represented in tables and graphical displays. Data displays clearly support the conclusion. | Patterns are revealed from data represented in tables and graphical displays. Data displays support the conclusion. | Results are displayed visually and/or numerically and generally support the conclusion. | Results are displayed visually or numerically with unclear connections to the conclusion. |
| | 4 | 3 | 2 | 1 |
| | Independent and imaginative approach uses color for emphasis and visuals that add to depth and clarity of conclusion. | Independent and imaginative approach uses color for emphasis and visuals that promote understanding of the conclusion. | Imaginative approach uses color and/or visuals that relate to the conclusion. | Approach uses color and/or visuals that may relate to the conclusion or field of study. |
| | 4 | 3 | 2 | 1 |
| Notes: "Independent" is defined as independent from adult support. Some projects may be collaborative among students. Visual displays can include but are not limited to drawings, photos, flowcharts , graphs , and/or diagrams (schematics) that reveal patterns, explain ideas, and show relationships. Communicating scientifically includes communicating clearly and persuasively student generated ideas. | | | | |
| Logbook (Communicating Scientifically) 12 points total | Original scientific thinking and process is communicated in detail and is descriptive and thorough. Thoughts, ideas, observations, revisions and actions are included. Research notes and bibliography with at least 3 varied sources (i.e. interview, website). | Scientific thinking and process is communicated in detail and is descriptive. Thoughts, ideas, observations, revisions and actions are included. Research notes and bibliography with 3 sources (i.e. websites) | Scientific thinking and process is communicated and is descriptive. Some thoughts, ideas, observations, revisions and actions are included. Research notes and bibliography, some sources noted. | Scientific thinking and process is communicated. Some thoughts, ideas, observations, revisions and actions are included. Research notes and/or bibliography may be included. |
| | 4 | 3 | 2 | 1 |

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| Logbook (continued) | <p>Entries include clearly labeled and organized data tables with raw data and trials.</p> <p>IV, DV groups and controls or constant factors are clearly labeled or identified.</p> | <p>Entries include labeled data tables with raw data and trials.</p> <p>IV, DV groups and controls or constant factors are labeled or identified.</p> | <p>Entries include data tables with most raw data and most trials.</p> <p>IV, DV groups and controls or constant factors may be labeled or identified in some entries.</p> | <p>Entries include raw data.</p> <p>IV, DV groups and controls or constant factors may be labeled or identified in some entries.</p> |
| | 4 | 3 | 2 | 1 |
| | <p>Entries are clearly labeled and logically organized with dates and times.</p> | <p>Entries are labeled with dates and times.</p> | <p>Most entries are labeled with dates and times</p> | <p>Some entries are labeled with dates and times</p> |
| | 4 | 3 | 2 | 1 |
| | <p>Notes: <u>Variable</u>s can be abbreviated with IV = Independent Variable and DV= Dependent Variable.</p> <p style="text-align: center;"><i>Highlighted sections relate to 6th-12th grade projects only.</i></p> | | | |