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| **Explanation** | **1** | **2** | **3** | **4** |
| * Students clearly explain a phenomenon, including a grade-appropriate level of the mechanism involved. | Statement of incorrect phenomenon or no description was produced | Statement of correct phenomenon without description | Incomplete description of phenomenon or description has errors | Complete description of the phenomenon without errors |
| **Evidence to construct or support the explanation** | **1** | **2** | **3** | **4** |
| * Students cite evidence to support the explanation. The evidence can come from student-generated data or from other sources, such as observations, reading material, or archived data. The evidence needs to be both appropriate and sufficient to support the explanation. | No citing of evidence to support their explanation. Irrelevant/missing evidence. | Cites some evidence that supports their explanation, but all/some may not be appropriate for explanation. | Cites evidence that is mostly appropriate and mostly sufficient to support the explanation. | Cites evidence that is appropriate and sufficient to support the explanation. |
| **Reasoning to connect the evidence to construct or support the explanation** | **1** | **2** | **3** | **4** |
| * Students describe the reasoning that connects the evidence to phenomena, including scientific background knowledge, scientific theories, or models as appropriate. | Poor/no description of reasoning that lacks connection to the appropriate scientific evidence or models to the phenomena. | A description of reasoning that somewhat connects the appropriate scientific evidence or models to the phenomena. | A description of reasoning that mostly connects the appropriate scientific evidence or models to the phenomena. | A complete description of reasoning that connects the appropriate scientific evidence or models to the phenomena. |

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| **Using Scientific Knowledge to generate the design solution** | **1** | **2** | **3** | **4** |
| **Using Scientific knowledge to generate the design solutions** | **1** | **2** | **3** | 4 |
| * In the design, students identify the scientific information (principles, theories, evidence) that is related to the problem. | Incomplete and/or inaccurate of the scientific information related to the problem. | A somewhat complete and /or inaccurate identification of the scientific information related to the problem. | Mostly complete and accurate identification of the scientific information related to the problem. | Completely and accurately identifies the scientific information related to the problem. |
| * Describe a solution(s) to the problem. | Incomplete, unreasonable, and/ or lacking detail in the description of the problem. | A somewhat reasonable description of the problem with some details. | A reasonable description of the problem with details. | A detailed and reasonable description of possible solutions to the given problem. |
| * Specify how the design solutions(s) uses the scientific information to address the problem. | The solution uses little or no scientific information to address the problem. | The solution lacks sufficient scientific information to address the problem. | The solution uses sufficient scientific information to address the problem. | The solution uses more than sufficient scientific information to address the problem. |
| **Describing Criteria and Constraints, including quantification when appropriate** | **1** | **2** | **3** | **4** |
| * Students describe the criteria and constraints for the problem based on the factors presented in the problem and any resource considerations. | Criteria and constraints for the problem are incomplete/not described. | Criteria and constraints for the problem are somewhat described. | Criteria and constraints for the problem are mostly described. | Criteria and constraints for the problem are fully described. |
| * Students describe the rationale for which criteria should be given highest priority if tradeoffs must be made. | Description includes a ranking of criteria with little to no explanation as to its priority. | Description includes a ranking of criteria with some details as to its priority. | Description includes a ranking of criteria with some details as to its priority. | Description includes a ranking of criteria with a detailed explanation as to its priority. |
| **Evaluating Potential Solutions** | **1** | **2** | **3** | **4** |
| * Students evaluate the design solution(s) systematically by analyzing how the solution meets each criterion and constraint described. | Little to no analysis of how the solution meets each criterion and constraints given. | A partial analysis of how the solution meets some criterion and constraints given. | An analysis of how the solution meets most criterion and constraints given. | An analysis of how the solution meets each criterion and constraints given. |
| **Refining the Design Solution** | **1** | **2** | **3** | **4** |
| * Students modify the solution(s) based on the results from the evaluation. | Little to no modifications of the solution based on the results of the evaluation. | Some modifications of the solution based on the results of the evaluation. | Several modifications of the solution based on the results of the evaluation. | Modification of the solution based on the results of the evaluation. |