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| **Components of a Model****\*Using a Model** | **1** | **2** | **3** | **4** |
| * Students identify and describe all of the essential variables or factors (components) for the phenomenon being modeled
* When appropriate, students describe the limitations of the model.
 | Students incorrectly identify essential variables or factors of the model.Students do not describe any limitations of the model. | Students correctly identify some essential variables or factors of the model.Students describe some limitations of the model. | Students correctly identify all of the essential variables or factors of the model.Students describe all limitations of the model. |  |
| **Relationships** | **1** | **2** | **3** | **4** |
| * Students describe how components of the model relate and/or interact with each other within the system being modeled.
 | Students do not relate the components of the model. | Students relate some of the components of the model. | Students correctly describe how all components of the model interact with each other. |  |
| **Connections** | **1** | **2** | **3** | **4** |
| * Students use reasoning to connect the components and relationships within the model to real world

phenomena or scientific theories. | Students do not relate the components and relationships of the model to the real world or scientific theories. | Students relate some of the components and relationships of the model to the real world or scientific theories. | Students relate all components and relationships of the model to the real world or scientific theories. |  |
| * Students use the model to describe and/or make predictions about phenomena.
 | Students use the model incorrectly and/or make incorrect predictions about phenomena. | Student use the model to make some correct predictions about phenomena. | Students correctly use the model to describe and/or make predictions about phenomena. |  |
| * Students use their understanding of the limitations of the model when describing or predicting

phenomena. | Students use no understanding of limitations of the model when predicting phenomena. | Students use limited understanding of the model when predicting phenomena. | Students correctly use the limitations of the model when describing or predicting phenomena. |  |
| **\*Developing a Model** | **1** | **2** | **3** | **4** |
| * Students develop a model (e.g., conceptual, physical) for a phenomenon or scientific theory that includes of the attributes above.
 | Students develop an irrelevant model for a phenomenon. | Students develop and incomplete model for a phenomena that includes the attributes above. | Students develop a complete model for a phenomena that includes the attributes above. |  |