 **Rubric for Student’s Scientific Modeling** (DRAFT) — base elements plus optional ones based on instruction

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| **Base Scoring Elements** | Not Yet | Approaches Expectations | Meets Expectations | Advanced |
| 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
| **1) Explains Phenomena:** Does my model explain the phenomenon?  | Model does not explain the phenomenon of the investigation.  |  | Model includes some of the relevant parts of the model to explain what *caused* the phenomena. Model might include text and diagrams. |  | Model connects all relevant components and relationships (observable and unobservable) of the model to explain what *caused* the phenomena. Model includes text and diagram(s) to describe model pieces and processes.  |  | Model includes the relevant parts of the model to explain what caused the phenomena (as in Level 3)—as well as additional components and relationships that fit the scientific model.  |
| **2) Fits with Evidence:** Does my model fit with the evidence collected?  | Evidence is not correctly related to the model.  |  | Model correctly incorporates some of the evidence collected through the investigations.  |  | Model refers to a sufficient amount of relevant evidence collected through the investigations to be compelling.  |  | Model fits with all of the evidence collected and additional evidence that could be collected is described.  |
| **3) Builds on Science Ideas:** Does my model incorporate established scientific ideas?  | Model does not include relevant science ideas.  |  | Model includes some of the essential concepts to explain the phenomena—but not all that are needed. |  | Model includes essential disciplinary science concepts AND crosscutting concepts needed to explain the phenomena.  |  | Model includes essential science concepts and other relevant science ideas.  |
| **4) Clarity of Communication:** Would someone else be able to understand my model?  | Model is not clearly described.  |  | Model is somewhat clearly described.  |  | Model is clearly explained in a way that allows others to understand how and why the phenomenon happens. Diagram and text include agreed-upon AND personally compelling conventions for representation. |  | Model is clearly described and additional communication or educational pieces are included for the audience.  |
| **5) Generality:** Can my model be used to explain related phenomena?  | Model is not related to phenomena beyond the focal phenomenon.  |  | Description of the model is applied to the phenomenon of the investigation and an attempt is made to another.  |  | Model-based explanation is applied to the phenomenon of the investigation and one other that is directly parallel or about a broader natural system.  |  | Description of the model is applied to the phenomenon of the investigation, a parallel phenomenon AND some other natural system. |
| **6) Considers Others’ Ideas:** Did I consider how other people might explain the phenomenon?  | Model does not consider the ideas of others.  |  | Models mentions how it is different from the ideas of others.  |  | Model-based explanation considers alternative explanations for the phenomenon and clearly highlights why my model provides a better explanation.  |  | Model considers alternative explanations of others, highlights why my model is better and provides evidence for that. |
| **7) Personal Connection:** Did I show that I have local or personal connection to the model I created?  | Model does not describe a personal or community connection.  |  | I describe how the model relates to my personal interests, those of my community, or the broader world. |  | I describe how the model relates to my personal or local interests, those of my community, AND the broader world.  |  | I explain how someone (myself, someone in my community, and/or a scientist) could use my model to address an issue or problem.  |

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| **Optional Scoring Elements Based on Instructional Focus** | Not Yet | Approaches Expectations | Meets Expectations | Advanced |
| 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
| **8) Revising My Model:** Do I describe how I have refined my model based on new evidence and/or my developing understanding?  | I vaguely explained how I changed my model but did not connect my changes to evidence. Or I did not revise my model.  |  | I explain how I changed my model to better explain what caused the phenomenon, but only loosely connected my changes to evidence. |  | I explain how I changed my model to better explain what caused the phenomenon as I gathered new evidence and/or developed new ideas about components or relationships of the model. |  | I explain how I changed/added to my model to better explain what caused the phenomenon and clearly connected to newly gathered evidence and/or ideas about components or relationships of the model. |
| **9) Evaluating Limitations of My Model:** Do I describe the limitations of my model?  | No limitations defined or only cosmetic changes suggested. |  | Some explanation of limitations. Little connection to the phenomena the model represents. |  | I explain what simplifications I have made in my model compared to the phenomena from the natural or built world.  |  | I explain the limitations of my model and discuss how this limits its use to explain other related phenomena and suggest improvements and unanswered questions. |
| **10) Use My Model to Predict a Phenomenon:** Can I use my model to make a theory-based prediction about a phenomenon?  | I do not explain the outcome of changing one ore more components, and/or I do not use my model to predict how another phenomenon occurs.  |  | I attempt to use my model to make a prediction, but I do not fully describe the outcome of changing one or more components, or I am missing some connections between my model and the different phenomenon. |  | Model-based explanation predicts the outcome of changing one or more components of the modelORModel is used to predict and explain how a different phenomenon occurs. |  | I describe the outcome of changing an additional component of the model OR I identify and predict / explain an additional related phenomenon. |
| **11) Use My Model to Generate Data to Test Ideas about a Phenomenon:** How can my model generate data to test scientific ideas?  | I do not use my model to generate new data or ideas about the phenomenon.  |  | I try to generate new data using my model but I can’t describe how they relate to model components or relationships.  |  | I tested a scientific idea related to one or more model components or relationships based on data generated by the model.  |  | I described how I discovered something new about how the phenomena operates in the natural or built world by working with my model.  |

Authored by Philip Bell and Tana Peterman in collaboration with teachers from Seattle Public Schools. The first page presents different general elements of the modeling practice to consider. The second page includes elements that make sense only when instruction focuses on them.

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