**Enduring skill: Developing and Using Models**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Level 1 (entering) | Level 2 (developing) | Level 3 (proficient) | Level 4 (beyond proficient) |
| Limitations of a model  8 | Identifies relevant limitations | Identifies relevant limitations with limited attempt to evaluate | Evaluates limitations by explaining how and why they limit the model | Evaluates both limitations and merits of models, perhaps by comparing multiple models of the same concept or phenomenon |
| 7 | Identifies limitations, some of which might not be relevant | Identifies relevant limitations | Identifies relevant limitations with limited attempt to evaluate | Evaluates limitations by explaining how and why they limit the model |
| 6 | Collaboratively identifies limitations | Identifies some limitations, some of which might not be relevant | Independently identifies relevant limitations | Identifies relevant limitations with limited attempt to evaluate |
| Model accurately describes real-world relationships/phenomena  8 | Develops or modifies a model so that it correctly describes the relationships in a known and well-understood system. Changes made in the model represent expected outcomes in the real system. | Collaboratively develops or modifies a model so that it correctly describes the relationships in a system containing uncertain or unobservable factors/mechanisms. | Independently develops or modifies a model so that it correctly describes the relationships in a system containing uncertain or unobservable factors/mechanisms. | Collaboratively develops or revises models to compare relationships between two or more systems containing uncertain or unobservable factors/mechanisms. |
| 7 | Develops or modifies a model so that it describes the relationships in a known and well-understood system. Some inaccuracies are noted. | Develops or modifies a model so that it correctly describes the relationships in a known and well-understood system. Changes made in the model represent expected outcomes in the real system. | Collaboratively develops or modifies a model so that it correctly describes the relationships in a system containing uncertain or unobservable factors/mechanisms | Independently develops or modifies a model so that it correctly describes the relationships in a system containing uncertain or unobservable factors/mechanisms. |
| 6 | Collaboratively develops or modifies a model so that it describes the relationships in a known and well-understood system. | Develops or modifies a model so that it describes the relationships in a known and well-understood system. Some inaccuracies are noted. | Independently develops or modifies a model so that it correctly describes the relationships in a known and well-understood system. Changes made in the model represent expected outcomes in the real system. | Collaboratively develops or modifies a model so that it correctly describes the relationships in a system containing uncertain or unobservable factors/mechanisms. |
| Model is useful to predict phenomena and/or test ideas  8 | Develops or modifies a model so that it describes the relationships in a known and well-understood system. Some inaccuracies are noted. | Model has utility in predicting or testing ideas but does not consider all relevant factors, especially those factors that are not well understood or are not easily observable. | Model yields quantifiable results, and predictions generated from the model are logical and consistent with current scientific understandings. Predictions, if testable, are similar to real-world results. | Collaboratively employs multiple models , comparing their merits and limitations to generate sophisticated predictions. |
| 7 | Collaboratively develops or modifies a model to describe the relationships in a known and well-understood system. | Develops or modifies a model so that it describes the relationships in a known and well-understood system. Some inaccuracies are noted. | Model has utility in predicting or testing ideas but does not consider all relevant factors, especially those factors that are not well understood or are not easily observable. | Model yields quantifiable results, and predictions generated from the model are logical and consistent with current scientific understandings. Predictions, if testable, are similar to real-world results. |
| 6 | Use or develop a model to test cause and effect relationships in a known and well-understood system. | Collaboratively develops or modifies a model to describe the relationships in a known and well-understood system. | Independently develops or modifies a model so that it describes the relationships in a known and well-understood system. Some inaccuracies are noted. | Model has utility in predicting or testing ideas but does not consider all relevant factors, especially those factors that are not well understood or are not easily observable. |