

| Skill                          | Score  |   |   | Notes or Comments |
|--------------------------------|--|---|---|-------------------|
|                                | Proficient   | Developing  | Needs Revisiting  |                   |
| Decide What to Model           | <ul style="list-style-type: none"> <li>Assumptions made are clearly identified and justified. Resulting limitations are stated when appropriate.</li> <li>Variables of interest are clearly identified and chosen wisely, and appropriate units of measure are used.</li> </ul>  | <ul style="list-style-type: none"> <li>Assumptions are noted but lacking in justification or difficult to find.</li> <li>Variables of interest are noted, but may lack justification, be difficult to find, or not be measured with appropriate units.</li> </ul> | <ul style="list-style-type: none"> <li>No assumptions are stated.</li> <li>No variables are defined.</li> </ul>       |                   |
|                                | <p>To improve at this skill, you could:</p> <ul style="list-style-type: none"> <li>Ask questions about the situation to understand it better</li> <li>Check the assumptions you're making to see if they're reasonable (Try asking a friend, or imagining that you're a person involved in the scenario. Would those assumptions make sense to you?)</li> <li>Double-check the variables you've identified: Are there other quantities in the situation that could vary? Is there something you've identified as a variable that is actually fixed or determined? (Remember that more abstract things like time and speed are also quantities.)</li> </ul> |   |   |                   |
| Formulate a Mathematical Model | <ul style="list-style-type: none"> <li>An appropriate model is chosen and represented clearly.</li> <li>Diagrams, graphs, etc. are clear and appropriately labeled.</li> </ul>   | <ul style="list-style-type: none"> <li>Parts of the model are unclear, incomplete, or contain mistakes.</li> </ul>  | <ul style="list-style-type: none"> <li>No model is presented, or presentation contains significant errors.</li> </ul> |                   |
|                                | <p>To improve at this skill, you could:</p> <ul style="list-style-type: none"> <li>Check your model more carefully to make sure it really fits well</li> <li>Consider a wider variety of possible models, to find one that fits the situation better</li> <li>Think about the situation more deeply before trying to find a model</li> <li>Convince a skeptic: Pretend that you think your model is inadequate, or ask a friend to pretend to be skeptical of it. What would a skeptic find wrong with your model? Try to fix those things, or explain why they're not actually problems.</li> </ul>   |   |   |                   |

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| Use Your Model to Reach a Conclusion | <ul style="list-style-type: none"> <li>• Solution is relevant to original problem.</li> <li>• Reader can easily understand the reasoning leading to the solution.</li> <li>• Relevant details are included like units of measure.</li> </ul>  | <ul style="list-style-type: none"> <li>• Solution is not well-aligned to original problem, or aspects of the solution are difficult to understand or incomplete.</li> </ul> | <ul style="list-style-type: none"> <li>• No solution is provided.</li> </ul>                             |                   |
|                                      | <p>To improve at this skill, you could:</p> <ul style="list-style-type: none"> <li>• Double-check your calculations: Show them to someone else to see if they agree, or take a break and look at your calculations again later</li> <li>• Make sure your calculations are justified by your model: Ask yourself how you decided what to calculate, and see if your reasoning matches up with your model</li> <li>• Think more deeply about what your conclusions mean in the original scenario: Imagine you're a person involved in the scenario, or explain your conclusions to someone else and see if they have questions</li> </ul> |   |  |                   |
| Refine and Share Your Model          | <ul style="list-style-type: none"> <li>• The model's implications are clearly stated.</li> <li>• The limitations of the model and solution are addressed.</li> </ul>  | <ul style="list-style-type: none"> <li>• The limitations of the model and solution are addressed but lacking in depth or ignoring key components.</li> </ul>                | <ul style="list-style-type: none"> <li>• No interpretation of model and solution is provided.</li> </ul> |                   |
|                                      | <p>To improve at this skill, you could:</p> <ul style="list-style-type: none"> <li>• Think more creatively about what your conclusions mean: Ask yourself "If I was involved in this situation, what would I understand better because of these conclusions? What would I want to do next?"</li> <li>• Be skeptical of your model: What don't you like about it, and what can you do to fix those things?</li> <li>• Explain your model to someone else: Tell them how it works and why it's good. If you're not sure how it works or why it's good, you might need to change it.</li> </ul>  |   |  |                   |