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Advice on Modeling

These are some steps that successful modelers often take, and questions that they ask themselves. You don't necessarily have to do all of these steps, or do them in order. Only do the parts that you think will help you make progress.

	Understand the Question Think about what the question means before you start making a strategy to answer it. Are there words you want to look up? Does the scenario make sense? Is there anything you want to get clearer on before you start? Ask your classmates or teacher if you need to.
	Refine the Question If necessary, rewrite the question you are trying to answer so that it is more specific.
	Estimate a Reasonable Answer If you don't have enough information to decide what's reasonable, try to come up with an answer that would be too low, and an answer that would be too high.
	Identify Unknowns ● What are the meaningful quantities in this situation? Write them down. ● What information would be useful to know? In order to get that information, you could: look it up, take a measurement, or make an assumption.
	Gather Information Write down any of the unknown information that you find. As you work, organize your information in a way that makes sense to you.

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	Experiment! Try different ideas to make progress toward answering your question. If you are stuck, think about: ● Helpful ways to organize the information you have or organize your work ● Questions you *can* answer using the information you have ● Ways to represent mathematical relationships or sets of data (tables, equations, scatter plots, graphs, statistical plots) ● Tools that are available for representing mathematics, both digital and analog
	Check Your Reasoning Do you have a first answer to your question? Great! See if it's reasonable. ● Make sure you can explain what the answer means in terms of the original problem. ● Check your precision: Is your answer overly precise (do you really need all those decimal places)? Not precise enough (were you overly aggressive with your rounding)?
	Use and Improve Your Model ● Did you make assumptions or measurements? How can you express your model more generally, so that it would work for a range of numbers instead of the specific numbers you used? ● What are the limitations of your model? That is, what are some ways it is not realistic? Does it only work for certain inputs but not others? Are there any meaningful inputs affecting the outcome that are not accounted for? If possible, improve your model to take these into account. ● What are the implications of your model? That is, what should people or organizations do differently or smarter as a result of what your model shows? What would be effective ways to communicate with them? ● What are the areas for further research? That is, what new things are you wondering about that could be investigated, by you or someone else?