Modeling: Chalk Talk—Possible Responses

What is modeling? • Using various representations such as graphs, equations, diagrams, scatterplots, etc., to represent real-world or mathematical situations. A model provides a way to reduce a problem to its essential characteristics. • Modeling is a way to help visualize something that cannot be directly observed. It is an activity that helps illustrate how devices or objects behave. • Modeling has a cyclical flow; often, a model will lead to a rethinking of the process and beginning anew.	*What is NOT modeling?* • Including a representation such as a graph, equation, table, and diagram with no purpose. • Using a representation without reflecting on its intended purpose, or not analyzing relationships displayed to draw conclusions. • Failing to look at the validity of a representation. Is the prediction valid and consistent with assumptions made?
How and why is modeling useful? • Models describe or explain why a behavior or results might have occurred. • Modeling helps prove or answer questions that do not have one answer. • Models enable us to predict future behaviors or results. We can use the results to make quantitative predictions or identify qualitative aspects of a situation. • Through modeling, we can learn to design (better) processes and systems that may not yet exist. • Modeling helps us create prototypes before investing time and money into a predicted outcome (i.e., creating a plane that will fly or a building that is structurally sound). • From an instruction standpoint, modeling allows for differentiation to occur naturally.	*What structures need to be in place for students to engage in modeling?* • Acknowledge the reality that there is always some degree of error in the world of modeling. • Uncertainty is to be expected, and the real world will rarely fully validate conclusions made from modeling. • Choices, assumptions, and approximations should help students explore questions mathematically. • Students must see a need for—and understand how to use—a model. • Results of a model must be interpreted and reflected upon. • Failure (in modeling) allows students the opportunity to talk about new models. • Teachers must have a shared understanding of the purpose and use of modeling with mathematics in the classroom.