



Grades 9–12

3.5.9-12.PP Technology and Engineering: Nature and Characteristics of Technology and Engineering

Students who demonstrate understanding can *demonstrate the use of conceptual, graphical, virtual, mathematical, and physical modeling to identify conflicting considerations before the entire system is developed and to aid in design decision making.*

Clarifying Statement: When making final decisions for designs, it is important to consider all relationships between design choices and end product results. Models and prototypes of all kinds can be useful in troubleshooting these relationships prior to developing final solutions. These models can vary from high-tech software to low-cost physical models of solutions.

Assessment Boundary: N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Technology and Engineering Practices (TEP)
Developing and Using Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. <ul style="list-style-type: none"> Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system. 	Models and Visualizations <ul style="list-style-type: none"> Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations. 	Making and Doing <ul style="list-style-type: none"> Demonstrates the ability to regulate and improve making and doing skills.

Pennsylvania Context: Examples of Pennsylvania context include but are not limited to Pennsylvania's manufacturing businesses and industry.

Pennsylvania Career Ready Skills: Evaluate a situation to identify skills and strategies to prevent and resolve conflicts.

Connections to Other Standards Content and Practices



Standard Source	Possible Connections to Other Standard(s) or Practice(s)
PA Core Standards: Reading and Writing in Science and Technical Areas	<p>CC.1.2.3.G: Use information gained from text features to demonstrate understanding of a text.</p> <p>CC.1.2.4.G: Interpret various presentations of information within a text or digital source and explain how the information contributes to an understanding of text in which it appears.</p> <p>CC.1.2.5.G: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>CC.1.4.3.V: Conduct short research projects that build knowledge about a topic.</p> <p>CC.1.4.4.V: Conduct short research projects that build knowledge through investigation of different aspects of a topic.</p> <p>CC.1.4.5.V: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.</p> <p>CC.1.4.3.W: Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.</p> <p>CC.1.4.4.W: Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.</p> <p>CC.1.4.5.W: Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.</p>
PA Core Standards and Practices: Math	<p>N/A</p>
Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12	<p>N/A</p>