Grades 9–12

3.5.9-12.AA Technology and Engineering: Design Thinking in Technology and Engineering Education

Students who demonstrate understanding can *safely apply an appropriate range of making skills to a design thinking process.*

Clarifying Statement: Students independently identify and safely use appropriate tools and processes to complete a design making task. Students recognize their own knowledge and skill gaps, pursue opportunities to develop necessary skills, and become more confident and competent in making.

Assessment Boundary: N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Technology and Engineering Practices (TEP)
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. • Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.	**Developing Possible Solutions** • Both physical models and computers can be used in various ways to aid in the engineering design process. **Develop and Test Prototypes** • Students develop, test and refine prototypes as part of a cyclical design process.	**Making and Doing** • Demonstrates the ability to regulate and improve making and doing skills.

Pennsylvania Context: N/A

Pennsylvania Career Ready Skills: Establish pro-social relationships to support self and others.

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	CC.1.2.3.G: Use information gained from text features to demonstrate understanding of a text. 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. 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. CC.1.4.3.V: Conduct short research projects that build knowledge about a topic. CC.1.4.4.V: Conduct short research projects that build knowledge through investigation of different aspects of a topic. CC.1.4.5.V: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. 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. 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. 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.
PA Core Standards and Practices: Math	MP.1: Make sense of problems and persevere in solving them. MP.5: Use appropriate tools strategically.
Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12	N/A