Grades 9–12

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

Students who demonstrate understanding can *analyze and use relevant and appropriate design thinking processes to solve technological and engineering problems.*

Clarifying Statement: High school students can benefit from examining relationships to technology in other cultures, such as the access (or lack of access) to technologies in specific cultures. For example, people in many locations around the world lack ready access to clean water. Strategies to address this problem will vary according to the resources and circumstances of a given location.

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 ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.	**NAEP D.12.8** • Meet a sophisticated design challenge by identifying criteria and constraints, predicting how these will affect the solution, researching and generating ideas, and using trade-offs to balance competing values in selecting the best solution.	**Critical Thinking** • Uses evidence to better understand and solve problems in technology and engineering, including applying computational thinking.

Pennsylvania Context: Examples of Pennsylvania context include but are not limited to Pennsylvania's graphic communication companies.

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	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.

Standard Source	Possible Connections to Other Standard(s) or Practice(s)
PA Core Standards: Reading and Writing in Science and Technical Areas (continued)	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.2: Reason abstractly and quantitatively.
Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12	N/A