



Grades 9–12

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

Students who demonstrate understanding can apply a broad range of design skills to a design thinking process.

Clarifying Statement: Students engage in meaningful discourse about the essential skills they have applied when engaged in designing, constructing, and implementing a solution. These include creativity, collaboration, resourcefulness, ideation, learning through failure, and many other essential skills of design.

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. <ul style="list-style-type: none"> Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. 	Know and Use a Deliberate Design Process <ul style="list-style-type: none"> Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. 	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 inventors and inventions.

Pennsylvania Career Ready Skills: Establish and pursue goals or post-secondary education, employment, and living within the community.

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>
PA Core Standards: Reading and Writing in Science and Technical Areas (continued)	<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>MP.1: Make sense of problems and persevere in solving them.</p>
Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12	<p>N/A</p>