## Grades 9–12

| 3.5.9-12.P Technology and Engineering: Design Thinking in Technology and Engineering Education |
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| **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. <br> **Assessment Boundary:** N/A |

| Science and Engineering Practices (SEP) | Disciplinary Core Ideas (DCI) | Technology and Engineering Practices (TEP) |
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| **Constructing Explanations and Designing Solutions** <br><br> 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. <br><br> • Design, evaluate, and/or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade-off considerations. | **ISTE 4A** <br><br> • Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems. | **Making and Doing** <br><br> • 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. |
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| **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** | CC.1.2.3.G: Use information gained from text features to demonstrate understanding of a text.<br>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.<br>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.<br>CC.1.4.3.V: Conduct short research projects that build knowledge about a topic.<br>CC.1.4.4.V: Conduct short research projects that build knowledge through investigation of different aspects of a topic.<br>CC.1.4.5.V: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.<br>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.<br>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. |
| **PA Core Standards: Reading and Writing in Science and Technical Areas (continued)** | 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. |
| **Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12** | N/A |