



Grades 9–12

3.5.9-12.Y (ETS) Technology and Engineering: Design Thinking in Technology & Engineering Education

Students who demonstrate understanding can *design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.*

Clarifying Statement: Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed.

Assessment Boundary: N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Technology and Engineering Practices (TEP)
<p>Constructing Explanations and Designing Solutions</p> <p>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.</p> <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. 	<p>Optimizing the Design Solution</p> <ul style="list-style-type: none"> Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. 	<p>Systems Thinking</p> <ul style="list-style-type: none"> Designs and troubleshoots technological systems in ways that consider the multiple components of the system. <p>Making & Doing</p> <ul style="list-style-type: none"> Demonstrates the ability to regulate and improve making and doing skills.

Pennsylvania Context: N/A

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	N/A
PA Core Standards and Practices: Math	MP.2: Reason abstractly and quantitatively. MP.4: Model with mathematics.



Standard Source	Possible Connections to Other Standard(s) or Practice(s)
Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12	N/A