



Grades 9–12

3.5.9-12.LL Technology and Engineering: Nature and Characteristics of Technology and Engineering

Students who demonstrate understanding can *analyze the stability of a technological system and how it is influenced by all of the components in the system, especially those in the feedback loop.*

Clarifying Statement: Automated control systems in a vehicle, for example, automatically detect and control the speed of the vehicle.

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"> Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables. 	Optimizing the Design Solution <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. 	Making and Doing <ul style="list-style-type: none"> Demonstrates the ability to regulate and improve making and doing skills. Systems Thinking <ul style="list-style-type: none"> Designs and troubleshoots technological systems in ways that consider the multiple components of the system.

Pennsylvania Context: Examples of Pennsylvania context include but are not limited to manufacturing businesses and industries.

Pennsylvania Career Ready Skills: Evaluate consequences from a personal, and civic perspective to inform decision making.

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> <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.2: Reason abstractly and quantitatively.</p>
Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12	<p>N/A</p>