



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)
<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"> Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables. 	<p>ETS1.C: 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>Making and Doing</p> <ul style="list-style-type: none"> Demonstrates the ability to regulate and improve making and doing skills. <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.

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)
<p>PA Core Standards: Reading and Writing in Science and Technical Areas</p>	<p>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. 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.</p>
<p>PA Core Standards and Practices: Math</p>	<p>MP.2: Reason abstractly and quantitatively.</p>
<p>Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K-12</p>	<p>N/A</p>