



Grades 9–12

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

Students who demonstrate understanding can *conduct research to inform intentional inventions and innovations that address specific needs and wants.*

Clarifying Statement: Years of research led to the design and development of laser systems used in atmospheric studies and other applications (LiDAR or LADAR). This same type of laser system was then modified and reapplied to treat the buildup of plaque in the arteries through laser angioplasty (i.e., surgical repair of a blood vessel such as an artery).

Assessment Boundary: N/A

Science and Engineering Practices (SEP)	Disciplinary Core Ideas (DCI)	Technology and Engineering Practices (TEP)
<p>Obtaining, Evaluating, and Communicating Information</p> <p>Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.</p> <ul style="list-style-type: none"> Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem. 	<p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. 	<p>Critical Thinking</p> <ul style="list-style-type: none"> Uses evidence to better understand and solve problems in technology and engineering, including applying computational thinking.

Pennsylvania Context: Examples of Pennsylvania context include but are not limited to Pennsylvania’s inventors and inventions.

Pennsylvania Career Ready Skills: Situate self in any social context as a means to determine a response.

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.1: Make sense of problems and persevere in solving them.</p>
<p>Integrated Standards for Science, Environment & Ecology, and Technology & Engineering Standards Grades K–12</p>	<p>N/A</p>