Grades 3–5

3.5.3-5.T Technology and Engineering: Design in Technology and Engineering Education

Students who demonstrate understanding can *apply universal principles and elements of design.*

Clarifying Statement: Students develop the necessary vocabulary to identify, describe, and begin to apply the principles and elements of design. Students can appreciate the impact of these principles and elements on design quality.

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 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.	**ETS1.A: Defining and Delimiting Engineering Problems** • Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **ETS1.B: Developing Possible Solutions** • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. • At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. **ETS1.C: Optimizing the Design Solution** • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	**Making and Doing** • Safely uses grade-appropriate tools, materials, and processes to build projects.

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

Pennsylvania Career Ready Skills: Demonstrate respect for the uniqueness of others.

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. 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.
PA Core Standards and Practices: Math	MP.2: Reason abstractly and quantitatively. MP.4: Model with mathematics. MP.5: Use appropriate tools strategically.
Science, Technology & Engineering, and Environmental Literacy & Sustainability Academic Standards	N/A