



SOUTHERN LEHIGH SCHOOL DISTRICT
 5775 Main Street
 Center Valley, PA 18034

Scope and Sequence for **Grade 7 STEM: Design and Modeling**

The Nature of Technology

National Standards for Technological Literacy	PA Standards for Science and Technology and Engineering Education
1. The characteristics and scope of technology. 9-12.L Inventions and innovations are the results of specific, goal-directed research.	1. Characteristics of Technology 3.4.7.A1 Explain how technology is closely linked to creativity, which has resulted in innovation and invention.
2. The core concepts of technology. 6-8.M Technological systems include input, processes, output, and at times, feedback. 6-8.N Systems thinking involves considering how every part relates to others. 6-8.R Requirements are the parameters placed on the development of a product or system. 6-8.T Different technologies involve different sets of processes. 9-12.EE Management is the process of planning, organizing, and controlling work.	2. Core Concepts of Technology 3.4.7.A2 Explain how different technologies involve different sets of processes.
3. The relationships among technologies and the connections between technology and other fields. 6-8.F Knowledge gained from other fields of study has a direct effect on the development of technological products and systems.	3. Technology Connections 3.4.7.A3 Explain how knowledge gained from other fields of study has a direct effect on the development of technological products and systems.

Technology and Society

National Standards for Technological Literacy	PA Standards for Science and Technology and Engineering Education
4. The cultural, social, economic, and political effects of technology. 6-8.D The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use. 6-8.F The development and use of technology poses ethical issues.	1. Effects of Technology 3.4.7.B1 Explain how the use of technology can have consequences that affect humans in many ways.
6. The role of society in the development and use of technology. 6-8.E The use of inventions and innovations has led to changes in society and the creation of new needs and wants.	3. Society and Development of Technology 3.4.7.B3 Describe how invention and innovation lead to changes in society and the creation of new needs and wants.
7. The influence of technology on history. 6-8.C Many inventions and innovations have evolved using slow and methodical processes of tests and refinements. 6-8.D The specialization of function has been at the heart of many technological improvements	4. Technology and History 3.4.7.B4 Explain how many inventions and innovations have evolved by using deliberate and methodical processes of tests and refinements.

Design

National Standards for Technological Literacy	PA Standards for Science and Technology and Engineering Education
<p>8. The attributes of design. 6-8.E Design is a creative planning process that leads to useful products and systems. 6-8.F There is no perfect design. 6-8.G Requirements for design are made up of criteria and constraints.</p>	<p>1. Design Attributes 3.4.7.C1 Describe how design as a creative planning process, leads to useful products and systems.</p>
<p>9. Engineering design. 6-8.F Design involves a set of steps, which can be performed in different sequences and repeated as needed. 6-8.G Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum. 6-8.H Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.</p> <p>9-12.K A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.</p>	<p>2. Engineering Design 3.4.7.C2 Explain how modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.</p>

Abilities for a Technological World

National Standards for Technological Literacy	PA Standards for Science and Technology and Engineering Education
<p>11. Apply the design process. 6-8.H Apply a design process to solve problems in and beyond the laboratory-classroom. 6-8.I Specify criteria and constraints for the design. 6-8.J Make two-dimensional and three-dimensional representations of the designed solution. 6-8.K Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed. 6-8.L Make a product or system and document the solution.</p>	<p>1. Applying the Design Process 3.4.7.D1 Identify and collect information about everyday problems that can be solved by technology and generate ideas and requirements for solving a problem.</p>
<p>12. Use and maintain technological products and systems. 6-8.H Use information provided in manuals, protocols, or by experienced people to see and understand how things work. 6-8.J Use computers and calculators in various applications</p>	<p>2. Using and Maintaining Technological Systems 3.4.7.D2 Select and safely use appropriate tools, products and systems for specific tasks.</p>
<p>13. Assess the impact of products and systems. 6-8.G Use data collected to analyze and interpret trends in order to identify the positive and negative effects of a technology. 6-8.I Interpret and evaluate the accuracy of the information obtained and determine if it is useful.</p>	<p>3. Assessing Impact of Products and Systems 3.4.7.D3 Use data collected to analyze and interpret trends in order to identify the positive or negative effects of a technology.</p>

The Designed World

National Standards for Technological Literacy	PA Standards for Science and Technology and Engineering Education
14. Medical technologies. 6-8.G Advances and innovations in medical technologies are used to improve healthcare.	1. Medical Technologies 3.4.7.E1 Investigate recent advancements in medical technologies and their impact on quality of life.
17. Information and communication technologies. 6-8.J The design of a message is influenced by such factors as intended audience, medium, purpose, and the nature of the message. 6-8.K The use of symbols, measurements, and drawings promotes a clear communication by providing a common language to express ideas.	4. Information and Communication Technologies 3.4.7.E4 Illustrate how information can be acquired and sent through a variety of technological sources, including print and electronic media.

Pennsylvania Core Standards for Reading in Science and Technical Subjects

Key Ideas and Details

CC.3.5.6-8.A. Cite specific textual evidence to support analysis of science and technical texts.

CC.3.5.6-8.B. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

CC.3.5.6-8.C. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

CC.3.5.6-8.D. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

Integration of Knowledge and Ideas

CC.3.5.6-8.G. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CC.3.5.6-8.H. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

Pennsylvania Core Standards for Writing in Science and Technical Subjects

Text Types and Purposes

CC.3.6.6-8.B. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

- Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
- Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
- Use precise language and domain-specific vocabulary to inform about or explain the topic.

Production and Distribution of Writing

CC.3.6.6-8.C. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

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Pennsylvania Core Standards for Writing in Science and Technical Subjects

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Research to Build and Present Knowledge

CC.3.6.6-8.F. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CC.3.6.6-8.G. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CC.3.6.6-8.H. Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing

CC.3.6.6-8.J.I. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.