Scope and Sequence for Grade 7 STEM: Design and Modeling

### The Nature of Technology

<table>
<thead>
<tr>
<th>National Standards for Technological Literacy</th>
<th>PA Standards for Science and Technology and Engineering Education</th>
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<tbody>
<tr>
<td><strong>1. The characteristics and scope of technology.</strong>&lt;br&gt;9-12.1. Inventions and innovations are the results of specific, goal-directed research.</td>
<td><strong>1. Characteristics of Technology</strong>&lt;br&gt;3.4.7.A1 Explain how technology is closely linked to creativity, which has resulted in innovation and invention.</td>
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<td><strong>2. The core concepts of technology.</strong>&lt;br&gt;6-8.M Technological systems include input, processes, output, and at times, feedback.&lt;br&gt;6-8.N Systems thinking involves considering how every part relates to others.&lt;br&gt;6-8.R Requirements are the parameters placed on the development of a product or system.&lt;br&gt;6-8.T Different technologies involve different sets of processes.&lt;br&gt;9-12.EE Management is the process of planning, organizing, and controlling work.</td>
<td><strong>2. Core Concepts of Technology</strong>&lt;br&gt;3.4.7.A2 Explain how different technologies involve different sets of processes.</td>
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<tr>
<td><strong>3. The relationships among technologies and the connections between technology and other fields.</strong>&lt;br&gt;6-8.F Knowledge gained from other fields of study has a direct effect on the development of technological products and systems.</td>
<td><strong>3. Technology Connections</strong>&lt;br&gt;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.</td>
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### Technology and Society

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<td><strong>4. The cultural, social, economic, and political effects of technology.</strong>&lt;br&gt;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.&lt;br&gt;6-8.F The development and use of technology poses ethical issues.</td>
<td><strong>1. Effects of Technology</strong>&lt;br&gt;3.4.7.B1 Explain how the use of technology can have consequences that affect humans in many ways.</td>
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<td><strong>6. The role of society in the development and use of technology.</strong>&lt;br&gt;6-8.E The use of inventions and innovations has led to changes in society and the creation of new needs and wants.</td>
<td><strong>3. Society and Development of Technology</strong>&lt;br&gt;3.4.7.B3 Describe how invention and innovation lead to changes in society and the creation of new needs and wants.</td>
</tr>
<tr>
<td><strong>7. The influence of technology on history.</strong>&lt;br&gt;6-8.C Many inventions and innovations have evolved using slow and methodical processes of tests and refinements.&lt;br&gt;6-8.D The specialization of function has been at the heart of many technological improvements.</td>
<td><strong>4. Technology and History</strong>&lt;br&gt;3.4.7.B4 Explain how many inventions and innovations have evolved by using deliberate and methodical processes of tests and refinements.</td>
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Scope and Sequence for Grade 7 STEM: Design and Modeling | Board Reviewed March 2019
### Design

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| **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. | **1. Design Attributes**  
3.4.7.C1 Describe how design as a creative planning process, leads to useful products and systems. |
| **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. | **2. Engineering Design**  
3.4.7.C2 Explain how modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions. |
# The Designed World

## National Standards for Technological Literacy

| 14. Medical technologies.  
6-8.G | Advances and innovations in medical technologies are used to improve healthcare. |
| 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. |
| 1. Medical Technologies  
3.4.7.E1 | Investigate recent advancements in medical technologies and their impact on quality of life. |
| 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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This section continues on the next page…
Pennsylvania Core Standards for Writing in Science and Technical Subjects

Continued…

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.