Pennsylvania Technology and Engineering Standards (6-12)

Grades 9, 10, 11, 12

Adopted 2022

Nature and Characteristics of Technology and Engineering

1. Evaluate how technology and engineering have been powerful forces in reshaping the social, cultural, political, and economic landscapes throughout history. 1.HS.1
2. Relate how technological and engineering developments have been evolutionary, often the result of a series of refinements to basic inventions or technological knowledge. 1.HS.2
3. Identify and explain how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools, materials, and processes. 1.HS.3
4. Analyze how the Industrial Revolution resulted in the development of mass production, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time. 1.HS.4
5. Investigate the widespread changes that have resulted from the Information Age, which has placed emphasis on the processing and exchange of information. 1.HS.5
6. Analyze the rate of technological and engineering development and predict future diffusion and adoption of new innovations and technologies. 1.HS.6
7. Demonstrate the use of conceptual, graphical, virtual, mathematical, and physical modeling to identify conflicting considerations before the entire system is developed and to aid in design decision making. 1.HS.7
8. 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. 1.HS.8
9. Troubleshoot and improve a flawed system embedded within a larger technological, social, or environmental system. 1.HS.9
10. Use project management tools, strategies, and processes in planning, organizing, and controlling work. 1.HS.10
11. Implement quality control as a planned process to ensure that a product, service, or system meets established criteria. 1.HS.11

Integration of Knowledge, Technologies, and Practices	1. **Assess how similarities and differences among scientific, technological, engineering, and mathematical knowledge and skills contributed to the design of a product or system.** 2.HS.1
	2. **Develop a plan that incorporates knowledge from science, mathematics, and other disciplines to design or improve a technological product or system.** 2.HS.2
	3. **Analyze how technology transfer occurs when a user applies an existing innovation developed for one function for a different purpose.** 2.HS.3
	4. **Evaluate how technology enhances opportunities for new products and services through globalization.** 2.HS.4
	5. **Connect technological and engineering progress to the advancement of other areas of knowledge and vice versa.** 2.HS.5
Applying, Maintaining, Assessing and Evaluating Technological Products and Systems	1. **Develop a solution to a technological problem that has the least negative environmental and social impact.** 3.HS.1
	2. **Develop a device or system for the marketplace.** 3.HS.2
	3. **Evaluate ways that technology and engineering can impact individuals, society, and the environment.** 3.HS.3
	4. **Critique whether existing or proposed technologies use resources sustainably.** 3.HS.4
	5. **Critically assess and evaluate a technology that minimizes resource use and resulting waste to achieve a goal.** 3.HS.5
	6. **Evaluate a technological innovation that arose from a specific society's unique need or want.** 3.HS.6
	7. **Evaluate how technology and engineering advancements alter human health and capabilities.** 3.HS.7
	8. **Evaluate a technological innovation that was met with societal resistance impacting its development.** 3.HS.8
	9. **Use various approaches to communicate processes and procedures for using, maintaining, and assessing technological products and systems.** 3.HS.9
	10. **Synthesize data and analyze trends to make decisions about technological products, systems, or processes.** 3.HS.10
	11. **Interpret laws, regulations, policies, and other factors that impact the development and use of technology.** 3.HS.11
Design Thinking in Technology and	1. **Apply a broad range of design skills to a design thinking process.** 4.HS.1

Engineering Education

2. **Implement and critique principles, elements, and factors of design.** 4.HS.2
3. **Evaluate and define the purpose of a design.** 4.HS.3
4. **Conduct research to inform intentional inventions and innovations that address specific needs and wants.** 4.HS.4
5. **Analyze and use relevant and appropriate design thinking processes to solve technological and engineering problems.** 4.HS.5
6. **Implement the best possible solution to a design using an explicit process.** 4.HS.6
7. **Apply principles of human-centered design.** 4.HS.7
8. **Optimize a design by addressing desired qualities within criteria and constraints while considering trade-offs.** 4.HS.8
9. **Use a design thinking process to design an appropriate technology for use in a different culture.** 4.HS.9
10. **Apply appropriate design thinking processes to diagnose, adjust, and repair systems to ensure precise, safe, and proper functionality.** 4.HS.10
11. **Recognize and explain how their community and the world around them informs technological development and engineering design.** 4.HS.11
12. **Safely apply an appropriate range of making skills to a design thinking process.** 4.HS.12