The Nature of Technology

Standard 1: Develop an understanding of the characteristics and scope of technology

Students will understand that:

TD.1.1 The nature and development of technological knowledge and processes are functions of the environment.
TD.1.2 The rate of technological development and diffusion is increasing rapidly.
TD.1.3 Inventions and innovations are the results of specific, goal-directed research.
TD.1.4 Most development of technologies these days is driven by the profit motive and the market.

Standard 2: Develop an understanding of the core concepts of technology

Students will understand that:

TD.2.1 Systems-thinking applies logic and creativity with appropriate compromises in complex real-life problems.
TD.2.2 Systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.
TD.2.3 Selecting resources involves trade-offs between competing values, such as availability, cost, desirability, and waste.
TD.2.4 New technologies create new products and improved processes.
TD.2.5 *Requirements* involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.

Standard 3: Develop an understanding of the relationships among technologies and connections between technology and other fields of study

Students will understand that:

TD.3.1 Technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.
TD.3.2 Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields.
TD.3.3 Technological ideas are sometimes protected through the process of patenting.
TD.3.4 Technological progress promotes advancement of all disciplines.

Technology and Society

Standard 4: Develop an understanding of the cultural, social, economic, and political effects of technology

Students will understand that:

TD.4.1 Changes caused by the use of technology can range from gradual to rapid and from subtle to obvious.
TD.4.2 Making decisions about the use of technology involves weighing the trade-offs between the positive and negative effects.
TD.4.3 Ethical considerations are important in the development, selection, and use of technologies.
TD.4.4 The transfer of a technology from one society to another can cause cultural, social, economic, and political changes affecting both societies to varying degrees.

Standard 5:	**Develop an understanding of the effects of technology on the environment**
Students will understand that:	
TD.5.1	When new technologies are developed to reduce the use of resources, considerations of trade-offs are important.
TD.5.2	With the aid of technology, various aspects of the environment can be monitored to provide information for decision-making.
TD.5.3	The alignment of technological processes with natural processes maximizes performance and reduces negative impacts on the environment.
TD.5.4	Decisions regarding the implementation of technologies involves the weighing of trade-offs between predicted positive and negative effects on the environment.

Standard 6:	**Develop an understanding of the role of society in the development and use of technology**
Students will understand that:	
TD.6.1	Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.
TD.6.2	The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.
TD.6.3	A number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads contribute to shaping the design of and demand for various technologies.

Standard 7:	**Develop an understanding of the influences of technology in history**
Students will understand that:	
TD.7.1	Most technology development has been evolutionary, the result of a series of refinements to a basic invention.
TD.7.2	The evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials.
TD.7.3	Throughout history, technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.
TD.7.4	Early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.
TD.7.5	The Iron Age was defined by the use of iron and steel as the primary materials for tools.
TD.7.6	The Middle Ages saw the development of many technological devices that produced long-lasting effects on technology and society.
TD.7.7	The Renaissance, a time of rebirth of the arts and humanities, was also an important development in the history of technology.
TD.7.8	The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.
TD.7.9	The Information Age places emphasis on the processing and exchange of information.

Design

Standard 8: Develop an understanding of the attributes of design

Students will understand that:

TD.8.1 The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.

TD.8.2 Design problems are seldom presented in a clearly defined form.

TD.8.3 The design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved.

TD.8.4 Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.

Standard 9: Develop an understanding of engineering design

Students will understand that:

TD.9.1 Established design principles are used to evaluate existing designs, to collect data, and to guide the design process.

TD.9.2 Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

TD.9.3 A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

Standard 10: Develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem-solving

Students will understand that:

TD.10.1 Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.

TD.10.2 Technological problems must be researched before they can be solved.

TD.10.3 Not all problems are technological, and not every problem can be solved using technology.

TD.10.4 Many technological problems require a multidisciplinary approach.

Abilities for A Technological World

Standard 11: Develop abilities to apply the design process

Students will be able to:

TD.11.1 Identify the design problem to solve and decide whether or not to address it.

TD.11.2 Identify criteria and constraints and determine how these will affect the design process.

TD.11.3 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.

TD.11.4 Develop and produce a product or system using a design process.

TD.11.5 Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.

Standard 12: Develop abilities to use and maintain technological products and systems

Students will be able to:

TD.12.1 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.

TD.12.2 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it.

TD.12.3 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.

TD.12.4 Operate systems so that they function in the way they were designed.

Standard 13: Develop an understanding of and be able to assess the impact of products and systems

Students will be able to:

TD.13.1 Collect information and evaluate its quality.

TD.13.2 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and environment.

TD.13.3 Use assessment techniques, such as trend analysis and experimentation, to make decisions about the future development of technology.

TD.13.4 Design forecasting techniques to evaluate the results of altering natural systems.

The Designed World

Standard 14: Develop an understanding of and be able to select and use communications, manufacturing, construction, transportation, energy and power technologies

Students will know and understand:

TD.14.1 There are many ways to communicate information, such as graphic and electronic means.

TD.14.2 Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.

TD.14.3 The interchangeability of parts increases the effectiveness of manufacturing processes.

TD.14.4 Marketing involves establishing a product's identity, conducting research on its potential, advertising it, distributing it, and selling it.

TD.14.5 Infrastructure is the underlying base or basic framework of a system.

TD.14.6 Structures are constructed using a variety of processes and procedures.

TD.14.7 The design of structures includes a number of requirements.

TD.14.8 Structures require maintenance, alteration, or renovation periodically to improve them or to alter their intended use.

TD.14.9 Structures can include prefabricated materials.