2020 STEL Benchmarks **5/11/2020**

Grade Band	STEL Benchmark
	STEL 1 Nature and Characteristics of Technology and Engineering
Pre-K-2	**1A.** Compare the natural world and human-made world.
Pre-K-2	**1B.** Explain the tools and techniques that people use to help them do things.
Pre-K-2	**1C.** Demonstrate that creating can be done by anyone.
Pre-K-2	**1D.** Discuss the roles of scientists, engineers, technologists and others who work with technology.
3-5	**1E** Compare how things found in nature differ from things that are human-made, noting differences and similarities in how they are produced and used.
3-5	**1 F**. Describe the unique relationship between science and technology, and how the natural world can contribute to the human-made world to foster innovation.
3-5	**1 G.** Differentiate between the role of scientists, engineers, technologists and others in creating and maintaining technological systems.
3-5	**1 H**. Design solutions by safely using tools, materials, and skills.
3-5	**1 I.** Explain how solutions to problems are shaped by economic, political and cultural forces.
6-8	**1J.** Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.
6-8	**1 K.** Compare and contrast the contributions of science, engineering, mathematics and technology in the development of technological systems.
6-8	**1 L.** Explain how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations.
6-8	**1 M.** Apply creative problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.
9-12	**1 N.** Explain how the world around them guides technological development and engineering design.
9-12	**1 O**. Assess how similarities and differences among scientific, mathematics, engineering, and technological knowledge and skills contributed to the design of a product or system.
9-12	**1P.** Analyze the rate of technological development and predict future diffusion and adoption of new technologies.
9-12	**1 Q**. Conduct research to inform intentional inventions and innovations that address specific needs and wants.
9-12	**1 R.** Develop a plan that incorporates knowledge from science, mathematics, and other disciplines to design or improve a technological product or system.
	STEL 2 Core Concepts of Technology and Engineering

Pre-K-2	**2A.** Illustrate how systems have parts or components that work together to accomplish a goal.
Pre-K-2	**2B.** Safely use tools to complete tasks.
Pre-K-2	**2C.** Explain that materials are selected for use because they possess desirable properties and characteristics.
Pre-K-2	**2D.** Develop a plan in order to complete a task.
Pre-K-2	**2E.** Collaborate effectively as a member of a team.
3-5	**2F.** Describe how a subsystem is a system that operates as a part of another, larger system.
3-5	**2G**. Illustrate how, when parts of a system are missing, it may not work as planned.
3-5	**2H**. Identify the resources needed to get a technical job done, such as people, materials, capital, tools, machines, knowledge, energy, and time.
3-5	**2I.** Describe the properties of different materials.
3-5	**2J.** Demonstrate how tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.
3-5	**2K.** Describe requirements of designing or making a product or system.
3-5	**2L.** Create a new product that improves someone's life.
6-8	**2M.** Differentiate between inputs, processes, outputs, and feedback in technological systems.
6-8	**2N.** Illustrate how systems thinking involves considering relationships between every part, as well as how the system interacts with the environment in which it is used**.**
6-8	**2O.** Create an open-loop system that has no feedback path and requires human intervention.
6-8	**2P**. Create a closed-loop system that has a feedback path and requires no human intervention.
6-8	**2Q.** Predict outcomes of a future product or system at the beginning of the design process.
6-8	**2R.** Compare how different technologies involve different sets of processes.
6-8	**2S.** Defend decisions related to a design problem.
9-12	**2T**. 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.
9-12	**2U.** Diagnose a flawed system embedded within a larger technological, social, or environmental system.
9-12	**2V.** 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.
9-12	**2W**. Select resources that involve tradeoffs between competing values, such as availability, cost, desirability, and waste while solving problems.
9-12	**2X**. Cite examples of the criteria and constraints of a product or system and how they affect final design.
9-12	**2Y.** Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.
9-12	**2Z.** Use management processes in planning, organizing, and controlling work.

	STEL 3 Integration of Knowledge, Technologies, and Practices
Pre-K-2	**3A.** Apply concepts and skills from technology and engineering activities that reinforce concepts and skills across multiple content areas.
Pre-K-2	**3B**. Draw connections between technology and human experiences.
3-5	**3C**. Demonstrate how simple technologies are often combined to form more complex systems.
3-5	**3D.** Explain how various relationships can exist between technology and engineering and other content areas.
6-8	**3E**. Analyze how different technological systems often interact with economic, environmental, and social systems.
6-8	**3F.** Apply a product, system or process developed for one setting to another setting.
6-8	**3G.** Explain how knowledge gained from other content areas affects the development of technological products and systems.
9-12	**3H.** Analyze how technology transfer occurs when a user applies an existing innovation developed for one function for a different purpose.
9-12	**3I.** Evaluate how technology enhances opportunities for new products and services through globalization.
9-12	**3J.** Connect technological progress to the advancement of other areas of knowledge and vice versa.
	STEL 4 Impacts of Technology
Pre-K-2	**4A.** Explain ways that technology helps with everyday tasks.
Pre-K-2	**4B.** Illustrate helpful and harmful effects of technology.
Pre-K-2	**4C.** Compare simple technologies to evaluate their impacts.
Pre-K-2	**4D.** Select ways to reduce, reuse, and recycle resources in daily life.
Pre-K-2	**4E.** Design new technologies that could improve their daily lives.
3-5	**4F.** Describe the helpful and harmful effects of technology.
3-5	**4G**. Judge technologies to determine the best one to use to complete a given task or meet a need.
3-5	**4H.** Classify resources used to create technologies as either renewable or non-renewable.
3-5	**4I.** Explain why responsible use of technology requires sustainable management of resources.
3-5	**4J.** Predict how certain aspects of their daily lives would be different without given technologies.
6-8	**4K.** Examine the ways that technology can have both positive and negative effects at the same time.
6-8	**4L.** Analyze how the creation and use of technologies consumes renewable and non-renewable resources and creates waste.
6-8	**4M.** Devise strategies for reducing, reusing, and recycling waste caused from the creation and use of technology.

6-8	**4N.** Analyze examples of technologies that have changed the way people think, interact, and communicate.
6-8	**4O.** Hypothesize what alternative outcomes (individual, cultural, and/or environmental) might have resulted had a different technological solution been selected.
9-12	**4P.** Evaluate ways that technology can impact individuals, society, and the environment.
9-12	**4Q.** Critique whether existing or proposed technologies use resources sustainably.
9-12	**4R.** Assess a technology that minimizes resource use and resulting waste to achieve a goal.
9-12	**4S.** Develop a solution to a technological problem that has the least negative environmental and social impact.
9-12	**4T.** Evaluate how technologies alter human health and capabilities.
	STEL 5 Influence of Society on Technological Development
PreK-2	**5A.** Explain the needs and wants of individuals and societies.
PreK-2	**5B.** Explore how technologies are developed to meet individual and societal needs and wants.
PreK-2	**5C.** Investigate the use of technologies in the home and community.
3-5	**5D**. Determine factors that influence changes in a society's technological systems or infrastructure.
3-5	**5E**. Explain how technologies are developed or adapted when individual or societal needs and wants change.
6-8	**5F.** Analyze how an invention or innovation was influenced by its historical context.
6-8	**5G.** Evaluate trade-offs based on various perspectives as part of a decision process that recognizes the need for careful compromises among competing factors.
9-12	**5H**. Evaluate a technological innovation that arose from a specific society's unique need or want.
9-12	**5I.** Evaluate a technological innovation that was met with societal resistance impacting its development.
9-12	**5J**. Design an appropriate technology for use in a different culture.
	STEL 6 History of Technology
PreK-2	**6A.** Discuss how the way people live and work has changed throughout history because of technology.
3-5	**6B.** Create representations of the tools people made, how they cultivated to provide food, made clothing, and built shelters to protect themselves.
6-8	**6C.** Compare various technologies and how they have contributed to human progress.
6-8	**6D**. Engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements.
6-8	**6E**. Verify how specialization of function has been at the heart of many technological improvements.
9-12	**6F.** Relate how technological development has been evolutionary, often the result of a series of refinements to basic inventions or technological knowledge.
9-12	**6G.** Verify that the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools, materials and processes.

9-12	**6H**. Evaluate how technology has been a powerful force in reshaping the social, cultural, political, and economic landscapes throughout history.
9-12	**6I**. 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.
9-12	**6J**. Investigate the widespread changes that have resulted from the Information Age, which has placed emphasis on the processing and exchange of information.
	STEL 7 Design in Technology and Engineering Education
PreK-2	**7A.** Apply design concepts, principles, and processes through play and exploration.
PreK-2	**7B.** Demonstrate that designs have requirements.
PreK-2	**7C.** Explain that design is a response to wants and needs.
PreK-2	**7D.** Discuss that all designs have different characteristics that can be described.
PreK-2	**7E.** Illustrate that there are different solutions to a design and that none are perfect.
PreK-2	**7F.** Differentiate essential skills of the technology and engineering design process.
PreK-2	**7G.** Apply skills necessary for making in design.
3-5	**7H.** Illustrate that there are multiple approaches to design.
3-5	**7I.** Apply the technology and engineering design process.
3-5	**7J.** Evaluate designs based on criteria, constraints and standards.
3-5	**7K.** Interpret how good design improves the human condition.
3-5	**7L.** Apply universal principles and elements of design.
3-5	**7M.** Evaluate the strengths and weaknesses of existing design solutions, including their own solutions.
3-5	**7N.** Practice successful design skills.
3-5	**7O.** Apply tools, techniques, and materials in a safe manner as part of the design process.
6-8	**7P.** Illustrate the benefits and opportunities associated with different approaches to design.
6-8	**7Q.** Apply the technology and engineering design process.
6-8	**7R.** Refine design solutions to address criteria and constraints.
6-8	**7S.** Create solutions to problems by identifying and applying human factors in design.
6-8	**7T.** Assess design quality based upon established principles and elements of design.
6-8	**7U.** Evaluate the strengths and weaknesses of different design solutions.
6-8	**7V**. Improve essential skills necessary to successfully design.
9-12	**7W.** Determine the best approach by evaluating the purpose of the design.
9-12	**7X.** Document trade-offs in the technology and engineering design process to produce the optimal design.
9-12	**7Y**. Optimize a design by addressing desired qualities within criteria and constraints.
9-12	**7Z.** Apply principles of human-centered design.

9-12	**7AA**. Illustrate principles, elements and factors of design.
9-12	**7BB**. Implement the best possible solution to a design.
9-12	**7CC.** Apply a broad range of design skills to their design process.
9-12	**7DD.** Apply a broad range of making skills to their design process.
	STEL 8 Applying, Maintaining, and Assessing Technological Products and Systems
PreK-2	**8A**. Analyze how things work.
PreK-2	**8B**. Identify and use everyday symbols.
PreK-2	**8C.** Describe qualities of everyday products.
3-5	**8D**. Follow directions to complete a technological task.
3-5	**8E.** Use appropriate symbols, numbers and words to communicate key ideas about technological products and systems.
3-5	**8F**. Identify why a product or system is not working properly.
3-5	**8G.** Examine information to assess the trade-offs of using a product or system.
6-8	**8H.** Research information from various sources to use and maintain technological products or systems.
6-8	**8I**. Use tools, materials, and machines to safely diagnose, adjust, and repair systems.
6-8	**8J**. Use devices to control technological systems.
6-8	**8K**. Design methods to gather data about technological systems.
6-8	**8L**. Interpret the accuracy of information collected.
6-8	**8M.** Use instruments to gather data on the performance of everyday products.
9-12	**8N.** Use various approaches to communicate processes and procedures for using, maintaining, and assessing technological products and systems.
9-12	**8O.** Develop a device or system for the marketplace.
9-12	**8P.** Apply appropriate methods to diagnose, adjust and repair systems to ensure precise, safe and proper functionality.
9-12	**8Q.** Synthesize data and analyze trends to make decisions about technological products, systems or processes.
9-12	**8R.** Interpret the results of technology assessment to guide policy development.