Grade, Subject/Course: 6th grade, Technology and Engineering	
Unit: Engineering Design Process	**___x__ Essential _____ Important _____ Compact**
Big Idea: How do engineers solve a problem?	
PA Core Content Standards/Anchors (or National Standards): 3.5.6-8.A Students who demonstrate understanding can research information from various sources to use and maintain technological products or systems. 3.5.6-8.B Students who demonstrate understanding can use instruments to gather data on the performance of everyday products. 3.5.6-8.C Students who demonstrate understanding can hypothesize what alternative outcomes (individual, cultural, and/or environmental) might have resulted had a different technological solution been selected. 3.5.6-8.D Students who demonstrate understanding can analyze how the creation and use of technologies consumes renewable, non-renewable, and inexhaustible resources; creates waste; and may contribute to environmental challenges. 3.5.6-8.F Students who demonstrate understanding can analyze examples of technologies that have changed the way people think, interact, live, and communicate. 3.5.6-8.J Students who demonstrate understanding can use tools, materials, and machines to safely diagnose, adjust, and repair systems. 3.5.6-8.L Students who demonstrate understanding can design methods to gather data about technological systems. 3.5.6-8.M Students who demonstrate understanding can develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. 3.5.6-8.N Students who demonstrate understanding can analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. 3.5.6-8.P Students who demonstrate understanding can evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. 3.5.6-8.Q Students who demonstrate understanding can apply a technology and engineering design thinking process. 3.5.6-8.U Students who demonstrate understanding can evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design.	**Interdisciplinary Standards (if applicable):** **Math:** CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools. CC.2.4.8.B.1 Analyze and/or interpret bivariate data displayed in multiple representations. **Reading and Writing:** CC.3.5.6-8B 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. 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. CC.3.6.6-8.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.I Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. CC.3.6.6-8.H Draw evidence from informational texts to support analysis, reflection, and research.

3.5.6-8.V Students who demonstrate understanding can refine design solutions to address criteria and constraints. 3.5.6-8.Y Students who demonstrate understanding can compare, contrast, and identify overlap between the contributions of science, technology, engineering, and mathematics in the development of technological systems. 3.5.6-8.BB Students who demonstrate understanding can demonstrate how knowledge gained from other content areas affects the development of technological products and systems. 3.5.6-8.DD Students who demonstrate understanding can engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements. 3.5.6-8.II Students who demonstrate understanding can predict outcomes of a future product or system at the beginning of the design process. 3.5.6-8.KK Students who demonstrate understanding can explain how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations. 3.5.6-8.JJ Students who demonstrate understanding can apply informed problem-solving strategies to the improvement of existing devices or processes or the development of new approaches. 3.5.6-8.LL Students who demonstrate understanding can compare how different technologies involve different sets of processes.	
Essential Questions: ● How is the design process used to solve a problem? ● What design is the best for a tower to hold a lot of weight without using a lot of material? ● What boat hull design is the best to hold a lot of weight? ● Which blade design creates the most electricity in a wind turbine?	**Understandings:** Students will understand that… ● There are several ways that engineers solve a problem. ● Solutions to a problem are based on affordability or urgency. ● Solutions to a problem impact the environment. ● Solutions to a problem have criteria and constraints.
Knowledge: Students will know…. ● How to use technological design & problem solving. ● How ideas are made into technological products or systems. ● The forces on a structure.	**Do/Skills:** Students will be able to… ● Demonstrate critical thinking ● Demonstrate collaboration ● Demonstrate creativity ● Demonstrate communication

Vocabulary: Empathize, Define, Ideate, Prototype, Test, Assess Primary member, secondary member, strength-to-weight ratio Buoyancy, volume, Renewable, pitch, generator, multimeter	**Core Resources:** Teacher generated instructions Tower lesson plan Tower Challenge Boat Lesson Plan Boat Challenge Wind Turbine Lesson Plan Wind Turbine Challenge
Common Assessment(s): Tower STEM Showcase Boat STEM Showcase Wind Turbine STEM Showcase	**Supplemental Resources:** https://pbskids.org/designsquad/build/ https://www.iteea.org/EbD.aspx

Grade, Subject/Course: 6th grade, Technology and Engineering	
Unit: Communication	**___x__ Essential _____ Important _____ Compact**
Big Idea: How can AI help to create a message that will be inspirational to a large audience?	
PA Core Content Standards/Anchors (or National Standards): ● 3.5.6-8.F Students who demonstrate understanding can analyze examples of technologies that have changed the way people think, interact, live, and communicate. ● 3.5.6-8.P Students who demonstrate understanding can evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. ● 3.5.6-8.Q Students who demonstrate understanding can apply a technology and engineering design thinking process.	**Interdisciplinary Standards (if applicable):** **Reading and Writing:** CC.3.5.6-8B 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. 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. CC.3.6.6-8.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).

• 3.5.6-8.S Students who demonstrate understanding can illustrate the benefits and opportunities associated with different approaches to design. • 3.5.6-8.U Students who demonstrate understanding can evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design. • 3.5.6-8.V Students who demonstrate understanding can refine design solutions to address criteria and constraints. • 3.5.6-8.X Students who demonstrate understanding can defend decisions related to a design problem. • 3.5.6-8.KK Students who demonstrate understanding can explain how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations.	CC.3.5.6-8.I Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. CC.3.6.6-8.H Draw evidence from informational texts to support analysis, reflection, and research.
Essential Questions: • How do you make an inspirational message that a large audience will understand? • How can you use graphic design principles to improve your design?	**Understandings:** Students will understand … • examples of technologies that have changed the way people think, interact, live, and communicate. • the benefits and opportunities associated with different approaches to design.
Knowledge: Students will know… • how to apply a technology and engineering design thinking process. • how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations.	**Do/Skills:** Students will be able to… • evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. • evaluate and assess the strengths and weaknesses of various design solutions given established principles and elements of design. • defend decisions related to a design problem.
Vocabulary: Empathize, Define, Ideate, Prototype, Test, Assess Medium, AI, contrast, font, negative space	**Core Resources:** STEM Infographic Lesson Plan

Common Assessment(s):	**Supplemental Resources:**
Inspirational Poster Grading Rubric	Canva.com