

Grade Band	STL Benchmark	NGSS (2013)	Score 1-5	CCSS Math	Score 1-5	CCSS ELA	Score 1-5
	STEL 1 Nature and Characteristics of Technology and Engineering						
Pre-K-2	1A. Compare the natural world and human-made world.	K-2-ETS1-1 Ask questions based on observations to find more information about the natural and/or designed world(s).		K.MD.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.		<u>ELA-Literacy.SL.K.3</u> Ask and answer questions in order to seek help, get information, or clarify something that is not understood.	
Pre-K-2	1B. Explain the tools and techniques that people use to help them do things.	2-PS1-3 Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.		1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points.		<u>ELA-Literacy.SL.1.4</u> Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.	
Pre-K-2	1C. Recognize that creating can be done by anyone.	ETS1.A A situation that people want to change or create can be approached as a problem to be solved through engineering.		K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.		<u>ELA-Literacy.W.K.2</u> Use a combination of drawing, dictating, and writing to compose informative /explanatory texts in which they name what they are writing about and supply some information about the topic.	
Pre-K-2	1D. Discuss the roles of scientists, engineers, technologists and others who work with technology.	2-PS1-2 Influence of Engineering, Technology, and Science on Society and Natural World				<u>ELA-Literacy.W.1.7</u> Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions).	

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-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.		5.G.4 Classify two-dimensional figures in a hierarchy based on properties.		<u>ELA-Literacy.W.3.7</u> Conduct short research projects that build knowledge about a topic.	
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.	5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the earth's resources and environment.				<u>ELA-Literacy.RI.3.3</u> Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.	
3-5	1 G. Differentiate between the role of scientists, engineers, technologists and others in creating and maintaining technological systems.	3-5-ETS1-2 At whatever stages, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.				<u>ELA-Literacy.W.5.7</u> Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.	
3-5	1 H. Design solutions by safely using tools, materials, and skills.	3-5-TS1-1 Possible solutions to a problem are limited by available materials and resources.		5.G.2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.		<u>ELA-Literacy.RI.5.7</u> Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.	
3-5	1 I. Explain how solutions to problems are shaped by economic, political and cultural forces.	3-5-ETS1-2 Research on a problem should be carried out before beginning to design a solution.		5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.		<u>ELA-Literacy.RI.4.3</u> Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.	

6-8	1J. Develop innovative objects and systems that solve problems and extend capabilities based on individual or collective needs and wants.	MS-ETS1-4 The iterative process of testing the most promising solutions and modifying what is proposed on the basis of test results leads to greater refinement and ultimately to an optimal solution.		7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.		<u>ELA-Literacy.W.7.7</u> Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.
6-8	1 K. Compare and contrast the contributions of science, engineering, and technologists in the development of technological systems.			6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.RI.6.7</u> Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
6-8	1 L. Investigate how technology and engineering are closely linked to creativity, which can result in both intended and unintended innovations.	MS-ETS1-4 Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.RST.6-8.8</u> Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
6-8	1 M. Apply creative problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.	MS-ETS1-3 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.		7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.		<u>ELA-Literacy.RI.7.3</u> Analyze the interactions between individuals, events, and ideas in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events).
9-12	1 N. Explain how the world around them guides technological development and engineering design.	HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal need and wants.		N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.		<u>ELA-Literacy.RST.9-10.2</u> Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an

						accurate summary of the text.	
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.	HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.		S-IC.6 Evaluate reports based on data.		<u>ELA-Literacy.RST.9-10.9</u> Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	
9-12	1P. Analyze the rate of technological development and predict future diffusion and adoption of new technologies.	HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.		N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.		<u>ELA-Literacy.RST.9-10.3</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	
9-12	1 Q. Conduct research to inform intentional inventions and innovations that address specific needs and wants.	S-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal need and wants.		S-MD.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).		<u>ELA-Literacy.W.9-10.7</u> Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	

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.	HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.RST.9-10.8</u> Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.	
	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.	2-PS1-3 Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.		1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points.		<u>ELA-Literacy.W.K.2</u> Use a combination of drawing, dictating, and writing to compose informative /explanatory texts in which they name what they are writing about and supply some information about the topic.	
Pre-K-2	2B. Safely use tools to complete tasks.	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.		<u>ELA-Literacy.SL.K.3</u> Ask and answer questions in order to seek help, get information, or clarify something that is not understood.	
Pre-K-2	2C. Explain that materials are selected for use because they possess desirable properties and characteristics.	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yard sticks, meter sticks, and measuring tapes.			

Pre-K-2	2D. Develop a plan in order to complete a task.	K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.		2.MD.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.		ELA-Literacy.SL.1.5 Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.	
Pre-K-2	2E. Collaborate effectively as a member of a team	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points.		ELA-Literacy.SL.1.1.b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.	
3-5	2F. Describe how a subsystem is a system that operates as a part of another larger system.	3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.		4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.		ELA-Literacy.W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.	
3-5	2G. Illustrate how, when parts of a system are missing, it may not work as planned.	3-5-ETS1.A Possible solutions to a problem are limited by available materials and resources (constraints).		4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.		ELA-Literacy.W.5.1.b Provide logically ordered reasons that are supported by facts and details.	

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 ETS 1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.		5.OA.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.		ELA-Literacy.W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
3-5	2I. Describe the properties of different materials.	5-PS1-3 Make observations to identify materials based on their properties.		4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money...		ELA-Literacy.W.4.2.b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
3-5	2J. Demonstrate how tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.	ETS1.A: Defining and Delimiting Engineering Problems: Possible solutions to a problem are limited by available materials and resources (constraints).		3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.		ELA-Literacy.W.5.2.b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
3-5	2K. Describe requirements of designing or making a product or system.	3-5 ETS1.A. The success of a designed solution is determined by considering the desired features of a solution (criteria).		5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.		ELA-Literacy.L.3.6 Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal spatial and temporal relationships.
3-5	2L. Create a new product that improves someone's life.	3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.		4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.		ELA-Literacy.W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.

6-8	2M. Differentiate between inputs, processes, outputs, and feedback in technological systems.	MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		6.SP.5 Summarize numerical data sets in relation to their context.		ELA-Literacy.SL.6.2 Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.	
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.	ETS1.B: Developing Possible Solutions: Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.		6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.		ELA-Literacy.W.7.7 Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.	
6-8	2O. Create an open-loop system that has no feedback path and requires human intervention.	ETS1.B: Developing Possible Solutions: There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.		6.SP.5 Summarize numerical data sets in relation to their context.		ELA-Literacy.W.6.2.b Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.	
6-8	2P. Create a closed-loop system that has a feedback path and requires no human intervention.	ETS1.B: Developing Possible Solutions: There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.		6.SP.5 Summarize numerical data sets in relation to their context.		ELA-Literacy.W.6.2.b Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.	
6-8	2Q. Predict outcomes of a future product or system at the beginning of the design process.	ETS1.C The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately an optimal solution		6.SP.5 Summarize numerical data sets in relation to their context.		ELA-Literacy.W.8.7 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.	

6-8	2R. Compare how different technologies involve different sets of processes.	MS-ETS 1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.RST.6-8.9</u> Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
6-8	2S. Defend decisions related to a design problem.	MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest.		<u>ELA-Literacy.SL.7.2</u> Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.
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.	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants		N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.		<u>ELA-Literacy.RI.11-12.7</u> Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve.
9-12	2U. Diagnose a flawed system embedded within a larger technological, social, or environmental system.	HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.W.9-10.7</u> Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

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.	ETS1.C: Optimizing the Design Solution: Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed.		S-IC.6 Evaluate reports based on data.		<u>ELA-Literacy.RST.9-10.5</u> Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., <i>force, friction, reaction force, energy</i>).
9-12	2W. Select resources that involve tradeoffs between competing values, such as availability, cost, desirability, and waste while solving problems.	HS-ETS1-2. Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed		N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.		<u>ELA-Literacy.RST.9-10.1</u> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
9-12	2X. Cite examples of the criteria and constraints of a product or system and how they affect final design.	HSETS1-3. When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts		N-Q. 3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.		<u>ELA-Literacy RST. 9-10.1</u> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
9-12	2Y. Implement quality control as a planned process to ensure that a product, service, or system meets established criteria.	HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g. using simulation.		<u>ELA-Literacy.RST.9-10.3</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

9-12	2Z. Use management processes in planning, organizing, and controlling work.	ETS1.A: Defining and Delimiting Engineering Problems: Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.		S-IC.6 Evaluate reports based on data.		ELA-Literacy.SL.9-10.1.d Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of evidence and reasoning presented.	
	STEL 3 Integration of Knowledge, Technologies, and Practices From Other Content Areas						
Pre-K-2	3A. Apply concepts and skills from technology and engineering activities that reinforce concepts and skills across multiple content areas.	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		2.MD.10 Draw a picture graph and bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph		ELA-Literacy.SL.1.4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.	
Pre-K-2	3B. Draw connections between technology and human experiences.	K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.		1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points.		ELA-Literacy.RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.	
3-5	3C. Demonstrate how simple technologies are often combined to form more complex systems.	ETS1.C: Optimizing the Design Solution: Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints		4.MD.2 Use four operations to solve word problems involving distances, intervals of time, liquid, volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.		ELA-Literacy.W.4.2.b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.	

3-5	3D. Explain how various relationships can exist between technology and engineering and other content areas.	3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.		5.G.4 Classify two-dimensional figures in a hierarchy based on properties.		<u>ELA-Literacy.RI.5.3</u> Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.	
6-8	3E. Analyze how different technological systems often interact with economic, environmental, and social systems.	ETS1.C Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process - that is, some of these characteristics may be incorporated into the new design.		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.SL.6.2</u> Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.	
6-8	3F. Apply a product, system or process developed for one setting to another setting.	MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.W.7.1</u> Write arguments to support claims with clear reasons and relevant evidence.	
6-8	3G. Explain how knowledge gained from other content areas affects the development of technological objects and systems.	ETS1.C: Optimizing the Design Solution: The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.W.8.9</u> Draw evidence from literary or informational texts to support analysis, reflection, and research.	

9-12	3H. Analyze how technology transfer occurs when a user applies an existing innovation developed for one function for a different purpose.	HS-PS3-3 Design, build, and refine a device that works within given constraints to convert on form of energy into another form of energy		S-MD.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).		<u>ELA-Literacy.W.9-10.2</u> Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content	
9-12	3I. Evaluate how technology enhances opportunities for new products and services through globalization.	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		S-IC.6 Evaluate reports based on data.		<u>ELA-Literacy.W.8.9</u> Draw evidence from literary or informational texts to support analysis, reflection, and research.	
9-12	3J. Connect technological progress to the advancement of other areas of knowledge.	ETS1.A: Defining and Delimiting Engineering Problems: Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.RST.6-8.1</u> Cite specific textual evidence to support analysis of science and technical texts.	
	STEL 4 Impacts of Technology						
Pre-K-2	4A. Explain ways that technology helps with everyday tasks..	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.		<u>ELA-Literacy.W.K.2</u> Use a combination of drawing, dictating, and writing to compose informative explanatory texts in which they name what they are writing about and supply some information about the topic.	

Pre-K -2	4B. Illustrate helpful and harmful effects of technology.	2-PS1-2 Analyze data obtained from testing different materials to determine which materials have properties that are best suited for their intended purpose.		1.G.1 Distinguish between defining attributes versus non-defining attributes; build and draw shapes to possess defining attributes.		ELA-Literacy.RL.2.1 Ask and answer such questions as <i>who, what, where, when, why, and how</i> to demonstrate understanding of key details in a text.	
Pre-K -2	4C. Compare simple technologies to evaluate their impacts.	K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.		K.MD.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.		ELA-Literacy.SL.1.1.b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.	
Pre-K -2	4D. Select ways to reduce, reuse, and recycle resources in daily life.	K-ESS2-2 Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.		K.MD.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.		ELA-Literacy.L.1.5.c Identify real-life connections between words and their use (e.g., note places at home that are cozy).	
Pre-K -2	4E. Design new technologies that could improve their daily lives.	ETS1.A: Defining and Delimiting Engineering Problems: A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)		K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.		ELA-Literacy.L.2.5.a Identify real-life connections between words and their use (e.g., <i>describe foods that are spicy or juicy</i>).	
3-5	4F. Describe the helpful and harmful effects of technology.	ETS1.B: Developing Possible Solutions: Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)		4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.		ELA-Literacy.SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.	

3-5	4G. Judge technologies to determine the best one to use to complete a given task or meet a need.	3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.		4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.		ELA-Literacy.W.3.7 Conduct short research projects that build knowledge about a topic.	
3-5	4H. Classify resources used to create technologies as either renewable or non-renewable.	ETS1.A: Defining and Delimiting Engineering Problems: Possible solutions to a problem are limited by available materials and resources (constraints).		5.G.4 Classify two-dimensional figures in a hierarchy based on properties.		ELA-Literacy.W.5.1.b Provide logically ordered reasons that are supported by facts and details.	
3-5	4I. Explain why responsible use of technology requires sustainable management of resources.	ESS3.C: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.		3.OA.8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.		ELA-Literacy.W.4.1.b Provide reasons that are supported by facts and details.	
3-5	4J. Predict how certain aspects of their daily lives would be different without given technologies.	ETS1.B: Developing Possible Solutions: At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)		5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.		ELA-Literacy.W.3.1.a Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.	

6-8	4K. Examine the ways that technology can have both positive and negative effects at the same time.	MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.		<u>ELA-Literacy.W.7.2</u> Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
6-8	4L. Analyze how the creation and use of technologies consumes renewable and non-renewable resources and creates waste.	ETS1.B: Developing Possible Solutions: A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4)		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.RST.6-8.7</u> 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).
6-8	4M. Devise strategies for reducing, reusing, and recycling waste caused from the creation and use of technology.	ETS1.B: Developing Possible Solutions: There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-3)		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.RST.6-8.3</u> Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
6-8	4N. Analyze examples of technologies that have changed the way people think, interact, and communicate.	MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.W.6.9</u> Draw evidence from literary or informational texts to support analysis, reflection, and research.

6-8	4O. Hypothesize what alternative outcomes (individual, cultural, and/or environmental) might have resulted had a different technological solution been selected.	MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.W.8.7</u> 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.
9-12	4P. Evaluate ways that technology can impact individuals, society, and the environment.	HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.		N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.		<u>ELA-Literacy.RI.11-12.7</u> Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
9-12	4Q. Critique how sustainably existing or proposed technologies use resources.	HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.W.9-10.1</u> Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9-12	4R. Assess a technology that minimizes resource use and resulting waste to achieve a goal.	HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.		S-MD.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).		<u>ELA-Literacy.RST.9-10.3</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

9-12	4S. Evaluate a solution to a technological problem that has the least negative environmental and social impact.	ETS1.B: Developing Possible Solutions: When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)		N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.		<u>CCSS.ELA-Literacy.RST.9-10.1</u> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	
9-12	4T. Evaluate how technologies alter human health and capabilities.	HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.		S-IC.6 Evaluate reports based on data.		<u>CCSS.ELA-Literacy.W.9-10.9</u> Draw evidence from literary or informational texts to support analysis, reflection, and research.	
	STEL 5 Influence of Society on Technological Development						
PreK-2	5A. Explain the needs and wants of individuals and societies.	ETS1.A: Defining and Delimiting Engineering Problems: A situation that people want to change or create can be approached as a problem to be solved through engineering.		K.MD.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.		<u>ELA-Literacy.RI.1.7</u> Use the illustrations and details in a text to describe its key ideas.	
PreK-2	5B. Explore how technologies are developed to meet individual and societal needs and wants.	K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.		1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points.		<u>ELA-Literacy.SL.K.3</u> Ask and answer questions in order to seek help, get information, or clarify something that is not understood.	
PreK-2	5C. Investigate the use of technologies in the home and community.	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points.		<u>CCSS.ELA-Literacy.W.2.7</u> Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).	

3-5	5D. Determine factors that influence changes in a society's technological systems or infrastructures.	3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.		3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.		ELA-Literacy.W.4.2.b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.	
3-5	5E. Explain how technologies are developed or adapted when individual or societal needs and wants change.	ETS1.C: Optimizing the Design Solution: Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)		5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.		CCSS.ELA-Literacy.W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.	
6-8	5F. Analyze how an invention or innovation was influenced by its historical context.	MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.		6.SP.5 Summarize numerical data sets in relation to their context		ELA-Literacy.RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.	
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.	ETS1.A: Defining and Delimiting Engineering Problems: The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		ELA-Literacy.W.8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.	
9-12	5H. Evaluate a technological innovation that arose from a specific society's unique need or want.	HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.		S-IC.6 Evaluate reports based on data.		ELA-Literacy.W.9-10.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.	

9-12	5I. Evaluate a technological innovation that was met with societal resistance impacting its development.	HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.		<u>ELA-Literacy.W.9-10.7</u> Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
9-12	5J. Design an appropriate technology for use in a different culture.	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		S-MD.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).		<u>CCSS.ELA-Literacy.SL.9-10.1.d</u> Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.	
	STEL 6 History of Technology						
PreK-2	6A. Discuss how the way people live and work has changed throughout history because of technology.	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects.		<u>ELA-Literacy.RI.2.3</u> Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.	

3-5	6B. Create representations of the tools people made, how they cultivated to provide food, made clothing, and built shelters to protect themselves.	5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the earth's resources and environment.		4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.		<u>ELA-Literacy.RI.4.3</u> Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
6-8	6C. Compare various technologies and how they have contributed to human progress.	ETS1.B: Developing Possible Solutions: There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2),		7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest.		<u>ELA-Literacy.RI.7.3</u> Analyze the interactions between individuals, events, and ideas in a text (e.g., how ideas influence individuals or events, or how individuals influence ideas or events)
6-8	6D. Engage in a research and development process to simulate how inventions and innovations have evolved through systematic tests and refinements.	MS-ETS1-4. 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.		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.W.8.7</u> 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.
6-8	6E. Verify how specialization of function has been at the heart of many technological improvements.	MS-ETS1-4. 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.		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.W.6.2.b</u> Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.
9-12	6F. Recognize that technological development has been evolutionary, often the result of a series of refinements to basic inventions or technological knowledge.	HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.		<u>ELA-Literacy.RST.9-10.2</u> Determine the central ideas or conclusions of a text, trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an

						accurate summary of the text.	
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.	HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.RI.11-12.7</u> Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.	
9-12	6H. Evaluate how technology has been a powerful force in reshaping the social, cultural, political, and economic landscapes throughout history.	HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.W.9-10.2</u> Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.	
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.	HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.W.9-10.7</u> Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject,	

						demonstrating understanding of the subject under investigation.	
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.	HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.		S-IC.6 Evaluate reports based on data.		<u>ELA-Literacy.W.9-10.6</u> Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	
	STEL 7 Design in Technology and Engineering Education						
PreK-2	7A. Apply design concepts, principles, and processes through play and exploration.	2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.		K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.		<u>ELA-Literacy.SL.K.1</u> Participate in collaborative conversations with diverse partners about <i>kindergarten topics and texts</i> with peers and adults in small and larger groups.	
PreK-2	7B. Recognize that designs have requirements.	ETS1.A: Defining and Delimiting Engineering Problems: A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)		1.G.1 Distinguish between defining attributes versus non-defining attributes; build and draw shapes to possess defining attributes.		<u>ELA-Literacy.2.1.a.</u> Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).	

PreK-2	7C. Explain that design is a response to wants and needs.	ETS1.A: Defining and Delimiting Engineering Problems: Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)		1.G.1 Distinguish between defining attributes versus non-defining attributes; build and draw shapes to possess defining attributes.		ELA-Literacy.SL.1.4 Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.	
PreK-2	7D. Discuss that all designs have different characteristics that can be described.	K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.		K.MD.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.		ELA-Literacy.RI.K.3 With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.	
PreK-2	7E. Recognize there are different solutions to a design and that none are perfect.	K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.		1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points.		ELA-Literacy.SL.1.1.b Build on others' talk in conversations by responding to the comments of others through multiple exchanges.	
PreK-2	7F. Differentiate essential skills of the technology and engineering design process.	K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.		K.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.		ELA-Literacy.RI.1.7 Use the illustrations and details in a text to describe its key ideas.	
PreK-2	7G. Apply skills necessary for making in design.	K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.		2.MD.10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.		ELA-Literacy.SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail.	
3-5	7H. Illustrate that there are multiple approaches to design.	3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.		4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.		ELA-Literacy.W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic	

3-5	7I. Apply the technology and engineering design process.	3-5 ETS 1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.		4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted.		ELA-Literacy.W.4.2.b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.	
3-5	7J. Evaluate designs based on criteria, constraints and standards.	3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.		S-IC.6 Evaluate reports based on data.		ELA-Literacy.W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.	
3-5	7K. Interpret how good design improves the human condition.	3-ESS-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard		4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.		ELA-Literacy.W.3.2 Write informative /explanatory texts to examine a topic and convey ideas and information clearly.	
3-5	7L. Apply universal principles and elements of design.	3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.		5.OA.2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.		ELA-Literacy.W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.	

3-5	7M. Evaluate the strengths and weaknesses of existing design solutions, including their own solutions.	3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.		3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.		<u>ELA-Literacy.W.3.7</u> Conduct short research projects that build knowledge about a topic.	
3-5	7N. Practice successful design skills..	ETS1.C: Optimizing the Design Solution: Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)		4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.		<u>ELA-Literacy.RI.4.7.</u> Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears	
3-5	7O. Apply tools, techniques, and materials in a safe manner as part of the design process.	3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.		5.NF.6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.		<u>ELA-Literacy.SL.6.2</u> Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.	
6-8	7P. Illustrate the benefits and opportunities associated with different approaches to design.	MS-ETS 1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.SL.6.5.</u> Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information	

6-8	7Q. Apply the technology and engineering design process.	MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.		7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically.		ELA-Literacy.W.7.7 Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation.	
6-8	7R. Refine design solutions to address criteria and constraints.	MS-ETS 1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem		7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.		ELA-Literacy.RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	
6-8	7S. Create solutions to problems by identifying and applying human factors in design.	MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions.		ELA-Literacy.W.6.7 Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.	
6-8	7T. Assess design quality based upon established principles and elements of design.	ETS1.B: Developing Possible Solutions: There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2),		6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.		ELA-Literacy.W.8.1 Write arguments to support claims with clear reasons and relevant evidence	
6-8	7U. Evaluate the strengths and weaknesses of different design solutions.	MS-ETS 1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	

6-8	7V. Improve essential skills necessary to successfully design.	ETS1.C: Optimizing the Design Solution: The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4)		6.SP.5 Summarize numerical data sets in relation to their context.		<u>CCSS.ELA-Literacy.SL.8.1.d</u> Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.	
9-12	7W. Determine the best approach by evaluating the purpose of the design.	HS-ETS1-2. Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed		N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.		<u>ELA-Literacy.RI.11-12.7</u> Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.	
9-12	7X. Document trade-offs in the technology and engineering design process to produce the optimal design.	HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.		S-IC.6 Evaluate reports based on data.		<u>ELA-Literacy.RI.11-12.7</u> Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.	
9-12	7Y. Optimize a design by addressing desired qualities within criteria and constraints.	HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g. using simulation.		<u>ELA-Literacy.RST.9-10.3</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	
9-12	7Z. Apply principles of human-centered design.	ETS1.A: Defining and Delimiting Engineering Problems: Criteria and constraints also include satisfying any requirements set by		G-CO.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper,		<u>ELA-Literacy.RST.9-10.1</u> Cite specific textual evidence to support analysis of science and technical texts,	

		society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.		tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.		attending to the precise details of explanations or descriptions.	
9-12	7AA. Illustrate principles and elements of design.	HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		S-MD.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).		<u>ELA-Literacy.W.9-10.9</u> Draw evidence from literary or informational texts to support analysis, reflection, and research.	
9-12	7BB. Implement the best possible solution to a design.	HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.W.9-10.7</u> Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	
9-12	7CC. Apply a broad range of design skills to their design process.	HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.		G-MG.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).		<u>ELA-Literacy.RST.9-10.1</u> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	

9-12	7DD. Apply a broad range of making skills to their design process.	ETS1.B: Developing Possible Solutions: Both physical models and computers can be used in various ways to aid in the engineering design process		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>ELA-Literacy.RST.9-10.3</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	
	STEL 8 Applying, Maintaining, and Assessing Technological Products and Systems						
PreK-2	8A. Analyze how things work.	K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.		K.MD.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.		<u>ELA-Literacy.SL.K.3</u> Ask and answer questions in order to seek help, get information, or clarify something that is not understood.	
PreK-2	8B. Recognize and use everyday symbols.	ETS1.B: Developing Possible Solutions: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)		K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects.		<u>ELA-Literacy.SL.1.5</u> Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.	
PreK-2	8C. Identify qualities of everyday products.	PS1.A Different properties are suited for different purposes.		K.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects.		<u>SL.K.5</u> Add drawings or other visual displays to descriptions as desired to provide additional detail.	

3-5	8D. Follow directions to complete a technological task.	3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.		4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.		<u>ELA-Literacy.RI.5.7</u> Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
3-5	8E. Use appropriate symbols, numbers and words to communicate key ideas about technological products and systems	ETS1.B: Developing Possible Solutions: At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)		5.NBT.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.		<u>ELA-Literacy.SL.5.4</u> Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.
3-5	8F. Identify why a product or system is not working properly.	5-PS1-3 Make observations to identify materials based on their properties.		5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots.		<u>ELA-Literacy.W.3.1.a</u> Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.
3-5	8G. Examine information to assess the trade-offs of using a product or system.	ETS1.A: Defining and Delimiting Engineering Problems: Possible solutions to a problem are limited by available materials and resources (constraints).		3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.		<u>ELA-Literacy.W.4.7</u> Conduct short research projects that build knowledge through investigation of different aspects of a topic.
6-8	8H. Research information from various sources to use and maintain technological products or systems.	MS-ETS1-4. 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.		6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.		<u>ELA-Literacy.W.6.7</u> Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

6-8	8I. Use tools, materials, and machines to safely diagnose, adjust, and repair systems.	ETS1.B: Developing Possible Solutions: There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2),		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.W.7.9</u> Draw evidence from literary or informational texts to support analysis, reflection, and research.	
6-8	8J. Use devices to control technological systems.	MS-ETS1-3. 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.		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.RST.6-8.3</u> Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	
6-8	8K. Design methods to gather data about technological systems.	MS-ETS1-4. 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.		7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically.		<u>ELA-Literacy.RST.6-8.3</u> Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	
6-8	8L. Interpret the accuracy of information collected.	ETS1.C: Optimizing the Design Solution: Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)		7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.		<u>ELA-Literacy.RST.6-8.8</u> Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	

6-8	8M. Use instruments to gather data on the performance of everyday products.	ETS1.B: Developing Possible Solutions: There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.		6.SP.5 Summarize numerical data sets in relation to their context.		<u>ELA-Literacy.RST.6-8.3</u> Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	
9-12	8N. Use various approaches to communicate processes and procedures for using, maintaining, and assessing technological products and systems.	ETS1.B: Developing Possible Solutions: Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. (HS-ETS1-4)		N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.		<u>ELA-Literacy.SL.9-10.5</u> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	
9-12	8O. Develop a device or system for the marketplace.	ESS3.C: Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation.		G-CO.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).		<u>ELA-Literacy.RST.9-10.3</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	

9-12	8P. Apply appropriate methods to diagnose, adjust and repair systems to ensure precise, safe and proper functionality.	ETS1.C: Optimizing the Design Solution: Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (HS-ETS1-2)		S-IC.6 Evaluate reports based on data.		<u>ELA-Literacy.RST.9-10.3</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	
9-12	8Q. Synthesize data and analyze trends to make decisions about technological products, systems or processes.	ETS1.B: Developing Possible Solutions: When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (HS-ETS1-3)		S-IC.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.		<u>CCSS.ELA-Literacy.W.9-10.1</u> Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.	
	8R. Interpret the results of technology assessment to guide policy development.	ETS1.A: Defining and Delimiting Engineering Problems □ Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.		S-MD.7. Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).		<u>RI.11-12.7</u> Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.	