Warren Township Public School District
Curriculum

Subject: Reach/Innovation & Design	**Grade: 1**	**Unit: Solving Problems**
Total Number of Lessons: 10	**Unit Time Frame: One marking period (10 six-day cycles)**	

Instructional Materials (Include specific text or digital resource links that are used by teachers and students within the unit):

Reach Manual - Innovation & Design - First Grade, Reach Engineering Kit - Solving Problems, legoeducation.com Spike Essential Lesson Website

Goals	**Skills / Understandings**
• Students engage in brainstorming, investigation, sketching, and collaboration prior to building their products. • Students test their products and use test data to inform redesign. • Computer software can enhance the performance of mechanical devices.	• Engineers build products that solve problems. • Science knowledge can be used to create effective designs. • Engineers research and collaborate during the design process. • Test results can be measured and used to determine if success criteria are met. • Motors add movement to models. • Complex 3D models can be constructed using step-by-step 2D pictorial instructions. • Processes can be represented by algorithms and duplicated to perform a defined task.

NJ Student Learning Standards and Descriptors:

- 1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
- K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.
- 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-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.

Unit Essential Questions:	Student Vocabulary:	Lesson Learning Statement::
• How can I use science knowledge to design solutions? • What elements must be in a model? • Why must everyone test under the same conditions? • How do I know if a model is good? • Why might engineers make different designs? • How do motors and computer software enhance the performance of a model?	• test environment sketch • engineer's journal model • Constraints • Inspiration • Zipline • Harness • Compare • protective padding design • test plan • Evaluate • Trials • Products • building materials • algorithm • Program • Debug • success criteria • Motor	• Engineers design solutions to real-world problems by making products. • Engineers select building materials to meet specific goals. • Engineers create several designs, are able to explain their designs, and can describe why they made those choices. • Engineers build and test what they design. • Engineers evaluate their products based on how well they match the success criteria. • Engineers use measurements to decide which design is best. • Motors enhance a product's performance. I can use computer software to control a motor. • Software can interact with a model to make the model do something.

Interdisciplinary Connections (include standard number and activity examples):	**Assessment Strategies / Resources:**	**Benchmark Assessments / Products: Specific common assessments both formative and summative (provide a link to the assessments)**
Cause and effect - simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1), (1-PS4-2), (1-PS4-3). Influence of Engineering, Technology, and Science, on Society and the Natural World: People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4) SL.1.1 - Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1), (1-PS4-2), (1-PS4-3) Influence of Engineering, Technology, and Science on Society and the Natural World - People depend on various technologies in their lives; human life would be very different without technology. (1-ESS3-2) 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) ● Ask questions, make observations, and gather information about a situation people want to change (e.g. “climate change”) to define a simple problem that can be solved through the development of a new or improved object or tool. ● Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)	Checklists Models Sketches	End of unit assessment

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, such as climate change, to other people. (K-2-ETS1-2) ETS1.C: Optimizing the Design Solution: ● Because there is always more than one possible solution to a problem, it is useful to compare and test designs (K-2-ETS1-3) Structure and Function: ● The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)		

21st Century Life and Careers - Technology (link to standard 8.1 and 8.2) / Career and 21st Century Skills (link to standard 9.1, 9.2, 9.2)
(Include standard number and activity examples from each area):

- 8.1.2.CS.1: Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
- 8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology.
- 8.1.2.DA.2: Store, copy, search, retrieve, modify, and delete data using a computing device.
- 8.1.2.AP.1: Model daily processes by creating and following algorithms to complete tasks.
- 8.1.2.AP.4: Break down a task into a sequence of steps.
- 8.1.2.AP.5: Describe a program's sequence of events, goals, and expected outcomes.
- 8.1.5.CS.1: Model how computing devices connect to other components to form a system.
- 8.1.5.CS.3: Identify potential solutions for simple hardware and software problems using common troubleshooting strategies.
- 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives.
- 9.4.2.CI.2: Demonstrate originality and inventiveness in work.
- 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem.
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan.
- 9.4.2.GCA.1: Articulate the role of culture in everyday life by describing one's own culture and comparing it to the cultures of other individuals.
- 9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts.

Warren QSAC Accommodations Chart

Pictorial displays of instructions, pictorial worksheets and checklists, options for written text