Warren Township Public School District
Curriculum

Subject: Reach/Innovation & Design	**Grade: 2**	**Unit: Designing Solutions**
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 - Second Grade, Reach Engineering Kit - Designing Solutions, legoeducation.com Spike Essential Lesson Website

Goals	**Skills / Understandings**
• Students use their understanding of design, science, and math to create products to meet needs. • Students evaluate their own and their peer's designs using given success criteria, constraints, and test results. • Students improve the performance of a machine by adding computer-controlled elements.	• Engineers use science and math to design solutions to everyday problems. • Blueprints provide more information than sketches. • Design choices influence the performance of the products. • Success criteria determine the measurements that are taken during testing. • Data collection during testing informs product redesign. • Feedback about product performance is given using success criteria and constraints. • Humans design computer programs to complete specific tasks. • Computers interface with mechanical devices such as machines to complete routine tasks. • Complex tasks require human intervention.

NJ Student Learning Standards and Descriptors:

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 and math knowledge to design solutions? • What role does measurement play in designing and building a product? • What elements must be in blueprints and how is a blueprint different from a sketch? • What data should I collect during testing? • How can testing inform redesign? • What is the best way to give feedback to my peers? • What is most helpful to them in redesign?	• mechanical • toy mechanism • redesign • constraints • success • criteria test results • test environment • algorithm • Debug • coding • programming • motor	• Engineers make products better by testing them. • Engineers build products taking success criteria and constraints into account. • Engineers continually learn new things about science and math to help them make better designs. • Engineers draw blueprints to help with building the product more accurately. • Engineers give each other feedback about their products taking success criteria and constraints into account.
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)**
W.2.8 - Recall information from experiences or gather information from provided sources to answer a question. (2-ESS2-3) Patterns - Patterns of change can be used to make predictions. (3-PS2-2) Cause and Effect: • Cause-and-effect relationships are routinely identified. (3-PS2-1) • Cause-and-effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3) MP.2 - Reason abstractly and quantitatively. (3-PS2-1)	Checklists Exit ticket	Innovation & Design K-2 Engineering Skills Benchmark Assessment

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) 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 the user needs and preferences. 8.1.2.CS.2: Explain the functions of common software and hardware components of computing systems. 8.1.2.CS.3: Describe basic hardware and software problems using accurate terminology. 8.1.2.IC.1: Compare how individuals live and work before and after the implementation of new computing technology. 8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats. 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.2: Model the way programs store and manipulate data by using numbers or other symbols to represent information. 8.1.2.AP.3: Create programs with sequences and simple loops to accomplish 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. 8.1.2.AP.6: Debug errors in an algorithm or program that includes sequences and simple loops. 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.CT.3: Use a variety of types of thinking to solve problems. 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.IML.1: Identify a simple search term to find information in a search engine or digital resource. 9.4.2.IML.2: Represent data in a visual format to tell a story about the data. 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, collaboration