Design Thinking/Technology/Career Readiness/Life Skills- 2nd Grade

Introduction to Design and Technology	Time: September-June	Standards:
Essential Questions **Properties of Matter** • How and why do engineers design? • What is the process like that engineers engage in design and problem solving? • Why is it important to do problem solving tasks? • How can I use each step of the engineering design process to help me to solve a problem? • What factors should we consider when developing solutions to problems? • Why is it important to work collaboratively with others in the design of solutions to problems? • How do materials affect design? • How do I share solutions and ideas with others? **Density and Buoyancy** • How can I use each step of the engineering design process to help me to solve a problem? • What factors should we consider when developing solutions to problems? • Why is it important to work collaboratively with others in the design of solutions to problems? • How do materials affect design? • How do I share solutions and ideas with others? **Seed Dispersal** • How do seeds travel? • How does structure affect function?	**Enduring Understandings** • I can define matter and identify the three types of matter. • I can apply the engineering design process to solve a problem. • I can analyze a text and identify main points and relevant details of the problem that will guide their possible solution. • I can define specifications and constraints. • I can conduct an experiment to investigate the properties of different solids. • I can collaborate with peers to develop a plan for one design. • I can communicate ideas to peers. • I can create a solution to solve a problem. • I can improve their designs based on observations during testing. • I can evaluate the effectiveness of a design. • I can analyze results to figure out how materials affect design. • I can utilize text boxes, graphics, and word art in a word processing setting. • I can design an ad on Google Slides. • I can choose their materials based on their investigation results. • I can compare and contrast materials based on their properties.	8.2.2.ED.1: Communicate the function of a product and its value. 8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. 8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process 8.2.2.ED.4: Identify constraints and their role in the engineering design process. 8.2.2.ITH.1: Identify products that are designed to meet human wants or needs. 8.2.2.ITH.2: Explain the purpose of a product and its value. 8.2.2.ITH.3: Identify how technology impacts or improves life. 8.2.2.ITH.4: Identify how various tools reduce work and improve daily tasks. 8.2.2.ITH.5: Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution. 8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem. 8.2.2.ETW.1: Classify products as resulting from nature or produced as a result of technology. 8.2.2.ETW.2: Identify the natural resources needed to create a product. 8.2.2.EC.1: Identify and compare technology used in different schools, communciites, regions, and parts of the world. 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool. 9.4.2.TL.2: Create a document using a word processing application. 9.4.2.TL.3: ENter information into a spreadsheet and sort information. 9.4.2.TL.4: Navigate a virtual space to build context and describe the visual content. 9.4.2.TL.5: Describe the difference between real and virtual experiences. 9.4.TL.6: Illustrate and communicate ideas and stories using multiple digital tools.

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- How do living things depend on each other in their habitats?
- Why is it important for seeds to travel?
- How do engineers use their observations of natural design to help them create new technologies?

- I can conduct an experiment to investigate the properties of different solids.
- I can explain why some objects float and some do not.
- I can identify conditions under which an object can float.
- I can explain how and why seeds travel.
- I can define structure and function, as well as how structure affects function.
- I can explain codependency in nature.
- I can use the observations of natural design to help them create new technologies.
- I can design a way for a seed to be dispersed.

9.4.2.TL.7: Describe the benefits of collaborating with others to complete digital tasks or develop digital artifacts.
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.

Benchmark Assessment(s)

➢ SWBAT challenged to create an invention that mimics an adaptation of one of the types of wind dispersal seeds and travels at least 6" during the "Sally the Seed Design Challenge".

➢ SWBAT apply the five steps of the engineering design process when solving the given problem and also utilizing research and technological skills.

Other Assessments

✔ Teacher observation
✔ Class discussions and group work

Materials

- Hair dryer
- Small, portable fans
- Tub of water for research
- Coins (preferably pennies) for testing designs
- Tennis ball

Building/Modeling Materials:

- Masking Tape
- Scissors
- Construction Paper
- Craft Sticks
- Pipe Cleaners
- Aluminum Foil
- Plastic bags (big and small)
- Straws
- Spoons
- Paper Clips

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- Brass Fasteners
- Index Cards
- Ruler
- Math Manipulatives (Hundreds Blocks, Ten Rods, Ones pieces)

SUGGESTED ACTIVITIES

- Engineering is Elementary (Museum of Science, Boston)
- Google Apps for Littles by Christine Pinto & Alice Keeler
- Read The Three Little Pigs (book)
- Complete Sink or Float Boats Challenge Introduction
- Complete Sink or Float Material Investigation
- Complete Sink or Float Boats Material List
- Complete Sally the Seed Biomimicry Design Challenge
- Complete Sally the Seed Material List
- Complete Seed Dispersal Research Worksheet

REINFORCEMENT

- Extra practice on devices.
- Pair students with a partner.
- Repeat activities, as needed.

ENRICHMENT

- Complete Piggy Material Investigation
- Complete Piggy Advertisement Planning Sheet

Suggested Websites

- www.discoveryeducation.com
- www.brainpopjr.com

Suggested Materials

- ITEEA's Engineering byDesign™ Program

Cross-Curricular Connections

Computer Science-

8.1.2.CS.3: Describe basic hardware and software problems using accurate terminology.

8.1.2.DA.2: Store, copy, search, retrieve, modify, and delete, data using a computing device.

21st Century Skills *–*

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

Science-

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-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an

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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.
English Language Arts-
RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
RI.2.8 Describe how reasons support specific points the author makes in a text.
W.2.7 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)
W.2.8 Recall information from experiences or gather information from provided sources to answer a question.