Design Thinking/Technology/Career Readiness/Life Skills- 3rd Grade

Introduction to Design and Technology	Time: September-June	Standards:
Essential Questions **Parachute Design and Peer Feedback** • How does application of the engineering design process help me to develop the best solution to a given problem? • How can I learn from receiving and providing effective feedback to and from peers? • How can I create a parachute that maximizes air resistance? • How can I safely and effectively communicate with peers through an online chat? **Safety Helmet Design** • How does application of the engineering design process help me to develop the best solution to a given problem? • What is a concussion and why is it important for me to have knowledge on them and how to prevent them? • How can I create a helmet that protects the brain from a concussion when playing a given sport? • How can I learn from receiving and providing effective feedback to and from peers? • How can I safely and effectively communicate with peers through an online chat? **Human Impact on the Environment** • What are the impacts that human actions have on the environment and what steps can I take to make a difference? • How are plastic pollution, deforestation, and climate change related and why is it	**Enduring Understandings** • I can name and apply the steps of the engineering design process to solve a problem. • I can meet the given expectations at each step of the Engineering Design Process. • I can provide effective peer feedback during the "Imagine" step in order to help peers better meet the given specifications. • I can work collaboratively with a group to solve the problem. • I can build parachutes using the Engineering Design Process. • I can decide what materials could be used to successfully design a parachute. • I can reflect on the success of personal and peer parachutes and demonstrate this understanding through having an online chat. • I will design and build helmets for a given sport using the Engineering Design Process. • I will conduct research on concussions in order to build a foundation of knowledge that will be used to guide decisions throughout the design challenge. • I can decide what materials could be used to successfully design a helmet. • I can interview classmates who play the sport that they will be designing a helmet for.	8.2.5.ED.1: Explain the functions of a system and its subsystems. 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. 8.2.5.ED.4: Explain factors that influence the development and function of products and systems (e.g., resources, criteria, desired features, constraints). 8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process. 8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system. 8.2.5.ITH.2: Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have. 8.2.5.ITH.3: Analyze the effectiveness of a new product or system and identify the positive and/or negative consequences resulting from its use. 8.2.5.ETW.1: Describe how resources such as material, energy, information, time, tools, people, and capital are used in products or systems. 9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images, graphics, or symbols. 9.4.5.TL.5: Collaborate digitally to produce an artifact (e.g., 1.2.5CR1d). 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3). 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data. 9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a

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important to be knowledgeable in these topics? • How can I use a variety of online resources to obtain information that fits into specific categories? • How can I effectively and productively collaborate with peers while working simultaneously on a project? • How can I create and format a Google document to best present information on a given topic?	• I can conduct research using online resources to find information that fits under a given category. • I can use information learned from researching to create a project of choice. • I can utilize a type of Google Document to present learned information. • I can type learned information. • I can format text. • I can insert pictures. • I can insert animations and transitions, if applicable.	local and/or global climate change issue and deliberate about possible solutions 9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue. 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity. 9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process. 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process. 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem. 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.

Benchmark Assessment(s)

➢ SWBAT complete a Gummy Bear Challenge- Students will create a parachute that will keep the Gummy Bears safe when they land on the ground. Students test their design by dropping their ensign off the top of the school's play structure. If the Gummy Bears stay in the design and land "on their feet" then it is a successful model. Students will have an opportunity to go back and improve their design based on observations from the initial test.

➢ SWBAT complete a Safety Helmet Design Challenge- Students create a helmet that will protect a head from injury and damage. They test their design by putting a water bottle under their helmet and dropping 2 books on top of it. If the balloon is unbroken, then they have created a successful model. Students will have an opportunity to go back and improve their design based on observations from the initial test.

Other Assessments

✔ Teacher observation

✔ Class discussions and group work

Materials

- Cardboard
- String
- Masking Tape
- Construction Paper
- Plastic Bag
- Cups
- Aluminum Foil
- Coffee Filters
- Index Cards
- Cotton Balls
- Bubble Wrap
- Pipe Cleaners
- Popsicle Sticks

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➢ SWBAT complete a Human Impacts Design Challenge- Students are challenged to develop a model for educating the Knowlton Community about human impacts on the environment. They present their findings to other classes in the school.

- Rubber Band
- Paper Clips
- Brass Fasteners
- Plastic Spoons
- Plastic Straws
- Jumbo pasta shells

SUGGESTED ACTIVITIES

- Engineering is Elementary (Museum of Science, Boston)
- Google Apps for Littles by Christine Pinto & Alice Keeler
- Forces on a Falling Object (video)
- Safety Helmet Design Challenge Slideshow
- Concussion Research Paper
- Create model heads
- Human Impact Images
- Human Impact Graphic Organizer
- Research Tips
- Human Impact Research Website

REINFORCEMENT

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

ENRICHMENT

- Human Impact Project Templates (brochure, fiction children's book, song, poster, slideshow)

Suggested Websites

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

Suggested Materials

- ITEEA's Engineering byDesign™ Program

Cross-Curricular Connections

Computer Science-

8.1.5.CS.1- Model how computing devices connect to other components to form a system.
8.1.5.NI.1- Develop models that successfully transmit and receive information using both wired and wireless methods.
8.1.5.NI.2- Describe physical and digital security measures for protecting sensitive personal information.
8.1.5.DA.1- Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.3- Organize and present collected data visually to communicate insights gained from different views of the data.

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.

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

Science-

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.

3-5-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.

3-5-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.

English Language Arts-

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

RI.3.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.

RI.3.5. Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.