

KINDERGARTEN ENGINEERS: UNIT 6

CONCEPTS AND ENDURING UNDERSTANDINGS:

Unit: Kindergarten Engineers

Time Frame: Four Weeks

Key Concepts: Engineers, Engineering Design Process, apparatus, mechanisms, structure, gravity, incline

ESSENTIAL QUESTION: How do engineers solve problems?

Great Idea: Engineers utilize the Engineering Design Process and collaboration to solve many problems. Many different types of engineers design and construct various mechanisms, apparatuses and structures to suit specific environments. Engineers are constantly evaluating, designing and improving their solution.

GUIDING QUESTIONS:

1. What is an engineer and how do they solve real world problems?

- Define three types of engineers.
- Generate questions.
- Collaboratively work to complete a team flag.
- Utilize a map to navigate.

2. How do engineers design or use resources to solve problems?

- Develop a plan to minimize the effects of gravity.
- Develop a plan to create a structure that protects against sun and water.
- Develop a plan to push or pull and object.

3. How can we be engineers to solve a problem?

- Protect a breakable object from the effects of gravity.
- Create an apparatus to minimize the effects of gravity.
- Collaboratively construct an index card tower structure.
- Create a structure that protects against sun and water.
- Determine and compare methods to move a heavy object.
- Create a push or pull mechanism.
- Create a zip line.
- Create a bridge.
- Collaboratively work to discover if objects sink or float.
- Create a bridge.

Lesson Sequence

Students will:

1. Define three types of engineers.
2. Generate questions.
3. Collaboratively work to complete a team flag.
4. Protect a breakable object from the effects of gravity.
5. Develop a plan to minimize the effects of gravity.
6. Create an apparatus to minimize the effects of gravity.
7. Collaboratively construct an index card tower structure.
8. Develop a plan to create a structure that protects against sun and water.
9. Create a structure that protects against sun and water.
10. Determine and compare methods to move a heavy object.
11. Develop a plan to push or pull an object.
12. Create a push or pull mechanism.
13. Utilize a map to navigate.
14. Create a zip line.
15. Create a bridge.
16. Collaboratively work to discover if objects sink or float.
17. Create a boat or raft that can float.
18. Answer questions to determine understanding of Kindergarten Engineers.

: CONTENT STANDARDS

Next Generation Science Standards
K. Forces and Interactions https://www.nextgenscience.org/topic-arrangement/kforces-and-interactions-pushes-and-pulls
K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.*
K. Energy https://www.nextgenscience.org/overview-topics
K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.*
K. Earth's Systems https://www.nextgenscience.org/dci-arrangement/k-ess2-earths-systems
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. Engineering Design https://www.nextgenscience.org/topic-arrangement/k-2engineering-design
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 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.

Social Studies

<https://marylandpublicschools.org/about/Documents/DCAA/SocialStudies/Framework/Kindergarten.pdf>

1.0 Civics: Students will understand the historical development and current status of the democratic principles and the development of skills and attitudes necessary to become responsible citizens.

A.1.b. Recognize rules help promote fairness, responsible behavior, and privacy.

A.2.a. Identify common symbols, such as the American Flag, and Statue of Liberty.

2.0 Peoples of the Nation and World: Students will understand how people in Maryland, the United States and around the world are alike and different.

C.1.a. Identify, discuss, and demonstrate appropriate social skills, such as listening to the speaker, taking turns, settling disagreements, and reaching compromise at home and in school

3.0 Geography: Students will use geographic concepts and processes to understand location and its relationship to human activities.

A.1.b. Describe how maps are models showing physical features and/or human features of places.

A.1.c. Identify a location by using terms such as near-far, above-below, and here-there.

A.1.d. Identify pictures and photographs that represent places on a map such as a playground and a fire station.

B.1.a. Recognize physical features as landforms and bodies of water using photographs and pictures.

B.1.b. Identify land forms, such as mountains and hills, and bodies of water, such as oceans, rivers, and streams.

B.1.c. Using photographs and pictures, recognize human-made features as modifications people have made to the land.

B.1.d. Identify human-made features, such as buildings, sidewalks, streets, and bridges.

C.1.a. Identify ways that people travel on land, water, and air.

C.1.b. Explain how transportation is used to move goods and people from place to place.

C.1.c. Identify ways that people communicate messages.

D.1.b. Identify ways that people change their environment to meet their needs, such as planting crops or cutting forests.

4.0 Economics: Students will identify the economic principles and processes that are helpful to producers and consumers when making good decisions.

A.2.a. Recognize workers as human resources.

A.2.c. Recognize that natural resources, such as water, trees, and plants are used to make products.

6.0 Social Studies Skills and Processes: Students shall use reading, writing, and thinking processes and skills to gain knowledge and understanding of political, historical, and current events using chronological and spatial thinking, economic reasoning, and historical interpretation, by framing and evaluating questions from primary and secondary sources.

A.1.a. Acquire new vocabulary through listening to and reading a variety of grade-appropriate print and non-print sources.
A.1.b. Discuss words and word meanings as they are encountered in texts, instruction, and conversation.
A.1.c. Make connections to prior knowledge and new vocabulary by listening, reading, and responding to a variety of texts.
C.1.a. Identify prior knowledge about the topic.
C.1.b. Pose questions about the topic.
C.2.a. Define problem/situation.
C.2.b. Identify prior knowledge about the problem/situation.
C.2.c. Pose/ Ask questions about the problem/situation.
D.1.a. Gather and read appropriate print sources, such as journals, textbooks, timelines, and trade books.
D.2.a. Engage in field work that relates to the topic/situation/ problem being studied and gather data.
D.2.b. Engage in field work that relates to the topic/situation/ problem being studied and make and record observations.
G.1.a. Present social studies information in a variety ways, such as plays, skits, posters, songs, poems, murals, and oral presentations.

Reading English Language Arts
https://www.marylandpublicschools.org/programs/Documents/ELA/Standards/Grades_PK_K_MCCR_ELA%20Standards.pdf
Reading: Literature
Key Ideas and Details
RL.K.1. With prompting and support, ask and answer questions about key details in a text.
Craft and Structure
RL.K.4. Ask and answer questions about unknown words in a text.
Range of Reading and Level of Text Complexity
RL.K.10. Actively engage in group reading activities with purpose and understanding.
Reading: Informational Text
Key Ideas and Details
RI.K.1. With prompting and support, ask and answer questions about key details in a text.
Craft and Structure
RI.K.4. Ask and answer questions about unknown words in a text.
Integration of Knowledge and Ideas
RI.K.7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
Range of Reading and Level of Text Complexity
RI.K.10. Read and comprehend complex literary and informational texts independently and proficiently.
Reading: Foundational Skills
Print Concepts
RF.K.1.a. Follow words from left to right, top to bottom, and page by page.

Writing
Texts Types and Purposes
W.K.2. 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.
Research to Build and Present Knowledge
W.K.8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
Speaking and Listening
Comprehensions and Collaboration
SL.K.1.a. Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and text under discussion).
SL.K.1.b. Continue a conversation through multiple exchanges.
SL.K.2. Confirm understanding of text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
SL.K.3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
Presentations of Knowledge and Ideas
SL.K.4. Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.
SL.K.5. Add drawings or other visual displays to descriptions as desired to provide additional details.
SL.K.6. Speak audibly and express thoughts, feelings, and ideas clearly.
Language
Conventions of Standard English
L.K.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
L.K.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
Vocabulary Acquisition and Use
L.K.5.a. Sort common objects into categories (e.g., shapes, foods) to gain a sense of the concepts the categories represent.
L.K.5.c. Identify real-life connections between words and their use (e.g., note places at school that are colorful).
L.K.6. Use words and phrases acquired through conversations, reading and being read to, and responding to texts.

Health
https://marylandpublicschools.org/about/Documents/DCAA/Health/Health_Education_Frame_work_July_2022.pdf
1.0 Mental and Emotional Health

A.1.a. Demonstrate positive communication among peers.

E.1.a. Identify character traits contributing to your uniqueness.

E.1.b. Identify actions to make a friend.

Physical Education

<https://www.marylandpublicschools.org/about/Documents/DCAA/PE/MDPEFramework.pdf>

6.0 Social Psychological Principles

C.1.a. Imitate socially acceptable behaviors of cooperation, respect, and responsibility to interact positively with others.

Mathematics

<https://www.marylandpublicschools.org/about/Documents/DCAA/Math/MCCRSM/MCCRS MKindergarten.pdf>

Measurement and Data

K.MD.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

K.MD.2 Directly compare two objects with a measureable attribute in common, to see which object has “more of/less of” the attribute and describe the difference.

Geometry

K.G.1. Describe objects in the environment using names of shapes and describes the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

Visual Arts

<https://www.marylandpublicschools.org/programs/Documents/Fine-Arts/Visual+Art+Standards+Grades+P-12.pdf>

Creative Expression and Production

3.1.c. Create artworks that explore the uses of color, line, shape, and texture to express ideas and feelings.



Dear Families,

We are beginning a new social studies and science unit called Kindergarten Engineers. In this unit, your child will learn about different type of engineers and practice solving real world problems as an engineer. As a class, the students will actively participate in an imaginary adventure called *Survivor, Kindergarten Edition*, adapted from the television show *Survivor*. Students will be taught how to think like an engineer and apply new learning throughout their adventure. ATTACHED IS A LIST OF SUPPLIES YOUR CHILD'S TEACHER WILL NEED IN ORDER TO MAKE THIS UNIT SUCCESSFUL!

Here are some of the science and engineering concepts to be explored in this unit:

- Effects of Gravity
 - Practice dropping objects from different heights to compare the speed of drop
 - Discuss why some objects break when dropped and other do not
 - Design ways to prevent fragile objects from breaking
- Forces of Motion: Push and Pull
 - Practice pushing or pulling a variety of objects on different surfaces
 - Practice applying different amounts of force to objects and observe changes
 - Play a game of tug of war
- Building Structures/ Bridges
 - Provide Legos, blocks, or other objects to build structures like skyscrapers, shelters or barns
 - Provide opportunities to build a bridge using different materials over items
 - Observe buildings, structures and bridges and discuss the characteristics of each
- Ramps and Inclines
 - Use objects to create ramps and observe how fast or slow objects move
 - Identify the characteristics of objects that slide, roll, or do not move
 - Experiment to observe how the height of the ramp changes the speed of the object
- Sink and Float
 - Practice experimenting with different objects to discover which sink or float
 - Identify the characteristics of objects that sink or float
 - Experiment to observe the speed of objects sinking

Please ask your child to share with you about the fun activities completed during this unit!

Your Child's Kindergarten Teacher,