

Unit 5: Engineering Design

Content Area: **Science**
Course(s): **Biology, Earth Science, Physical Science**
Time Period: **Generic Time Period**
Length: **5 weeks**
Status: **Published**

Standards

SCI.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.
MA.1.1.MD.C.4	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
SCI.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.
SCI.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.
LA.1.W.1.6	With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.
LA.1.SL.1.5	Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.
LA.1.W.1.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
LA.1.RL.1.1	Ask and answer questions about key details in a text.

Learning Objective

TSWBAT make a snowflake with 20 popsicle sticks, paint, glitter, and glue.

TSWBAT build a snowman with doughnuts, oreos, candy, pretzels, toothpicks and frosting.

TSWBAT build a groundhog that casts the longest shadow.

TSWBAT build a hibernation station to hold three or more animals.

TSWBAT create a Valentine's box that holds the most candy.

TSWBAT create "airmail" with a secret code that flies the furthest.

TSWBAT construct the tallest snowball structure with marshmallows and toothpicks.

TSWBAT create a nest that can protect Horton's egg when Horton is sitting on it.

TSWBAT determine what kind of matter is oobleck and what will sink and/or float in oobleck.

TSWBAT create a rainbow bridge that will hold the heaviest pot of gold.

TSWBAT create a maze that a marble will run through when being blown with wind.

TSWBAT construct a bird nest that stands 10 cubes high.

TSWBAT construct a container that will protect an egg when it's dropped.

TSWBAT construct a pollinator that will work like a bee when it pollinates flowers.

TSWBAT create a bubble wand and mixture of soap/water to create a successful bubble.

Essential Questions

How can you work collaboratively with a group of students to accomplish the weekly STEAM challenge using only the materials given in 20 minutes?

Learning Activities

Snowflake challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard. Make individual prediction about how many popsicle sticks you will use

-Problem Solving: Create a plan of action and carry out the plan together in your group

-complete results sheet

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback

-Closure: What could I do differently next week?

Snowman challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group

-complete results sheet of 3 designs created, how tall each snowman is

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Groundhog Shadow challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of 3 designs created, measure how long each shadow is with cubes

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Hibernation challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, measure how many animals can fit inside

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Valentine's Candy box challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, measure how many candy hearts fit inside

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Airmail challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record which type of paper testing, measure distance flown

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Snowball challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record drawing of snowball, how tall was it?

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Horton and 10 Apples up on Top Challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Oobleck challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Rainbow Bridge challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Wind maze challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Bird nest challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Egg drop challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Pollinator challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Bubble wand challenge

-SB activity: go over rules, expectations, materials allowed on the Smartboard.

-Problem Solving: Create a plan of action and carry out the plan together in your group, record your design plan on sheet

-complete results sheet of design created, record materials and drawing

-Reflection: Share your result with the class with one problem your group encountered and one thing you think worked well, groups give each other feedback, complete reflection sheet about whether you were successful & what you could do differently

-Closure: What could I do differently next week?

Materials & Resources

www.mysteryscience.com

Smartboard with internet access

STEAM Smartboard files (Google Docs)

scissors

glue sticks

pencils

crayons

construction paper

craft sticks

white paint

glitter

marshmallows

rolos

m&ms

oreos

pretzel sticks

felt, cotton, wool

plastic cups

paper plates

snap cubes

play doh

pipe cleaners

Valentine's candy

Airmail code

mini marshmallows

toothpicks

solo cups

corn starch

mixing bowls and spoons

playdoh

pipe cleaners

heavy object for "pot of gold"

pattern blocks

cubes

marbles

eggs

egg cartons

tissue boxes

pom poms

Kool Aid powder

water

soap

Respective worksheets from STEAM challenges for student use

Assessment

Completed weekly STEAM challenge worksheets with trial design, data, results, and reflection

Accommodations & Modifications

- Large print textbooks
- Additional time for assignments
- Review of directions
- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Adaptive writing utensils
- Support auditory presentations with visuals
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Space for movement or breaks

- Extra visual and verbal cues and prompts
- Books on tape
- Graphic organizers
- Quiet corner or room to calm down and relax when anxious
- Preferential seating
- Alteration of the classroom arrangement
- Reduction of distractions
- Answers to be dictated
- Hands-on activities
- Use of Manipulatives
- Follow a routine/schedule
- Alternate quiet and active time
- Teach time management skills
- Rest breaks
- Verbal and visual cues regarding directions and staying on task
- Daily check-in special education teacher
- Visual daily schedule
- Varied reinforcement procedures
- Immediate feedback
- Personalized examples