

# Unit 8: 3-5 Engineering Design

Content Area: **Science**  
Course(s):  
Time Period: **Generic Time Period**  
Length: **3 weeks**  
Status: **Published**

## **Objective**

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To research, create and carry out a design that will be a solution to a problem.

## **Concepts that will be taught**

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SWBAT:

- \*Work collaboratively in groups to complete STEM activities.
- \*Construct a flower that will sink for one minute (using given materials)
- \*Construct a bridge that will hold the most weight (using given materials)
- \*Create an animal that would survive in the environment of the classroom
- \*Create a hurricane proof skyscraper
- \*Create an animal that will be able to adapt to the environment of the classroom.

## **3-5 Engineering Design**

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## **ETS1.A: Defining and Delimiting Engineering Problems**

- [Possible solutions to a problem are limited by available materials and resources \(constraints\). The success of a designed solution is determined by considering the desired features of a solution \(criteria\). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. \(3-5-ETS1-1\)](#)

## **ETS1.B: Developing Possible Solutions**

- [Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. \(3-5-ETS1-2\)](#)
- [At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. \(3-5-ETS1-2\)](#)
- [Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. \(3-5-ETS1-3\)](#)

## **ETS1.C: Optimizing the Design Solution**

- [Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. \(3-5-ETS1-3\)](#)

LA.5.W.5.8	Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.
LA.5.W.5.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.5.RI.5.7	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
LA.5.RI.5.9	Integrate and reflect on (e.g. practical knowledge, historical/cultural context, and background knowledge) information from several texts on the same topic in order to write or speak about the subject knowledgeably.
3-5-ETS1	Engineering Design
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.
LA.5.RI.5.1	Quote accurately from a text and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.

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## **Essential Question**

Given a problem, how can you work collaboratively with your group to design a solution?

## **Activities**

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### **Floating Flower**

Students will create a Flower that will float in a tub of water for 1 minute. The students will have thirty minutes to design and create their flower. The flowers must be within the given dimensions and students will only be able to use the materials provided.

### **Hurricane Proof SkyScraper:**

Students will discuss the problems with hurricanes (and other natural disasters) and will come up with a solution for skyscraper safety. They will research the causes and effects of hurricanes and design a building that would withstand the elements. Students will use the time and building constraints and will use materials given to complete their project.

### **Adaptable Animal:**

In our discussion about animals and their ability to adapt to their surroundings, students will then collaborate with their group and create an animal who would thrive if their environment/habitat was the classroom. Students will present their animals to the rest of the class and explain how they would thrive in their new environment.

### **Bulging Bridge:**

Students will discuss and collaborate with their group to design a bridge that could carry the most weight. Students will research bridges in the world to create their design. Students will test the design by seeing which models hold the most weight.

## **Materials & Resources**

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[www.mysteryscience.com](http://www.mysteryscience.com)

Mini dells or Ipads for research, pencils, paper, journals for brainstorming and sketching design

### **Floating Flowers**

construction paper, tape, glue, tissue paper, tub, water, pipe cleaners, tin foil, newspaper

### **Skyscraper:**

pipe cleaners, tape, glue, tooth picks, skewers, spaghetti, marshmallows

### **Animal:**

construction paper, tape, glue, tissue paper, pipe cleaners, newspaper

### **Bridge:**

Toothpicks, Hot Glue

## **Assessment**

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Presentation of the project, demonstration of the project

Teacher Observation/ Experiment

Journals Entries

Quizzes, Tests

### **Accommodations & Modifications**

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- 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