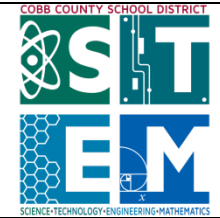


# Lesson Title: Float the Boat



**Grade Level:** Kindergarten

**Quarter:** 3

**Standards:** List relevant STEM – Science, Technology, & Math standards. Include ELA CCGPS if applicable.

SKP1a- Compare and Sort Materials of Different Composition

SKP1b Use Senses to Classify Common Materials

MCKK.CC.1 Count to 100 by ones and by tens

MCKK.CC.4 Understand the relationship between numbers and quantities

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

**Lesson Essential Question:**

Why do some objects sink and other objects float?

**Vocabulary:**

sink                      buoyancy\*

float                     flexibility\*

weight

\*nice to know, may introduced – not mastered

**Lesson Materials:**

Foil, Styrofoam, plastic bubble wrap, wooden sticks, large bowls, water, and counting bears (or equivalent)

**Lesson Assessment:**

Student journal;

Teacher Observation;

Peer feedback;

STEM rubric

**STEM Challenge Overview:**

Students will examine various common materials and classify them according to their buoyancy. Students will then design a boat using only one of the previous materials. Their boat should be able to hold as many teddy bears as possible.

**Teacher Background:**

Matter is composed of different properties. Children need to explore how some objects push water out of the way in order to float and how shape can help things float. Many children believe that heavy objects sink and lighter objects float. Guide student observations and conversations to help them recognize that some heavy objects like boats float, while relatively lighter objects such as coins sink. The degree to which a solid object will float when placed in water depends on the density of the material. At the elementary level, students have observational experiences with floating and sinking objects of different sizes and shapes. They are able to describe observable properties of objects, such as how an object floats in water. The concept of characteristic properties, such as density, should wait until middle school.

– Adapted from P. Keely’s *Uncovering Student Ideas in Science, Vol. 2.*

## INSTRUCTION

### 1. Ask/Engage

*How will you engage students? Introduce design challenge in general terms- what problem will students need to solve? Review any STEM Content that students will need to apply to solve design challenge.*

- Tell Students about the general idea of their challenge: Some special passengers were stranded on an island when their boat sank. They need your help! You need to build a boat that will carry as many passengers as possible to the main land using only the supplies available.
- Ask students” What makes some objects float in water and other objects sink?” Write down students’ ideas.
- Read the book: *Captain Kidd’s Crew- Experiments with Sinking and Floating* or similar book about buoyancy.
- Refer back to students’ ideas on objects that float in water and objects that sink
- Discuss concept of Density by demonstrating 2 objects that are the same size, but one with a much higher density (you should choose 1 object that sinks and 1 object that floats). Show what happens when they are put in water.
- Give students an opportunity to test various materials that they could use to construct a boat: foil, Styrofoam, bubble wrap, wooden sticks, etc.

- Show students various pictures of boats and point out the different shapes. Take note at which boats seemed to be designed to carry a lot of weight.

## 2. Imagine/Brainstorm

*Introduce the constraints of the design plan. Define the criteria for success. Ask each student to work independently to come up with 1-2 possible design solutions. Students should draw/label their designs.*

- Students will need to design a boat that will hold 10 or more passengers using limited materials.
- Students can only use ONE of these materials to construct their boats
  - A sheet of foil
  - A sheet of bubble wrap
  - 20 wooden sticks
  - 20 styrofoam peanuts
- Everyone will be given 12 inches of masking tape
- Give students 10 minutes to brainstorm INDEPENDENTLY. They should draw their designs in their journal.
- Discuss criteria for measurement and success. Should students stop counting as soon as the first teddy bear gets wet? Should they stop counting when the whole boat is submerged?

## 3. Plan/Design

*Each student presents their ideas to their team. Student teams collaborate to come up with final design plan. Students draw final design plan and make a list of needed supplies.*

Each student presents their ideas to their team. Student teams collaborate to come up with final design plan. Students draw final design plan and make a list of needed supplies.

## 4. Create / Test

*Student teams build their design according to their design plan. Students test their design plan and record data.*

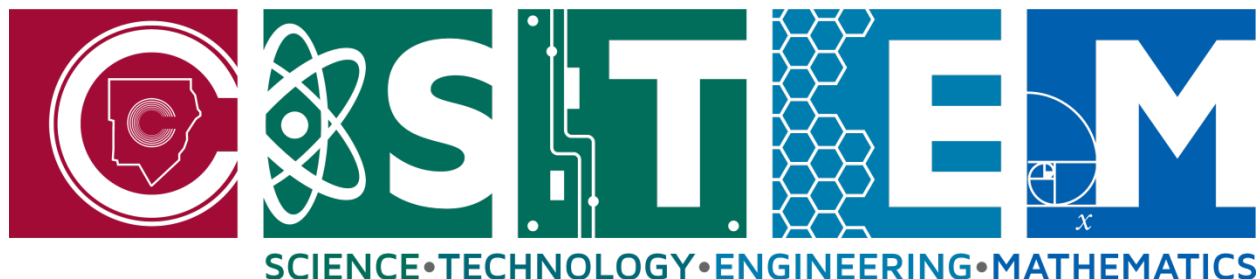
Student teams build their design according to their design plan. Before testing, students should make a prediction as to how many bears that their boat will hold. Students should look around the room and compare their design to other students' designs. Students should test their design by placing their boat in a container of water. Students should add bears one at a time, making sure to count as they go. Students should record their final number.

## 5. Evaluate/Improve – and repeat Steps 1-5

*Students evaluate their design for success. Did it meet the established criteria? Did their final design match their planned design? How would students improve their design?*

- Students evaluate their design for success. Did it meet the established criteria? Did their final design match their planned design?
- Using student data, construct a simple graph
- Compare designs/data to see which design was the most successful
- How would students improve their designs? Repeat Design Process.

## COBB COUNTY SCHOOL DISTRICT



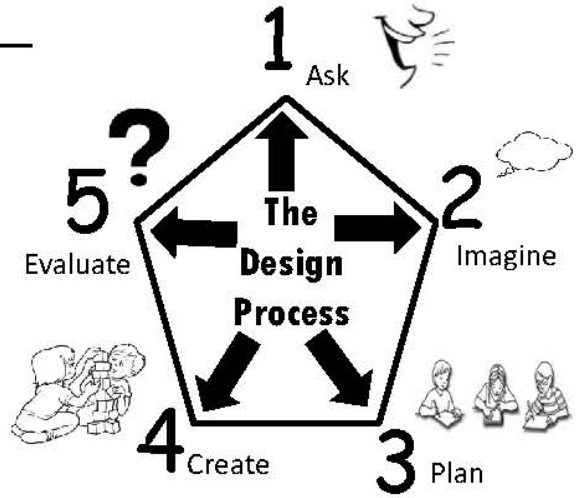
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# Student Journal

1. Ask



2. Imagine Brainstorm



Can use whole space or divide with pencil into 2 spaces

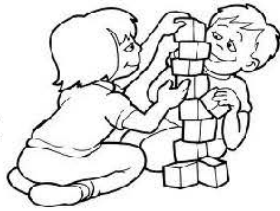
3. Plan/Design





Draw or write what materials you need for this design

#### 4. Create/Test



Did it work?



Why or Why not? Discuss with your group.

#### 5. Evaluate/Improve



How can you improve or make your design better next time?