



Georgia Department of Education

In this 5E instructional segment, students will evaluate and classify materials based on their attributes and apply their knowledge of these materials to build a model of a cargo ship.

**Student Science Performance**

**Grade or course: Kindergarten**

**Title:**

**Topic:** Physical Attributes

Where did it come from and how was it made?

**Performance Expectation for GSE:**

**SKP1. Obtain, evaluate, and communicate information to describe objects in terms of the materials they are made of and their physical attributes.**

- a. Ask questions to compare and sort objects made of different materials. (Common materials include clay, cloth, plastic, wood, paper, and metal.)
- b. Use senses and science tools to classify common objects, such as buttons or swatches of cloth, according to their physical attributes (color, size, shape, weight, and texture).
- c. Plan and carry out an investigation to predict and observe whether objects, based on their physical attributes, will sink or float.

**Performance Expectations for Instruction:**

- Students will explore the properties of different objects using their senses.
- Students will compare how the materials are similar and how they are different.
- Students will group objects based on their attributes and explain their reasoning.
- Students will test objects for buoyancy and apply their knowledge to solve a problem.

[Additional notes on student supports](#)

**Materials**

**Float or sink:** Plastic toy boat, bucket, water

**Sorting:** bags filled with a variety of samples of paper, plastic (buttons, etc.), cloth, clay, foam, metal, and wood

**Building a boat:** wooden craft sticks, aluminum foil, foam pieces, clay, cargo such as small wooden blocks, paper clips, counters

*Students will continuously obtain, evaluate, and communicate information. This is not a linear process. Students will communicate through writing and discussions to allow for formative assessment. This benefits the teacher, student, and whole group to guide instruction to clarify misconceptions or extend content.*

**Engaging Learners**

**Phenomenon**

Everything is composed of matter. Matter is identified and classified by observing physical attributes for unique characteristics. These characteristics determine how an object functions. Students will use their senses to make observations and then describe, compare, and sort according to physical attributes.

[Aircraft Carrier](#)

This photograph shows a very large aircraft carrier ship. This ship is longer than 3 football fields and taller than a building with 24 floors. It is home to over 90 airplanes and more than 6000 people. What do you think the boat looks like on the inside? What materials do you think were used to make the boat? How does the boat stay floating? What other objects can float? Why do some objects float and other objects sink?

*Teacher Notes: A common misconception among students is that light objects float and heavy objects sink. At this age, we can explain that air helps things to float in water without going into a complex explanation of density. Students will also note that the*

	<p><i>shape of the object makes a difference in sinking and floating. A ball of clay may sink, but when the ball is reshaped, it can float.</i></p> <p><i>Obtaining</i> Students obtain information from examining pictures of different kinds of boats. Students will examine the photographs and make observations about the size of the boat, the shape of the boat, and the type of materials used to construct the boat. Ask students to brainstorm a list of materials used in the ship’s construction.</p> <p><i>Evaluating</i> The teacher will give students a toy boat and a bucket of water to investigate. Students will observe what happens when they put the boat in water. <i>Teacher should ask questions to guide students’ observation: What happened when you put the boat in water? What does it mean to float? What does it mean to sink? Which material was used to make this boat? What other materials could make boats?</i></p> <p><i>Communicating</i> In a whole group, the teacher will guide students to develop a list of materials that are used to construct boats.</p>
<b>Exploring</b>	<p><i>Obtaining</i> Students carry out the following hands-on investigation to obtain information about the properties of different materials. Students will group materials with similar attributes and create a classification system for sorting these objects.</p> <p>Teachers will provide a small group (2-4) students with a large zip-top bag full of a variety of different materials. Examples of these materials include paper, metal, plastic, cloth, foam, wood, and clay. Without giving students sorting guidelines, ask them to sort the materials into different categories. Once students have completed this sort, ask students to repeat the activity several more times using a DIFFERENT way to sort them each time.</p> <p><i>Teacher Notes: When choosing materials to put in the bag, try to select materials that show variety. For example, you could put several different types of paper in the bag: a piece of white paper, a piece of yellow construction paper, a piece of colorful wrapping paper, a piece of a brown paper bag, a piece of newspaper, etc. Repeat this for each type of material.</i></p>
	<p><i>Communicating</i> Students will explain their reasoning for how they classified different materials. Once students have sorted their materials, they should discuss WHY they sorted them the way that they did. Students may have sorted them by color, by size, by shape, by function, by texture, by material, etc. Students should develop a “rule system” for how each item was sorted and should explain their reasoning.</p>
	<p><i>Evaluating</i> The teacher should explain that different objects are made from different materials. The teacher should specifically name plastic, paper, clay, metal, foam, cloth, and wood. Teacher should show examples of each of these materials and point out other examples around the classroom. Finally, students will complete one final sort and to put them into categories based on the material.</p>



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**Formative Assessment of Student Learning**

<p><b>Explaining</b> Finalizing Model</p>	<p><i>Obtaining</i> Students revisit the list of materials that they came up with during the engage segment and discuss which materials they will test to see whether they sink or float. Students can add any additional materials that they wish to test. <i>Teacher Notes: Materials include aluminum foil (metal), wooden craft sticks, foam cup/plate, and clay.</i></p> <p><i>Evaluating</i> Students will perform a sink or float test on various materials. They will keep a record of which materials float in water and which materials sink in their journal. Let them see that some materials will float if put in the water one way but sink if put in the water a different way.</p> <p><i>Communicating</i> On a T-chart, students communicate which objects floated and which objects sank.</p>
<p><b>Elaborating</b> Applying Model to Solve a Problems</p>	<p><b>Phenomenon</b> <a href="#">Loaded cargo ship</a> Cargo ships are an important tool that allows materials and goods to be shipped to places all around the world. It is important to make sure that a ship is well built to hold a lot of weight. We are going to design a cargo ship. We need to test to see how much cargo our ship will hold. Which material do you think will work the best at constructing a cargo ship? How will you construct your boat?</p> <p><i>Obtaining</i> Students will develop a plan to construct a boat using materials that will float. Students will select a boat building material that floats. Students will design this boat in their journal prior to building their boat.</p> <p><i>Evaluating</i> Students will test their boats to see how much cargo they will hold. Students should add cargo (objects such as small wooden blocks, paper clips, counters) one piece at a time until their boat sinks. Allow students multiple opportunities to redesign and retest their boat designs. Teachers help guide students to understand how their boat may have failed and how they could improve their design. Students will record the number of pieces of cargo on a sticky note.</p> <p><i>Communicating</i> The teacher will use a data table for students to display their results. Once all students have tested their cargo boats and recorded their results, teacher will lead an analysis of the results to see which material used made the best boat. Teacher should circle the highest numbers and lead a discussion about why that material might have worked the best.</p>
<p><b>Evaluation</b></p>	<p><b>Assessment of Student Learning</b></p> <p>In their journals, have students complete the following Claims/Evidence/Reasoning based on the test results of their class.</p> <p><i>I think that _____(material) is the best for making boats because it held _____ pieces of cargo when our class tested it.</i></p> <p>Have them note which physical property (color, size, shape, weight, and texture) is most important in building a boat that floats and can hold cargo, and why they think this.</p>



<i>SEP, CCC, DCI</i>	<b>Science Essentials</b>
Science and Engineering Practices	<ul style="list-style-type: none"> <li>● Asking questions and defining problems</li> <li>● Planning and carrying out investigations</li> <li>● Constructing explanations and designing solutions</li> <li>● Obtaining, evaluating, and communicating information</li> </ul>
Crosscutting Concepts	<ul style="list-style-type: none"> <li>● Patterns</li> <li>● Scale, Proportion, and Quantity</li> </ul>
Disciplinary Core Ideas	<p>From <a href="#"><i>A Framework for K-12 Science Education</i></a>:</p> <p><b>PS1.A Structure and Properties of Matter</b></p> <ul style="list-style-type: none"> <li>● Matter can be described and classified by its observable properties (e.g., visual, aural, textural), by its uses, and by whether it occurs naturally or is manufactured.</li> <li>● Different properties are suited to different purposes.</li> <li>● A great variety of objects can be built up from a small set of pieces (e.g., blocks, construction sets).</li> <li>● Objects or samples of a substance can be weighed and their size can be described and measured.</li> </ul>

**Additional Supports for struggling learners:**

**The following supports are suggestions for this lesson and are not the only options to support students in the classroom. These supports target students that struggle with science material, this lesson or a previous lesson. These are generalized supports and do not take the place of IEP accommodations as required by each student’s Individualized Education Program.**

**General supports for the following categories:**

<p><b><u>Reading:</u></b></p> <ol style="list-style-type: none"> <li>1. The teacher can have students match letters prior to reading to remind them of the alphabet.</li> <li>2. The teacher can have students identify words that they know in the text as the class reads.</li> <li>3. The teacher should remind students to use strategies when they are reading.</li> </ol>	<p><b><u>Writing:</u></b></p> <ol style="list-style-type: none"> <li>1. The teacher can provide practice for students in the area of writing both in context and practicing just letters.</li> <li>2. The teacher can provide a sentence starter for the students.</li> <li>3. The teacher should continually give encouragement to the students.</li> <li>4. The teacher can provide constructive positive feedback during the writing process to help students understand the expectations.</li> </ol>	<p><b><u>Math:</u></b></p> <ol style="list-style-type: none"> <li>1. Provide students with opportunities to interact with numbers.</li> <li>2. The teacher can provide manipulatives to allow the students to count and interact with materials.</li> </ol>
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**Supports for this specific lesson if needed:**

**Performance expectations for instruction:**

1. The teacher should provide information to students in various formats to reach as many students as possible.
2. The students should be given adequate time to complete each part of the lesson.
3. The students should be allowed to express their knowledge in various formats.
4. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material.

**Engage:**

1. The teacher should show an image of an aircraft carrier.
2. The teacher should consider showing a video that gives a tour of an aircraft carrier.
3. The teacher should consider making the measurements more real to the students. The teacher can consider taking the students outside and having the students visualize the school stacked on top of itself 24 times (if the school is only one story).

4. Then have students observe the school yard, an aircraft carrier is about an acre or so long which is around the length of most schools plus the parking lots (adjust accordingly to your school).
5. Another way for the teacher to make scale comparisons is to use images to compare the sizes. The teacher can do an image of something everyday that is small and a larger picture of a sky scrapper to show the large size difference between the two.
6. The teacher should practice making observations with students. The teacher can ask them to make observations about the school yard, their peers and things inside the school.
7. The teacher should consider doing a demo of clay sinking and then ask the students for suggestions that might make the clay float.
8. The teacher should consider scale when giving images of different kinds of boats. Students need assistance visualizing how big the aircraft carrier is compared to the other boats. So, the teacher should consider giving images that provide scale as well as images to make observations.
9. The teacher should consider having students watch a video clip of how ships are made.
10. The teacher should consider giving students images of several materials then the students can discuss with a partner or as a class how the materials might or might not work for building a boat.

**Exploring:**

1. The teacher should consider helping students hypothesize which materials will float. Then the students can test these hypothesize before sorting the materials.
2. The teacher should use guiding questions to help students sort materials.
3. The teacher should have the students explain their reasoning for sorting materials in the way they did. Then the students can explain their sorting to the class.
4. The teacher should consider providing samples of objects that are made of many different materials.
5. The students can generate a list of things that they encounter every day that are made of the materials discussed. This is used to help make connections to how different objects are made of different materials.

**Explaining:**

1. Ask students why it is important that the materials that are used to build ships float?
2. The teacher should consider giving students images of the items that they are doing a sink-float test on and then have the students sort the images into piles as they do the test.
3. The teacher can have the students present their results to the class and discuss if every group saw the same results.

**Elaborating:**

1. The teacher should use probing questions to help students select some materials as they work on building their boat.
2. The teacher can also be encouraging while they work on their design.
3. The students should draw the boat design and attempt to differentiate between the materials they are using. The teacher can model creating a key for their design.
4. The teacher should have students record data for every test they complete on their boat.
5. The teacher will need to explicitly explain and model how to record data.

**Evaluating:**

1. The teacher may need to model using the sentence frame to assist students in explaining their ideas. Also, consider having students share their idea with the class.
2. The teacher should consider letting struggling students verbally explain as appropriate.

