

Microgravity: Always A Bad Hair Day

How Heavy Is It?

Lesson 2 of 2

Grade Level: K-4

Subject: Physical Science

Prep Time: 10-30 minutes

Activity Duration: 1 hour

Materials Category: Special requirements

National Education Standards				
Science	Mathematics	Technology		Geography
		ISTE	ITEA	
2a, 3a, 5a				

Objective: To experiment with how heavy or light something is related to how compact something is, leading to an understanding of density.

Materials:

- Six clear containers (soda bottles, deli containers, jars)
- Student Sheet
- One weighing scale
- Three pairs of similar looking materials (flour and salt, gravel and pebbles, jelly beans and beans, Styrofoam and florist foam, or rice and rice-shaped pasta)
- Pencil



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Teacher Sheets

Pre-lesson Instructions

- Read the NASAexplores K-4 article, “Microgravity: Always A Bad Hair Day,” and discuss it.
- Divide the students into groups of four to six students, and prepare a set of materials for each group of students.
- Label each pair of similar materials, and place them in their own stations. For example, the flour and salt containers are placed at one station, and the gravel and pebble containers are grouped together and placed at another station. There should be three stations with two of the similar containers at each station.
- The students will walk to each station with their Student Sheets to complete the lesson. They are to predict the weight of each container and then find the actual weight. They must decide which container is heavier before actual weighing.

Background

Astronauts in orbit can often move huge heavy objects with just the slightest effort. That is because in orbit, even though objects do not lose any mass, they lose nearly all their weight. The students will discover that bigger isn't always heavier. The formal concept of density is usually beyond the younger student. However, this experiment will relate how heavy or light something is with how compact something is, leading to an understanding of density.

Guidelines

1. Hold up an object, such as a brick, and ask the students to think of words to describe the object (hard, heavy, rectangle). Tell them they described the properties of the brick. One property is weight. Hold up a similar sized object, such as a block of wood, and ask, “Which one weighs more? Why?” Ask for a volunteer to hold each object, and to state which is heavier.
2. Use the scales to weigh the objects, and write the results on the board.
3. Show the students the set of materials in the stations, and explain the following steps:
 - Compare the two similar objects (without picking them up), and guess which one might be heavier. Record their predictions on the Student Sheet.
 - Have students weigh the samples, and record their findings. They repeat this until they have visited all three stations.
4. Have the students discuss their findings, and complete the questions on the Student Sheets.

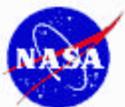


Discussion / Wrap-up

- Ask the students;
What makes something heavier than something else?
Is it easy to tell how heavy something is by looking at it?
Which is heavier, a pound of sand or a pound of feathers? This is a tricky question because sand seems heavier than feathers, but a pound of something is always a pound of something. A pound of feathers would take up much more space than a pound of sand.
Which is heavier a cup of feathers or a cup of sand? The sand would be heavier. The sand has more density because one cup of material that weighs more than one cup of another material is more dense.
- Coming back to the containers in the stations, tell the students that the containers are have materials that fill the same amount of space. Therefore, the heavier container is also the more dense one.
- Discuss with the students that even if something takes up a lot of space, if it doesn't have much weight, it's not very dense. For example, compare a big piece of Styrofoam and a brick. The brick is more dense.

Extensions

- Have students experiment with sinkers and floaters. Collect an assortment of objects, and have students predict which will sink and which will float. Be sure to emphasize that it's not the object's weight that determines whether it will float or sink, but how dense it is.



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Student Sheet

Prediction	Actual Weight
Station 1 I think _____ is heavier than _____.	Station 1 Container 1 Weight _____ Container 2 Weight _____
Station 2 I think _____ is heavier than _____.	Station 2 Container 1 Weight _____ Container 2 Weight _____
Station 3 I think _____ is heavier than _____.	Station 3 Container 1 Weight _____ Container 2 Weight _____

In Station 1, which container was heavier? _____ Does this make it denser? _____

In Station 2, which container was heavier? _____ Does this make it denser? _____

In Station 3, which container was heavier? _____ Does this make it denser? _____

Is it easy to tell how heavy something is by looking at it?

What makes something heavier than something else?

Was everyone's predictions the same? _____

