HU-GK 12 Program 11-29-07

Activity:

Title:

"Gold Rush"

Prepared By:

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DCPS Standards:

(ChaLC Goal):

8.4.2.
Know density is mass per unit volume
8.4.4.
Determine and explain that the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced; this principal can be used to predict whether an object will float or sink in a given fluid.

Goals:

1) The students will understand the concepts of density and the effect it was on objects at different weights

2) The students will understand some basic concepts of buoyancy

Objectives:

1) Given information on density the students will demonstrate their ability to solve real life problems using basic density concepts and formulas.

2) Given information on density, the students will be able to discuss concepts in buoyancy.

Background:

Density is a measure of the amount of matter packed into a unit volume. The density of an object is equal to its mass divided by its volume, which is measured in grams per cubic centimeter. Buoyant force is the upward force pushing on an object in a fluid. If an object is

floating in any liquid, the buoyant force is balancing the weight. Density and buoyancy work interchangeably, because whether or not a boat floats depends on both the density of the boat and the density of the water. A good story to tell the kids is about the Greek scientist Archimedes. Archimedes was the first scientist to discover how to measure volume of an object that had irregular shape. He had a task of measuring the density of King Hiero's crown, which had an irregular shape. King Hiero was under the impression that the goldsmith that was hired to make his crown did not use all the gold that was given to him to make the crown. He could not be sure because there was no way to measure the volume of an object with irregular shape. If you can measure volume you can measure density. Therefore, the King put Archimedes to the task of finding a way to measure the crown. Archimedes could not melt down the crown to measure the density. He was struggling to figure out a way to accomplish his task until he was taking a bath and realized that the water level would rise as soon as he gets into the bath. Archimedes applied this notion to the King's crown and found that when you put the crown in water, it displaces the water in an amount. With this information Archimedes knew that the density of the crown would be less if a cheaper metal was used. When this information was given back to the king, the goldsmith was later put to death.

Prerequisite Knowledge:

Using mass and volume to calculate density

Materials:

- Any silver, gold or metal objects with irregular shapes and sizes
- Weighing scales
- 250 ml or 500 ml beakers

Set up:

For the instructor, the set-up for this lab is minimal and can essentially be done by the students. Depending on the amount of beakers available and the sizes of the beaker, the instructor can measure an equal amount of water into each beaker for each group.

Procedure:

1) Measure the mass of the irregular metal object and record data.
2) Measure the amount of water that in the beaker (ml) and record this amount.
3) Place the irregular object into the water and measure the water amount in the same
4) Now subtract the amount of water displaced by the amount of water in the beaker before irregular object was put in the water.
5) Use the formula D = Mass/Volume to calculate the density of the metal object.