Density Study Guide

Learning Target (LT M.5): I can explain what different objects do when placed in water.

Essential Questions:
What determines whether an object can sink or float when placed in a fluid?
What is density and how is the density of a substance calculated?
What is surface tension?

Vocabulary- Level 7 (Basic):
mass-

volume-

density-

grams (g)-

milliliters (mL)-

g/mL or g/cm3-

graduated cylinder-

buoyancy-

surface tension-

displacement-

irregular solid-

v=lwh

m÷v=d

1.0g/mL-

Levels 9 & 10 (Proficient/Advanced):

What is the density of water?

What is the unit of measure used to measure density in the metric system (International System)?

What is the formula used to calculate density?

What is the density of an object with a mass of 240g and a volume of 30mL?

Will an object with a mass of 240g and a volume of 30mL sink or float when placed in water?

What is the rule that allows us to accurately predict whether an object will sink or float when placed in water?

What is surface tension?

Steel has a density of 8g/mL or 8g/cm3. Because of this, objects such as a steel nail sink in water. Large boats such as a cruise ships, cargo ships or battleships are also made of steel but yet they float. Why do most steel objects sink but steel boats float?

Density Test Practice Problems

Learning Target (LT M.5): I can explain what different objects do when placed in water.

Essential Questions:
What determines whether an object can sink or float when placed in a fluid?
What is density and how is the density of a substance calculated?
What is surface tension? (not covered on this assignment- see study guide previously sent home)

The purpose assignment is to review how to calculate the density of different substances in order to determine whether they will sink or float when in water. This is only meant to review how to use the "math" aspect of the test.

Density is a physical property of matter that measures the amount of mass per unit of volume. Basically, how compact an object is. Think of this: a hot air balloon is much more mass than a pebble but the balloon will float and the pebble will sink because it has more mass for the space available. The density of an object can be measured by measuring the mass and volume of an object then dividing the object's mass by its volume.

Formula: Density=mass ÷ volume (also written as d=m/v or $D = \frac{m}{V}$)
Steps to calculate the density of an object:

Abbreviations & What They Measure:
g= gram; measures mass
mL= milliliter, measures volume of a liquid
cm^3= cubic centimeter, measures volume of a solid
g/mL or g/cm^3= grams per milliliter or grams per cubic centimeter, measures density

1. Find the mass of the object.
2. Find the volume of the object.
3. Divide the object's mass by the volume. Now you have the density.
4. Label the density answer as g/cm^3 or g/mL (grams per cubic centimeter or grams per milliliter).
5. Compare the object's density to the density of water (water has a density of 1 g/mL).
6. If the object's density is greater than 1g/mL it will sink. If the object's density is less than or equal to 1g/mL it will float.

Example: An object has a mass of 6g and a volume of $3cm^3$
1. Divide 6g by $3cm^3$ (6÷3)
2. 6÷3=2 (so $6g÷3cm^3=2g/cm^3$) The object has a density of 2 grams per cubic centimeter or 2 grams per milliliter.
3. $2g/cm^3$ is greater than water's density which is 1g/mL so the object would sink.

Practice Problems: For each object, calculate the density then write whether it will sink or float. Remember to label the density answer with the unit g/cm^3 or g/mL.

1. mass: 8g
   volume: 2mL
   density:
   sink or float:

2. mass: 10g
   volume: $10cm^3$
   density:
   sink or float:

3. mass: 20g
   volume: 4mL
   density:
   sink or float: