Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ period \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| http://www.spacegrant.hawaii.edu/class_acts/WebImg/CourseLogo.gif | **Density** |
| **Purpose**  To understand the compactness of planetary matter by measuring mass and volume and relating these to density. |
| **Key Words**  mass  volume  density  grams  cubic centimeters    **Materials**  balance  metric ruler  rock cubes  ice cubes  steel [ball bearings](http://skimlinks.pgpartner.com/mrdr.php?url=http%3A%2F%2Fskimlinks.pgpartner.com%2Fsearch.php%2Fform_keyword%3Dball%2Bbearings)[http://s.skimresources.com/img/cbuddy2.png](http://skimlinks.pgpartner.com/mrdr.php?url=http%3A%2F%2Fskimlinks.pgpartner.com%2Fsearch.php%2Fform_keyword%3Dball%2Bbearings) or rods  graduated cylinder  beaker or cup  water  calculator  "Density Data Chart" | **Background**  Density is defined as the average mass per unit volume; it is a measure of how much matter is squeezed into a given space. The more closely packed the molecules, the higher the density of the material. In general, planetary bodies in our Solar System are composed of iron, rock, ice, liquids, gases, and in the special case of Earth, organics. This activity focuses on techniques to determine densities of cubes, spheres, or rods of metal, rock, and ice.  The equation for density is:  http://www.spacegrant.hawaii.edu/class_acts/WebImg/Density.gif  **Procedure**  **Finding Density for a Regular Object**  1.  Use the balance to find the mass of the object. Record this value on the "Density Data Chart."  2.  Use the metric ruler to measure the length, width, height, or diameter of the object. Record the values that apply to your object.  3.  Compute the volume of the object using the values determined in step 2. Record the volume on the data chart.  4.  Compute the density of the object by dividing the mass value by the volume value. Record the density on the data chart.    **Finding Density for an Irregular Object**  1.  Use the balance to find the mass of the object. Record the value on the "Density Data Chart."  2.  Pour water into a graduated cylinder up to an easily-read value, such as 50 milliliters and record the number.  3.  Drop the object into the cylinder and record the new value in millimeters.  4.  The difference between the two numbers is the object's volume. Remember that 1 milliliter is equal to 1 cubic centimeter. Record the volume on the data chart.  5.  Compute the density of the object by dividing the mass value by the volume value. Record the density on the data chart. |

**Results**

1.

Of the objects you measured, which one was most dense? Why?

2.

How would you calculate the density of an irregular object that floats?

3.

How would you calculate the density of an irregular object that does not fit inside the graduated cylinder?

**Density Data Chart**  
Don't just write in the numbers. **Remember to use the appropriate units too!**  
mass in **grams,**  
length, width, height, and diameter in **centimeters**,  
volume in **cubic centimeters**,  
density in **grams per cubic centimeters**.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Object | Mass | Length | Width | Height | Diameter | Volume | Density |
| 1 |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |