

Student Sheet 02.0

Building an understanding toward density

Getting Started!



<p>One block is Styrofoam and the other is Brick. I used dots to represent mass and to show which is most dense.</p>
<p>Describe what you think the dots are in real life.</p>
<p>Describe what would happen to the number of dots if you doubled the size of the Styrofoam block.</p>

Exploring

Obtain a 25-ml graduated cylinder and some modeling clay. Fill the graduated cylinder to the 1/2-way point with water.

Add precisely 2-cm³ of modeling clay to the graduated cylinder. Then get the clay out of the water and carefully press it into one chunk. Try to get as much water out of the clay as you can without losing any clay!

One of you can go get an estimate of the mass of your clay with an electronic balance.



<p>The mass of 2-cm³ of modeling clay is _____ g.</p>
<p>If I were to cut this 2-cm³ chunk of clay exactly in-half, the volume of each piece would be...</p>
<p>And if I weighed each piece, they should weigh...</p>

Now actually split the chunk of clay in-half as perfectly as you can.



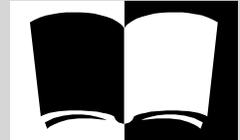
<p>This is how we decided to actually split the clay in-half...</p>
<p>The estimates of mass were _____ g and _____ g.</p>
<p>Using these estimates of mass as evidence, describe how precise you were at splitting the clay in-half.</p>

Scientists like standard things to compare. For length they prefer centimeters (cm). For mass they prefer grams (g). And for volume they prefer cubic centimeters (sometimes written as "cc" and sometimes as "cm³"). Whenever possible, scientists compare 1-cm³ chunks of substances.



How much mass would there be in a 4-cm ³ chunk of this clay?
How much mass would there be in an 8-cm ³ chunk of this clay?
How much mass would there be in a 23-cm ³ chunk of this clay?
Explain how you could find the mass of any sized chunk of this clay:
Try to write a formula for this clay so that someone else can find the mass of any sized chunk of it. (hint m= mass. V= volume).

Density is a description of how much mass there is in 1-cm³ of something. Scientists use the lowercase Greek letter ρ ("roh") to represent density. The units for density are "g/cm³" and they're read "grams for each 1-cm³".



Density diagrams: Whenever we think about density, it helps to draw things in a diagram so that we remember we are looking at the mass in a certain amount of space. To make a density diagram of your clay:

1. Draw a picture of your 2-cm³ chunk of clay. Be sure to leave at least one line between your title and your drawing.
2. Above your drawing, write the mass of your 2-cm³ chunk (m= ____g).
3. Below your drawing, write the volume of your 2-cm³ chunk (V= ____cm³).
4. Use lighter lines to break up your drawing into the number of cubic centimeters it's made out of.
5. To the right of your drawing write how much of the mass is in each 1-cm³. (This is the density, so you can write "Density= ____g/cm³" or you can write "ρ= ____g/cm³").

When are done, your density diagram should look almost identical to this one:

A Density Diagram of our clay:	
m = ____ g	
	r= ____ g/cm ³
Clay	
V= ____ cm ³	



Meet with your instructor to check over your understanding. If you have to wait for your instructor, continue on until they come to find you.