

16243 Metal Cubes & Slab Set

Purpose:

To investigate the properties of mass and density.

Contents:

One (1)	Steel Cube
One (1)	Aluminum Cube
One (1)	Aluminum Slab
Two (2)	Plastic Rulers

Required Accessories:

Pan Balance

Discussion:

Every day, you will pick up many different objects, some large and some small. You may also notice that these objects have many different weights. If you pay very close attention, you may find objects of about the same size that have vastly different weights. Why is this? After all, if two objects have the same size, shouldn't they be the same weight? Not necessarily; it all depends on what the objects are made of. You know from experience that a gallon of milk is much heavier than a fluffy pillow you might sleep on, even though the pillow may be much larger.

Experiences like these have led us to describe materials in a way that is independent of their physical shapes and sizes. The description is called the **density** of the material.

The Experiment:

You will find two cubes and one slab in this kit. All of these objects have the same physical appearance so there is no way to know what the material is just by looking at it. Pick up one of the cubes. Feel how heavy it is. Put it down and pick up the other cube. Judging by its weight, is it the same material as the first cube? Is it lighter or heavier? What about the slab? Can you tell what material it is by its weight? Is it the same material as the first cube or the second cube?

Judging by weight alone, there is no way you can answer this last question. You will need more information. With a ruler, measure each of the three perpendicular edges that meet at one corner of Cube #1 (it does not matter which cube you pick, the other will be cube #2).

Record your measurements and multiply these values together to obtain the volume of the cube. Next, weigh this cube on a pan balance and record this value.

Density is a number that describes the mass (in this case weight) of an object per unit volume. To calculate the density of Cube #1, divide its weight by its volume. Record this value as the density.

Repeat this procedure for the second cube. These two densities will be used as a reference to determine which material makes up the “unknown” slab. To find the density of the slab, follow the same procedure as you did with the cubes. Measure each of the edges that meet at one corner and multiply together each of these three axes. This will allow you to calculate its volume as you did for the cubes. Then weigh the slab. Again, divide the weight by the volume to get the density. How does the density of the slab compare with the density of each of the cubes? Can you tell from your data if the slab is the same material as either one of the cubes?

Density is a value that describes the material that an object is made of, and it is not influenced by the size or the shape of the object in **any** way. This is why density is such an important and useful property. In fact, density is a **characteristic** property of a material. It is one of the important properties by which a material can be **identified**.

Time Allocation:

No prior assembly is required for this product. Experiment times will vary depending methods of instruction, but normally will not exceed one class period.

Feedback:

If you have a question, a comment, or a suggestion that would improve this product, you may call our toll free number.