

# Density Encyclopedia Article

## Density

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# Density

The density of an object is defined simply as the **mass** of the object divided by the volume of the object. For a concrete example, imagine you have two identical boxes. You are told that one is filled with feathers and the other is filled with cement. You can tell when you pick up the boxes, without looking inside, which is the box filled with cement and which is the box filled with feathers. The box filled with cement will be heavier. It would take a very large box of feathers to equal the **weight** of a small box of cement because the box of cement will always have a higher density.

Density is a property of the material that does not depend on how much of the material there is. One pound of cement has the same density as one ton of cement. Both the mass and the volume are properties that depend on how much of the material an object has. Dividing the mass by the volume has the effect of canceling the amount of material. If you are buying a piece of gold jewelry, you can tell if the piece is solid gold or gold plated steel by measuring the mass and volume of the piece and computing its density. Does it have the density of gold? The mass is usually measured in kilograms or grams and the volume is usually measured in cubic meters or cubic centimeters, so the density is measured in either kilograms per cubic meter or in grams per cubic centimeter.

The density of a material is also often compared to the density of water to give the material's specific **gravity**. Typical rocks near the surface of Earth will have specific gravities of 2 to 3, meaning they have densities of two to three times the density of water. The entire Earth has a density of about five times the density of water. Therefore the center of Earth must be a high density material such as nickel or iron. The density provides an important clue to the interior composition of objects, such as Earth and **planets**, that we can't take apart or look inside.