

## Lessons 1&2 Test Study Guide on Unit 6, "Matter"

A physical property can be measured without changing the identity of the substance.

Matter is anything that has mass and takes up space.

All matter has mass.

A metal coin has certain properties that can be measured; weight is one property of a coin that is different on the moon than it is on Earth.

The volume of a rectangular solid that is 40 centimeters long, 10 centimeters wide, and 5 centimeters high is  $2,000 \text{ cm}^3$

Density is a physical property that does not change when the size of the sample changes.

Hydrogen gas ( $\text{H}_2$ ) can be found in trace amounts in Earth's atmosphere. One physical property of hydrogen is that it is less dense than oxygen gas.

One chemical property of a sheet of paper is that paper can be burned.

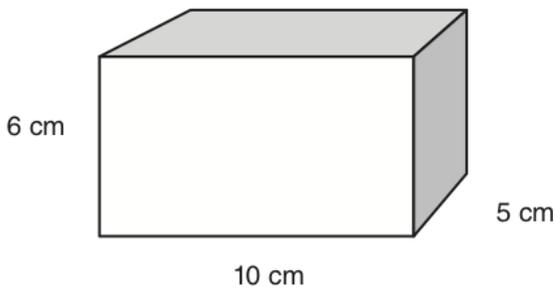
The pictures below show four objects—a paper clip, a pair of scissors, a needle, and a horseshoe. Assume that each object is made of the same metal. One physical property that is not similar in all four of these objects is mass.



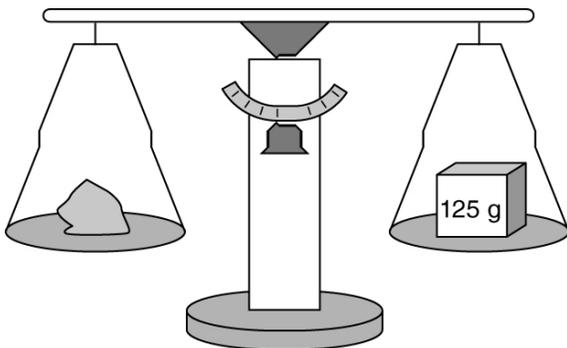
The density of aluminum is  $2.7 \text{ g/cm}^3$ . The volume of a piece of aluminum is  $3.0 \text{ cm}^3$  if its mass is 8.1 grams. ( $d=m/v$ )

Some properties are the same in a substance no matter the amount of the substance. Density does not change based on the amount of the substance.

The illustration below shows a rectangular solid.  $300 \text{ cm}^3$  is the volume of this solid ( $V=L \times W \times H$ )



The instrument below is used to measure an object. The instrument is measuring mass.



Alisa placed a small seashell on the pan of a balance. The other tool she needs to determine the density of the seashell is a graduated cylinder.

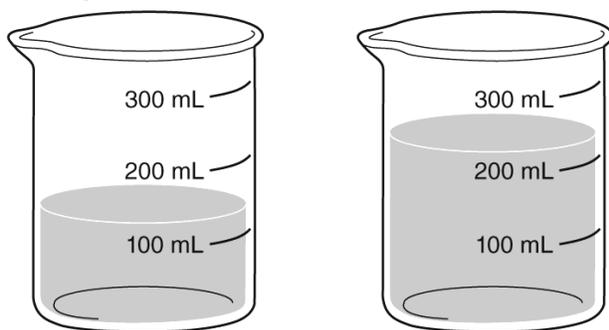
The table below lists the densities of some common materials at 20°C. If a scientist has 10 grams of each material, gasoline has the greatest volume.

Material	Density (g/cm <sup>3</sup> )
gasoline	0.70
mercury	13.6
milk	1.03
water	0.998

One chemical property that can be measured in a substance is its reactivity with water. Flammability is another chemical property.

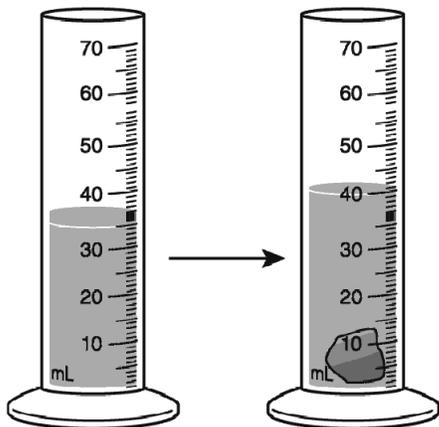
Amin had two metal cubes of identical sizes. He placed cube A on one side of a pan balance and cube B on the other side of the balance. The pan that held cube B was now lower than the pan that held cube A. One conclusion Amin can draw about the two cubes is the densities of the two cubes are different.

The two beakers shown below contain pure water. Density is one property that is the same for the water in both beakers, even though volume is different.



The ability to tarnish is an example of a chemical property of a metal statue.

Josie partially filled a graduated cylinder with water. She then dropped a rock into the water. The illustration below shows what happened to the level of the water inside the graduated cylinder. The property of matter Josie is measuring is volume.



#### ESSAY TOPIC:

Explain why the melting point of any substance is always a physical property and not a chemical property. Use an ice cube in your explanation.

#### **(Example Response)**

Melting points are always physical properties. No attempt at creating a new substance is needed when you find a physical property. Chemical properties require an attempt to change a substance's identity. In an ice cube that begins to melt at zero degrees Celsius, frozen water is the same chemical as liquid water. Frozen water and liquid water have the same identity, so the zero degrees melting point of water is a physical property.