Edgenuity

Warm-Up | Introduction to Matter

Lesson Question

What is matter?

Lesson Goals

Examine matter.

Describe the particles that make up matter.

Determine ways to measure matter.

Examine the difference Between mass and weight.

Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

atom	the smallest unit of matter
displacement	the movement of something from its original position
mass	the amount of matter in an object
matter	the stuff that everything is made of

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Words to Know

volume	the amount of space an object takes up
weight	the downward pull on an object due to gravity

Scientific Inquiry

Scientists study the world around them by:

- asking questions.
- performing investigations.
- collecting data.
- providing explanations.
- communicating results.

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Matter

Matter makes up [all] objects and organisms.

Matter is made up of very small particles called [atoms].

Atoms

Atoms are the smallest units of [matter].

- Were named by the Greek philosopher Democritus in the fifth century BCE
- Come from the Greek word *atomos*, meaning "[cannot be divided]"
- Come in over [one hundred] types

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Mass

Mass is the amount of [matter] in an object.

- [Depends] on the object or organism.
- Is measured in [kilograms] (kg) or [grams] (g).
- [1,000] g = 1 kg

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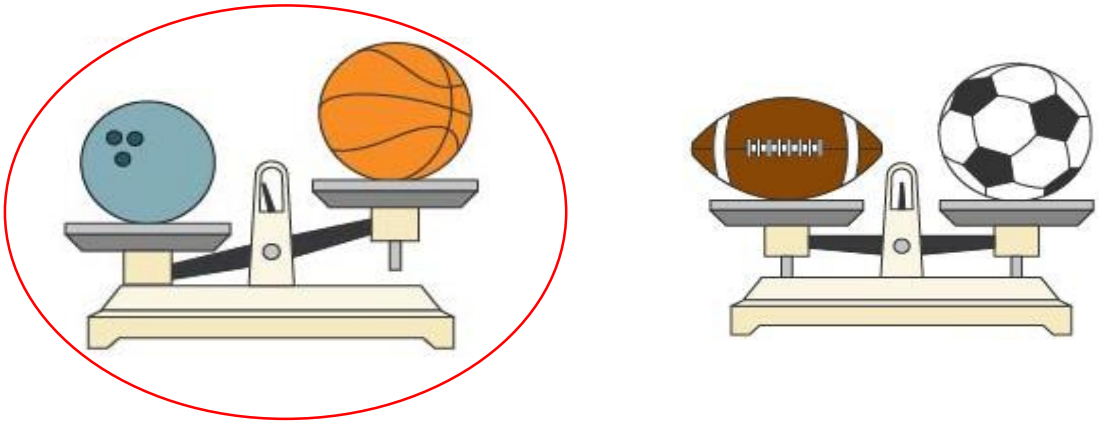
Mass: Comparing the Mass of Objects

The mass of two objects is compared using a pan balance.

- The pan that drops [down] has the object with [greater] mass. The pointer points [toward] this object.
- The pan that [rises] up has the object with [less] mass. The pointer points [away] from this object.
- If the pans are at the same height and the pointer is straight up, the masses of the two objects are about the [same].

Circle the image that shows objects that have different masses.



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Weight

Weight is the downward pull on an object due to [gravity].

- Measured with a spring [scale]
- Measured in [newtons] (N) or [pounds] (lb)

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Mass vs. Weight

Mass and weight are not the same.

- Mass is the amount of matter in an object.
- Weight is the downward pull on an object due to gravity.

The moon's gravity is $\frac{1}{6}$ of the gravity of Earth.

- On Earth, 1 kg has a weight of 2.2 lb.
- On the Moon, 1 kg has a weight of 0.36 lb.

A person has a greater weight on Earth than on the Moon.

A person has the same mass on Earth and on the Moon.

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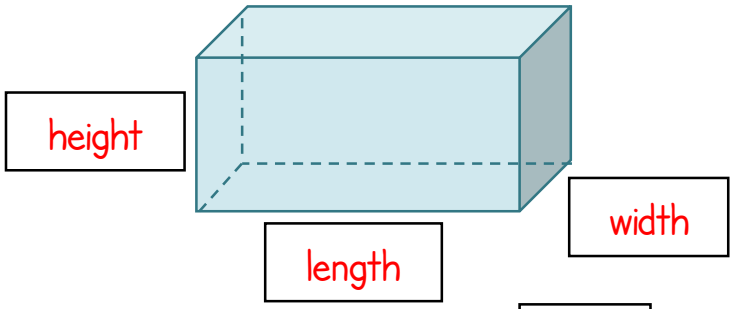
The Volume of Regular Solids: Rectangular Prisms

Volume is the amount of space an object takes up.

The formula for the volume a rectangular prism is V = lwh.

Volume $= length \times width \times height$



If we are using centimeters, the answer will be in cm^3.

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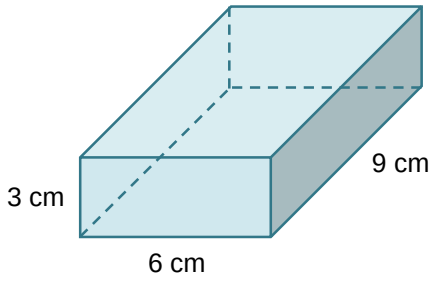
Another way to write the formula for the volume of a rectangular prism is $V = Bh$.

- $V =$ volume
- $B =$ base, or $l \times w$

The Volume of Rectangular Prism

Example: What is the volume of a box with a length of 9 cm, a width of 6 cm, and a height of 3 cm?



Step 1: Write the formula for finding the volume of a rectangular prism.

$V = lwh$

Step 2: Fill the values into the formula and solve.

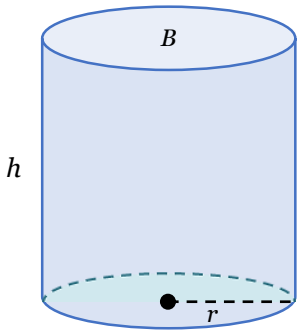
$$V = 9 \text{ cm} \times 6 \text{ cm} \times 3$$

$$V = 162 \text{ cm}^3$$

The Volume of Regular Solids: Cylinders

The formula for the volume of a cylinder is $V = Bh$.

- $V =$ Volume
- $B =$ base
- $h =$ height



The base of a cylinder is a circle.

To find the area of a circular base, multiply $\pi \times radius^2$, or πr^2.

$\pi =$ 3.14

Putting it all together, the formula for the volume a cylinder is $V = (3.14r^2)h$,

or $V =$ Bh.

The Volume of Regular Solids: Cones

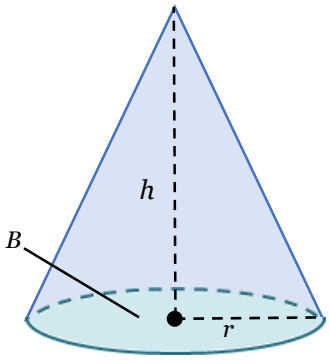
The formula for the volume of a cone is $V = \frac{1}{3}Bh$ or $V = \frac{Bh}{3}$.

$V =$ volume

$B =$ base, or $B = \pi r^2$

$h =$ height

The height (h) of a cone is measured from the center point of the base to the tip of the cone.



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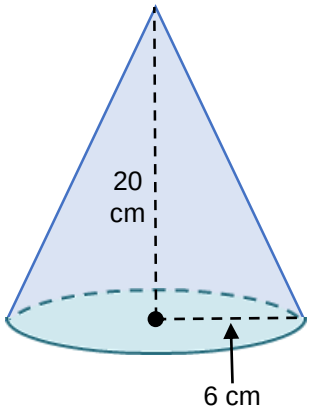
Example: What is the volume of a cone with a height of 20 cm and a radius of 6 cm? Round your answer to the nearest tenth.

Step 1: Write the formula for finding the volume of a cone.

$V = \frac{1}{3}Bh$ or $V = \frac{Bh}{3}$



Step 2: Fill the values into the formula and solve.

$$V = \frac{\pi \boxed{6}^2 \times \boxed{20}}{\boxed{3}} = 753.98$$

$$= \boxed{754 \text{ cm}^3}$$

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The Volume of Regular Solids: Spheres

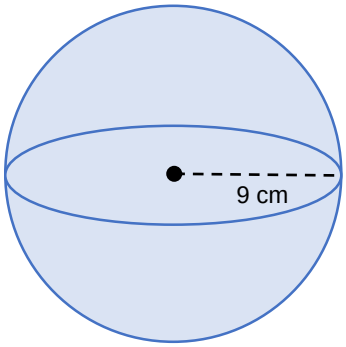
The formula for the volume of a sphere is $V = \boxed{\frac{4}{3}\pi r^3}$ or $\frac{4\pi r^3}{3}$.

Example: What is the volume of a sphere with a radius of 9 cm?

Round your answer to the nearest tenth.

Step 1: Write the formula for finding the volume of a sphere.

$V = \frac{4}{3}\pi r^3$ or $\frac{4\pi r^3}{3}$



Step 2: Fill the values into the formula and solve.

$$V = \frac{4}{3}\pi (9)^3 = 3053.6 = \boxed{3053 \text{ cm}^3}$$

The Volume of Irregular Solids

There is no formula for determining the volume of [irregular solids].

The volume of an irregular solid is calculated using the [displacement] of water.

A [graduated] cylinder is used to measure the volume of an irregular solid.

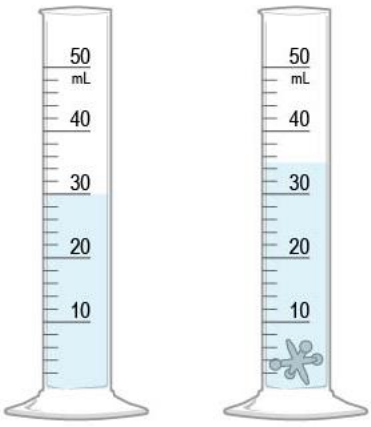
[Initial volume] is the volume of water only.

[Final volume] is the volume of water and object.

$$\text{final volume} - \text{initial volume} = \text{displacement}$$

$$\text{displacement} = \text{the volume of the irregular solid}$$

Example: Find the volume of a jack.



Step 1: Find the initial volume.

The volume of water only is [30] mL.

Step 2: Place the object into the cylinder and find the final volume.

The volume of the water and object is [35] mL.

Step 3: Find the displacement, or the final volume minus the initial volume.

The volume of the jack is $35 \text{ mL} - [30] \text{ mL} = [5] \text{ mL}$.

$1 \text{ mL} = 1 \text{ cm}^3$, so the final volume of the jack is [5 cm^3].

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Lesson Question

What is matter?

Answer

(Sample answer) Matter makes up all objects and organisms and is made of very small particles called atoms.

Review: Key Concepts

Matter can be measured by:

- mass, or the amount of matter in an object.
- weight, or the downward pull on an object due to gravity.
- volume, or the amount of space that an object takes up.

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Use this space to write any questions or thoughts about this lesson.