**Title:** Calculating Volume of 3D Objects

**Appropriate Grade Level:** 5

**Objective:** After completing this lesson, students will be able to:

identify 3D objects.

* identify that every solid (3D) shape has a volume.
* calculate the volume of geometric shapes.
* understand that 3D shapes can be measured in different units
* apply the concept/ formula to real world 3D shapes

**Material lists:**

* 3D geometric solids shapes

**What is volume?:**

* The volume is the measure of the space a solid figure occupies and is measured in cubic units.
* We can use unit cubes to find the volume of any geometric shape
* We find the number of unit cubes it takes to fill the base without any gaps or overlaps, then multiply that number of layers that make up its height.

**Louisiana Grade Level Standards**:

<https://www.louisianabelieves.com/docs/default-source/teacher-toolbox-resources/louisiana-student-standards-for-k-12-math.pdf>

GRADE 5

1. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.

b. A solid figure that can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.

2. Measure volumes by counting unit cubes, using cubic cm, m, and improvised units.

3.  Relate volume to the operations of multiplication and solve real-world and mathematical problems involving volume.

a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

b. Apply the formulas V = l × w × h for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

**Rationale:**

To help students find the volume which refers to the amount of space the object takes up. Volume concepts can be applied to real life objects such as cereal boxes, vegetable cans, shoe boxes, etc.

**CAREERS that use volume:**

[**CAD engineer**](https://www.indeed.com/q-CAD-designer-jobs.html) (Computer Aid Design) Engineer

* CAD engineer, or computer aided design engineer, creates construction plans for cars, bridges, skyscrapers or other buildings using software systems.
* Their main responsibilities include designing 2D or 3D images for construction workers to accurately present complex projects, establishing budgets and timelines and analyzing the data of certain projects to develop creative solutions to any design issues.
  + <https://www.bls.gov/ooh/architecture-and-engineering/drafters.htm>

**Surveyor**

* A surveyor uses mathematical calculations, like elevations, shapes and dimensions with tools and equipment to take measurements of land for private, government and public developments.
* Other job duties include visiting various job sites to take measurements, measuring angles and distances on different properties to determine legal construction boundaries, using calculations to confirm measurements and analyzing data found on maps, charts, software systems and plans.
* <https://www.bls.gov/ooh/architecture-and-engineering/surveyors.htm>

**Fashion Designer**

* Fashion Designers need to have a good understanding of geometry and measurement to make clothes that enhance the human body,but can be broken down into parts which can be cut out of patterns.
* Clothes are stitched using geometrical measurements, and designers need to know how to take a three-dimensional shape, and convert it into a two-dimensional pattern that can be made from flat cloth
  + <https://www.bls.gov/ooh/arts-and-design/fashion-designers.htm>

**Medical imaging**

* Medical imaging is a method used for reconstructing shapes from inside the human body.
* For example, if a CAT scan reveals a tumor, a medical imaging specialist can then use the data from the scan, along with the principles of geometry, to construct a three-dimensional model that is the size, shape and density of the tumor. Likewise, this geometrical skill can be applied to reconstructing organs, bones, and virtually any other item from the human body, according to the Geometry in Action site.
* <https://www.bls.gov/ooh/healthcare/radiologic-technologists.htm>

**LEARN MORE**: Would you like to learn more about volume? Try these great activities!

Activity 1: Safari

Conducting your own volume safari

Go through home and calculate Cereal box, can of food, shoe box, book, and cup and try and calculate the volume!

Instead of a ruler, try using legos to measure!

Activity 2:  Marshmallow activity

Use marshmallows and toothpicks to create different 3D geometric shapes!

Then use a ruler and see if you can calculate the volume

Activity 3:  Volume of a Cylinder

* <https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fm.youtube.com%2Fwatch%3Fv%3DfGVlL47TKAw&amp;data=05%7C01%7Cclope26%40lsu.edu%7C997e4e977b0047117a9d08da26dda73d%7C2d4dad3f50ae47d983a09ae2b1f466f8%7C0%7C0%7C637865030675663280%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&amp;sdata=xHTL62%2BaZKZZYxtdIPuVMOlK14sqgpAxO3LIkAuUKzk%3D&amp;reserved=0>

Activity 4: Volume Song

* + <https://www.youtube.com/watch?v=1soZ1eCtWuA>

**YOUTUBE VIDEO AND ACTIVE LINK:**

<https://www.youtube.com/watch?v=I3DXy5WZ0Fg>