# VOLUME OF SPHERE

## Subject

Mathematics

## Prepared By

[Instructor Name]

## Grade Level

5

## Overview

This lesson plan covers teaching content for;

1. Comparing the volume of sphere with the volume of a cylinder
2. Proving the formula for the volume of a sphere
3. Solving volume related problem involving a sphere.

## Objectives

Students should be able to;

1. Find the volumes of spheres.
2. Find the radii of spheres given the volumes.
3. Get the volume of a sphere by comparing with the volume of a cylinder.
4. Prove the formula for the volume of a sphere.

## Activity Starter/Instruction

1. Spheres are three-dimensional shapes with no corners. Every point on the surface is the same distance from the center.
2. We see spheres every day, and we don't think much about how they are defined.
3. Take a ball, for example. A ball is a sphere, but do we think about how it is defined? No, because most likely we will end up playing with it, bouncing it up and down.
4. But take a close look, and you will see that it has no corners and that no matter how you hold the ball, every one of those points will be the same distance to the very center of the ball.
5. This distance from any point on the sphere's surface to the center of the sphere is called the radius.
6. Because a sphere is a uniform shape, meaning that no matter how you turn it, it will always look the same, the radius is the only measurement we need.

## Teacher Guide

**Day 1/ Lesson 1: 20mins**

1. Getting the volume of a sphere by comparing it to the volume of a cylinder.
2. Volume of cylinder = B h

   B = area of the circle

   Cylinder: V = B h

   Base = $\pi r^2$

   V = ($\pi r^2$) h

   h = 2r

   V = ($\pi r^2$)(2r)

   V = 2 $\pi r^3$

   Cylinder: V = 2 $\pi r^3$
3. Sphere: h = 2r

   V =?
4. If a hemisphere is the exact half of a sphere, and 3 hemisphere = volume a cylinder. Therefore volume of sphere = 2/3 sphere = a cylinder.

   Cylinder: V = 2 $\pi r^3$

   Sphere: V = 2/3 (2 $\pi r^3$)

   V = 4/3 $\pi r^3$
5. A manufacturer of snow globes needs to calculate how much distilled water will be needed to fill each snow globe. Find the volume of the snow globe with a radius of 4 cm.

## Materials Required

- Four spherical objects of varying sizes (Ping-Pong balls,
- Measuring tape
- Calculator
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## Additional Resources

- https://teacher.desmos.com/activitybuilder/custom/5 e5d7-41ce-bf7b-05f3b0897eba
- https://www.bigideasmath.com/teachers/crosswalk/a
- https://www.onlinemathlearning.com/volume-sphere
- https://www.mathexpression.com/volume-of-a-spher
- https://www.onlinemathlearning.com/volume-of-a-sp
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## Additional Notes

## Guided Practice

**Day 2/ Lesson 2: 15 Mins**

1. Students determine the volume of several spherical objects by using the formula for the volume of a sphere
2. $V = \dfrac{4\pi r}{3}$
3. Students measure the circumference of each object using measuring tape, then derive the value of the radius r using the formula for the circumference of a circle
4. $C = 2\pi r$
5. They then substitute the value for r into the formula for volume. Answers may vary depending on the objects chosen.
6. Students use the formula for the volume of a sphere to solve problems as a group.
7. Answers may vary depending on whether students use a calculator with a $\pi$ button or if they use the approximate value 3.142 for $\pi$.

Radius = 4r

Volume =?

Sphere: $V = 4/3 \,\pi r^3$

$V = 4/3\ (4cm)(4cm)(4cm)(\ \pi)$

6. $85\ \pi\ cm^3$

## Guided Practice

**Day 3/ Lesson 3: 15mins**

1. Everyone draws a three column chart on their whiteboard and labels the columns cylinder, cone, and sphere.
2. Set the clock for 3 minutes and everyone writes down examples of everyday items that are cylinders, cones, and spheres. They keep their answers secret as they write on their board.
3. At the end of the 3 minutes, see who got the most points. Each students is competing against the teacher. The teacher reads her list and if students have any of the same examples, they have to cross them off their list. Players get one point for every example they have that the teacher doesn't have.
4. Students share their unique examples. A winner is declared. (Don't have them battle everyone in the class because it can take a long time to go around and have every single person share all of their examples.)
5. Most of the students will get into this game. It is a great way to build background and kids love the opportunity to outwit the teacher.

### Summary

Go over the activities with students and see how well they understand them.

### Assessment Activity

1. Students need to understand the steps involved to get the volume of a sphere

### Assessment Activity

Assess if students can

1.Identify a sphere.
2.Solve volume problems involving sphere correctly