

STRUCTURE OF THE EARTH

Subject

Mathematics

Prepared By

[Instructor Name]

Grade Level

4

Overview

This lesson plan covers teaching content for;

1. Description of the shape of the earth
2. Description of spherical objects
3. Calculation of volume and surface area of spheres and spherical objects
4. Comparing volume of spheres and cuboids

Objectives

Students should be able to;

1. Describe the shape of the earth.
2. Say which is bigger, the volume of the sphere or the volume of the cuboid that encloses it
3. Compare volume of a sphere and cuboid

Guided Practice

Day 2/ Lesson 2: 30 Mins

3-D Earth Geometry

1. An interesting topic in 3-dimensional geometry is Earth geometry. The Earth is very close to a sphere (ball) shape, with an average radius of 6371km. (It's actually a bit flat at the

Activity Starter/Instruction

1. Pupils need a good understanding of the concept of circles. They need to be able to measure length and distance round a circle.
2. They also need to understand and be able to choose the appropriate unit of circumference.
3. Make them draw circles and measure round them.
4. You can also allow pupils to practice measuring of circumference on the school playing ground and on paper
5. **sphere**: a round solid figure, or its surface, with every point on its surface equidistant from its centre
6. **radius**: a straight line from the centre to the circumference of a circle or sphere
hemisphere: a half of a sphere

Guided Practice

Day 2/ Lesson 2: 20 Mins

1. Explain to the students that A sphere is a perfectly round three dimensional shape

Teacher Guide

Day 1/ Lesson 1: 15 Mins

1. Provide a globe to allow pupils to see the shape of the Earth.
2. Compare this shape with orange shape and ball shapes and ask pupils to draw these shapes in their books.
3. This focus of the lesson is on the shape of the earth and the volume of a sphere.
4. Ask pupils to mention other objects that are spherical in shape.
5. Explain to the pupils that a sphere has a centre just like an orange.
6. Cut an orange into two equal halves and show to the pupils its centre.
7. Tell them that each half of a sphere is called a hemisphere.

Guided Practice

Day 3/ Lesson 3: 10 Mins

Finding the volume and surface area of a sphere

1. A sphere is the shape of a basketball, like a three-dimensional circle. Just like a circle,

Materials Required

- Whiteboard
- Globe
- Blank sheet
- Pencils
- Orange

Additional Resources

- <https://www.intmath.com/vectors/3d-earth-geometry>
- <http://www.kidsmathgamesonline.com/facts/geometry>
- <https://courses.lumenlearning.com/prealgebra/chapter/volume-and-surface-area-of-a-sphere/>

Additional Notes

poles, but only by a small amount).	similar to a ball you might play soccer or basketball with.	the size of a sphere is determined by its radius, which is the distance from the center of the sphere to any point on its surface. The formulas for the volume and surface area of a sphere are given below.
2. Earth geometry is a special case of spherical geometry.	2. All points on the surface of a sphere are the same distance from the center.	2. A sphere has a radius 6 inches. Find its volume and surface area.
3. When we measure distances that a boat or aircraft travels between any 2 places on the Earth, we do not use straight line distances, since we need to go around the curve of the Earth from one place to another.	3. A sphere is perfectly symmetrical around its center.	3. Step 1 is the same for both 1. and 2., so we will show it just once.
4. Think about the direct or straight-line distance between London and Sydney, through the Earth. That's going to be a lot less than the distance a plane flies around the surface of the Earth.	4. The distance from the center of a sphere to its surface is called the radius.	4. Step 1. Read the problem. Draw the figure and label it with the given information.
5. Latitude and Longitude	5. The maximum distance through the sphere is called the diameter, it is twice the size of the radius.	5. To find the volume, let V = volume
6. First, we represent the Earth by a sphere:	6. The value of Pi (π) to 2 decimal places is 3.14, it comes in handy when working out the volume and surface area of a sphere.	6. Write the appropriate formula $V = \frac{4}{3}\pi r^3$ $V \approx \frac{4}{3}(3.14)6^3 \approx 904.32 \text{ cubic inches}$
7. We slice the Earth through the equator and remove the top. We show the Earth's axis which (by convention) points to North at the top.	7. To find the volume of a sphere you can use the following formula: $\text{Volume} = \frac{4}{3}\pi r^3$	7. Double-check your math on a calculator.
	8. In an easier to read form: $\text{Volume} = \frac{4}{3} * \pi * r * r * r$	8. To find the surface area of the cube let S = surface area. Write the appropriate formula: $S = 4\pi r^2$ Therefore: $S \approx 4(3.14)6^2$ $S \approx 452.16$
	9. To find the surface area of a sphere you can use the following formula: $\text{Area} = 4\pi r^2$	
	10. In an easier to read form: $\text{Area} = 4 * \pi * r * r$	
	11. Sometimes a sphere is given a north and south pole (found on opposite sides of the surface).	
	12. An equator is a circle that is the same distance from the north and south poles.	
	13. A sphere can be divided into two equal hemispheres by a flat two dimensional surface (plane) that passes through the center.	
	14. The words north pole, south pole, equator and hemispheres are often used when talking about planet Earth even though it isn't really a sphere, it's more like a flattened sphere (oblate spheroid).	

Assessment Activity

Assessment Activity

1. A globe of Earth is in the shape of a sphere with radius 14 centimeters. Find its 1. volume and 2. surface area.
2. Round the answer to the nearest hundredth.
3. A mysterious orb is in the shape of a sphere with radius 4.5 inches. Find the volume and surface area, round your answer to two decimal places.

Assessment Activity

Summary

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1. Pupils to list and draw as many spherical objects as they can think of.
 2. Pupils should be able to calculate the volume of a sphere and a cuboid. Some pupils may need extra help.
 3. Make sure pupils understand how to use the formula
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