

VOLUME OF PRISM

Subject

Mathematics

Prepared By

[Instructor Name]

Grade Level

5

Overview

This lesson plan covers teaching content for;

1. Surface area and Volume of Rectangular prism
2. Surface area and Volume of Triangular prism
3. Volume of Trapezoidal prism

Objectives

Students should be able to;

1. Solve problems for the volume of triangular prisms.
2. Solve for volume of rectangular prism
3. Solve for the volume of all prisms.

Activity Starter/Instruction

1. Show students three dimensional models of many prisms. Discuss what part of each model represents the surface area and the volume.
2. Using the model of the rectangular prism, show where the length, width, and height of the model are in order to determine the volume of the prism. As you do this, have the students note the formula for finding the volume of a rectangular prism.
3. Next look at the surface area formula for a rectangular prism. Trace your finger along each dimension of the object as it comes in the formula.
4. Practice calculating the surface area and volume for a rectangular prism with $L = 3\text{ft}$, $w = 6\text{ft}$ and $h = 8\text{ft}$.
5. Surface Area = $2lw + 2hw + 2hl$
 $= (2 \times 3 \times 6) + (2 \times 8 \times 6) + (2 \times 3 \times 8) = 180\text{ft}^2$
6. Volume = $l \times w \times h$
 $= 3 \times 6 \times 8 = 144\text{ft}^3$

Teacher Guide

Day 1/ Lesson 1: 20mins

1. A triangular prism is simply a 3D shape that has two triangular bases and three rectangular sides.
2. In our daily life, there are many examples of shapes resembling a triangular prism. First of all, a camping tent, a slice of cake is a very good example of a triangular prism.
3. The key to find the surface area of a triangular prism is to find the area of five of its faces (2 triangular bases and three rectangular sides)
4. To find the area of a rectangle we need to multiply base and height or the rectangle. Sometimes base and height of a rectangle are called length and breadth (width) of the rectangle.
5. To find the area of a triangle, multiply the length of base to the height of triangle from the same base and divide the answer by 2.
6. Surface area = Area of two triangular faces + Area of bottom rectangle + Area of two side rectangles
7. The volume of a triangular prism is the half the volume of a rectangular prism
8. Volume = $\frac{1}{2} \times \text{length} \times \text{width} \times \text{height}$.
9. The trick is to locate one of the triangular faces, the next step is to find its area using its base and height.

Materials Required

- Calculator
- Paper
- Tape
- Scissors
- Ruler
- An empty cereal box
- A box of any type of cereal
- Three-dimensional models of a rectangular prism and c
- White board
- Marker
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Additional Resources

- <http://www.shodor.org/interactivate/lessons/Surface>
- <http://jenniferfindley.com/teaching-volume-common>
- <http://www.edugains.ca/resourcesMath/CE/LessonsS>
- <http://www.shodor.org/interactivate/lessons/Volume>
- <http://www.cpalms.org/Public/PreviewResourceLesso>
- <https://math.tutorvista.com/geometry/volume-of-a-t>
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Additional Notes

Teacher Guide

Day 2 Lesson 2: 15mins

1. Show students an empty cereal box. Ask them to estimate the volume and surface area of the box.
2. Unfold the box, showing its net, and allow students to change their estimates if they want. (If you have enough boxes, give one to each group, otherwise, this can be a demonstration.)
3. Calculate the volume and surface area of the box.
4. Get students to measure and to do the calculations for volume and surface area.

7. Repeat the process using other models: a triangular prism and a hexagonal prism.

Guided Practice

Day 2/ Lesson 2: 15 Mins

1. Each group of students needs an 8.5 in. x 11 in. piece of paper. Ask each group to create a box without a lid.
2. Have one group cut a ½" square out of each corner, another a 1 in. square, and another with 1.5 in. squares.
3. Continue until you get to 4in. if you have that many groups. Give each group tape so they can tape the sides together to make the box.
4. Each group is to estimate then calculate the volume, and surface area of their 'box' (pretend the box has a top)
5. Ask the students if the volume or surface areas of the boxes will be the same.
6. Ask students to show their boxes to each other. Have the students list the boxes in order from least to greatest by what they predict the volumes to be.
7. Fill the largest-predicted volume box with cereal. Pour that cereal into the next largest.
8. Discuss what should happen if the volume is in fact larger (the cereal should flow over the smaller box).
9. Continue on down the line and fix the order as necessary.

10. Once the area of one of the triangular faces is calculated, the next step is to locate the second triangular face.
11. The distance between these two faces is also known as length or height of the triangular prism. So, locate the given measurement for the distance between two triangular faces, which is length of the prism.
12. Finally, multiply the area of the triangular base to the length of the prism to find its volume.

Guided Practice

Day 4/ Lesson 4: 20mins

1. A trapezoidal prism is a three dimensional geometric shape that consists of a trapezoid or trapezium shape on one cross section, and a rectangle on the other cross sections.
2. The most important components of this geometric shape are its length, height, base width, and top width. With their values known, it's possible to calculate the volume of a trapezoidal prism.
3. $\text{Volume (V)} = L \times H \times ((a + b) / 2)$
where,
L - Length
H - Height
a - Top width
b - Bottom width
4. Calculate the volume of a trapezoidal prism having a length of 7 centimeters and a height of 4 centimeters. The top and bottom widths are 3 and 2 centimeters respectively.
5. $\text{Volume (V)} = 7 \times 4 \times ((3 + 2) / 2)$
 $= 28 \times 2.5$
 $= 70$
6. Thus, the volume of the prism is 70 cubic centimeters.

