



UNIT: VOLUME OF RIGHT RECTANGULAR PRISMS
CREATING A CITYSCAPE WITH RECTANGULAR PRISMS (Lesson 4 of 5)
Grade Band: 5
Content Focus: Visual Arts and Math



LEARNING DESCRIPTION

In this lesson, students will develop skills to create and analyze right rectangular prisms and understand the concept of volume. Students will apply their knowledge of volume of right rectangular prisms to creating a collaborative class cityscape sculpture.

LEARNING TARGETS

Essential Questions	"I Can" Statements
How can I create a building for a cityscape using the formula for finding the volume of a right rectangular prism?	I can create a rectangular prism that has six rectangular faces.
How can I find the volume of a rectangular prism?	I can find the volume of a rectangular prism by multiplying the length, width, and height.
	I can use my understanding of volume and dimensions to design and create a building for a cityscape.



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GEORGIA STANDARDS

Curriculum Standards	Arts Standards
5.GSR.8.3 Investigate volume of right rectangular prisms by packing them with unit cubes without gaps or overlaps. Then, determine the total volume to solve problems.	VA5.CR.4.b Create sculpture that demonstrates a design concept using a variety of methods (e.g. papier-mâché, paper sculpture, assemblage, found object sculpture).

SOUTH CAROLINA STANDARDS

Curriculum Standards	Arts Standards
5.MDA.3 Understand the concept of volume measurement. a. Recognize volume as an attribute of right rectangular prisms; b. Relate volume measurement to the operations of multiplication and addition by packing right rectangular prisms and then counting the layers of standard unit cubes; c. Determine the volume of right rectangular prisms using the formula derived from packing right rectangular prisms and counting the layers of standard unit cubes.	Anchor Standard 1: I can use the elements and principles of art to create artwork.

KEY VOCABULARY

Content Vocabulary	Arts Vocabulary
<ul style="list-style-type: none"> • <u>Volume</u> - The amount of space occupied by a three-dimensional object or shape • <u>Height</u> - The perpendicular distance from the base of a shape or object to its topmost point • <u>Length</u> - The distance from one end of an object to the other along its longest side • <u>Width</u> - The measurement of the shorter side of an object or shape when compared to its length; it is usually the horizontal dimension • <u>Three-dimensional figure</u> - A figure that has length, width, and height 	<ul style="list-style-type: none"> • <u>Form</u> - An object that is three-dimensional and encloses volume (cubes, spheres, and cylinders are examples of various forms) • <u>Sculpture</u> - A three-dimensional work of art that can be made from a variety of materials, such as wood, clay, metal, or stone • <u>Cityscape</u> - A visual representation or depiction of an urban environment, often showing the buildings, streets, and other features of a city; it can be an artwork, photograph, or a model that captures the overall layout, architecture, and atmosphere of a city



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MATERIALS

- Graph paper
- Tape
- Colored pencils and/or fine line markers
- Scissors
- Pencils
- Cardstock or thin cardboard
- Examples of [cityscapes](#)

INSTRUCTIONAL DESIGN

Opening/Activating Strategy

- Show students examples of [cityscapes](#).
 - Ask students to make observations about how the buildings are arranged.
 - Students should notice that they are a variety of heights and are arranged close together.
 - Ask students to make observations about the designs they see on the buildings.
 - Students might notice that many buildings have windows covering the outsides.
 - Ask students what they notice about the structures? How would they describe their shape?
 - Allow students to share their observations and discuss the fact that these structures are all rectangular in shape.
 - Review how to find the volume of a right rectangular prism.

Work Session

- Tell students that they will be creating a three-dimensional cityscape as a class. Each student will design and build their own building.
 - Show them an example of a rectangular structure on graph paper and explain how each square on the paper represents a unit of measurement.
 - *Anticipate the misconception that students might think that the number of squares on graph paper represents the volume of the structure. Clarify that the graph paper is just a tool for visualizing and measuring, and the actual volume is calculated using multiplication.*
 - Show them the dimensions of an example building: $l = 8$, $w = 6$, $h = 15$.
 - Show students how to use these dimensions to draw out each face of the right rectangular prism on graph paper.
 - Then, demonstrate how to cut out each shape on the graph paper and use that shape as a template to trace on either cardstock or thin cardboard.
 - Next, show students how to cut out each shape and assemble them together using tape.
 - Finally, students will be able to add designs to their buildings using fine line markers and/or colored pencils.
- Pass out dimensions, rulers, and graph paper to students.
- Circulate the classroom and monitor student work, providing support and clarification as needed.



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- As students complete their templates on graph paper, pass out cardstock/thin cardboard, colored pencils/markers, and tape to construct their buildings.
- The final step students should complete is to calculate the volume of their building using the formula for volume.
- Have students write their equation and solution on a notecard.
- Students should place their buildings with their notecards together in a designated area to create the class cityscape.

Closing/Reflection

- Have the class conduct a gallery walk observing the connection between the dimensions and volume of each structure and its form.
- Close the lesson with class reflection questions:
 - How did you calculate the volume of your building? Why is it important to use multiplication to find the volume instead of just counting the squares on the graph paper?
 - How do you think your building fits into the overall cityscape you created as a class?
 - How might you apply what you've learned about volume and design in future projects or real-world situations?

ASSESSMENTS

Formative

Use guided questions and student check-ins throughout the lesson to check for students' understanding of how to calculate volume and use the tools provided to create their buildings.

Summative

Criteria	3 Points	2 Points	1 Point
Creativity	The sculpture demonstrates exceptional creativity and originality. The student goes above and beyond in designing an innovative and visually appealing rectangular prism sculpture.	The sculpture demonstrates some creativity and originality. The student puts effort into designing a visually interesting rectangular prism sculpture.	The sculpture lacks creativity and originality. The student does not put much effort into designing a visually appealing rectangular prism sculpture.
Accuracy of Dimensions	The student accurately determines and correctly labels the length, width, and height of the rectangular prism sculpture.	The student determines the dimensions of the rectangular prism sculpture with minor errors or omissions in labeling.	The student inaccurately determines the dimensions of the rectangular prism sculpture or fails to label them correctly.
Volume Calculation	The student accurately calculates the volume of the rectangular prism sculpture using the formula $V = l * w * h$ and provides a clear explanation of the process.	The student calculates the volume of the rectangular prism sculpture with minor errors or omissions in the calculation or explanation.	The student inaccurately calculates the volume of the rectangular prism sculpture or fails to provide a clear explanation of the process.
Craftsmanship	The sculpture exhibits excellent craftsmanship, showing attention to detail and careful construction. It is neatly and securely assembled using appropriate art materials.	The sculpture exhibits satisfactory craftsmanship, with some areas showing attention to detail and careful construction. It is mostly neatly and securely assembled using appropriate art materials.	The sculpture exhibits poor craftsmanship, lacking attention to detail and careful construction. It is sloppily and insecurely assembled using inappropriate art materials.



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DIFFERENTIATION

Accelerated: Have students research skyscraper designs and create more complex buildings by combining several right rectangular prisms together. Students can then solve for the volume of the prisms and add them together to find the total volume of their building.

Remedial:

- Provide students with pre-cut shapes with dimensions that they can then construct. Students should still calculate the volume of the structure.
- Allow students to work with a partner.

ADDITIONAL RESOURCES

CREDITS

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