



UNIT: VOLUME OF RIGHT RECTANGULAR PRISMS
EXPLORING VOLUME THROUGH MUSICAL DYNAMICS (Lesson 2 of 5)
Grade Band: 5
Content Focus: Music and Math



LEARNING DESCRIPTION

Students will learn and apply the formula for finding the volume of a rectangular prism ($V = l \times w \times h$) by integrating mathematical concepts with dynamics through an original musical composition.

LEARNING TARGETS

Essential Questions	"I Can" Statements
How can we represent the dimensions and volume of a rectangular prism through musical composition?	I can represent the dimensions and volume of a rectangular prism through musical composition.
How does the dynamics in each musical composition reflect the dimensions and volume of the corresponding rectangular prism?	I can explain how the dynamics in each musical composition reflect the dimensions and volume of the corresponding rectangular prism.



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GEORGIA STANDARDS

Curriculum Standards	Arts Standards
5.GSR.8: Examine properties of polygons and rectangular prisms, classify polygons by their properties, and discover volume of right rectangular prisms.	ESGM5.RE.1 Listen to, analyze, and describe music. b. Describe music using appropriate vocabulary. ESGM5.CR.2 Compose and arrange music within specified guidelines.

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 arrange and compose music. Anchor Standard 6: I can analyze music.

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>Right rectangular prism</u> - A three-dimensional geometric shape with the following characteristics: 	<ul style="list-style-type: none"> • <u>Dynamics</u> - Loud and soft sounds; volume <ul style="list-style-type: none"> ○ <u>Piano</u> - Soft ○ <u>Pianissimo</u> - Very soft ○ <u>Mezzo-forte</u> - Moderately loud ○ <u>Forte</u> - Loud ○ <u>Fortissimo</u> - Very loud ○ <u>Crescendo</u> - Get louder ○ <u>Decrescendo</u> - Get softer (synonymous with diminuendo) • <u>Form/Composition</u> - The organization of a piece (how the music is put together)



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- Faces: It has six faces, all of which are rectangles.
- Right Angles: Each of its edges meets at a right angle (90°), making it a "right" prism.
- Parallel and Perpendicular: Opposite faces are parallel, and adjacent faces are perpendicular.
- Vertices and Edges: It has 8 vertices (corners) and 12 edges.

MATERIALS

- Rectangular prism models or visuals
- Whiteboard and markers
- Musical instruments or access to online music creation tools
- Examples of music with varying dynamics, such as ["In the Hall of the Mountain King"](#)
- [Incredibox](#) (for acceleration)

INSTRUCTIONAL DESIGN

Opening/Activating Strategy

- Begin by reviewing the formula for finding the volume of a rectangular prism ($V = l \times w \times h$).
- Discuss the three dimensions of the rectangular prism: Length (l), width (w), and height (h).
- Explain that students will integrate this mathematical concept into the creation of a musical composition.

Work Session

- Choose a specific rectangular prism model or display a visual representation on the whiteboard.
- Guide students through the process of calculating the volume using the formula.
- Emphasize the importance of accurately identifying and labeling the dimensions in cubic units.
- Play an example of music with varying dynamics (soft to loud). A good example is [In the Hall of the Mountain King](#).
 - Ask students what emotions they felt at various points in the piece and why.
 - Ask students how the tempo (speed of the music) changed. What did this make them feel?
 - Ask students how the dynamics (volume of the music) changed. What did this make them feel?
 - Introduce musical terms related to dynamics:
 - Crescendo (gradually getting louder) and decrescendo (gradually getting softer)



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- Piano - Soft
- Pianissimo - Very soft
- Mezzo-forte - Moderately loud
- Forte - Loud
- Fortissimo - Very loud
- Crescendo - Get louder
- Decrescendo - Get softer (synonymous with diminuendo)
- Connect the concept of volume in mathematics to the dynamic levels in music. The smaller the volume, the softer the sound.
- Introduce students to various body percussion techniques—clapping, snapping, stomping, patting, tapping, etc.
- Divide the class into small groups.
- Provide each group with four rectangular prism models or visual representations.
- Instruct students to create a short musical composition using body percussion that mirrors the dimensions and volume of the given rectangular prisms.
 - Compositions should include one body percussion sound for each dimension and one for the volume. This will mean that students must calculate the volume for each prism. There will be 16 sounds total in the composition.
 - Encourage creativity in using dynamics to represent the mathematical dimensions. Students should connect that the smaller the volume or dimensions the softer the sound.

Closing/Reflection

- Each group will perform their musical composition for the class. After each performance, discuss how changes in dynamics reflected the dimensions and volume of the corresponding rectangular prism.
- Reflect as a class on how dynamics connect to mathematical concepts like volume.

ASSESSMENTS

Formative

- The teacher will observe students' ability to recognize changes in dynamics during listening to a musical sample.
- The teacher will make observations during the musical composition activity, focusing on the incorporation of volume-related dynamics.
- The teacher will solicit informal reflections through question and answer from students on the relationship between volume in mathematics and dynamics in music.

Summative

- Students can compose a musical piece using body percussion that demonstrates their understanding of volume through their use of dynamics.
- Students will submit their calculations for all four assigned prisms.

DIFFERENTIATION

Accelerated:

- Allow students to incorporate “found sound” (making sounds with objects that are readily available like tapping pencils together or tearing paper) into their compositions.
- Allow students to use [Incredibox](#) to compose their pieces.



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- Have students record and explain their pieces using a platform such as Flipgrid.

Remedial:

- Reduce the number of prisms students must calculate and use in their composition from four to two.
- Scaffold the lesson by creating a composition for one prism together as a class talking through the process of choosing body percussion and dynamics.

ADDITIONAL RESOURCES**CREDITS**

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