

Subject/Grade: Grade 6 Math Lesson Title: Beyond the Surface: Understanding Volume Teacher: Cheryl Bratton	
Stage 1: Identify Desired Results	
Outcome(s)/Indicator(s): SS6.2 Extend and apply understanding of perimeter of polygons, area of rectangles, and volume of right rectangular prisms (concretely, pictorially, and symbolically) including: <ul style="list-style-type: none"> • relating area to volume • comparing perimeter and area • comparing area and volume • generalizing strategies and formulae • analyzing the effect of orientation • solving situational questions. <p>d. Generalize a rule (formula) for determining the volume of right rectangular prisms.</p> <p>f. Solve a situational question involving the perimeter of polygons, the area of rectangles, and/or the volume of right rectangular prisms.</p>	
Key Understandings: ('I Can' statements) <ul style="list-style-type: none"> ➤ I can understand and explain to others what volume is. ➤ I can determine the volume of a rectangular prism in multiple ways. ➤ I can explain the connection between the dimensions of a prism and its volume. ➤ I can identify and explain why units for volume are cubed. 	Essential Questions: <ul style="list-style-type: none"> ➤ What is volume? ➤ How can I figure out the volume of a rectangular prism? ➤ How can I use the dimensions of a rectangular prism to determine volume? ➤ Why are the units for volume cubed?
Prerequisite Learning: <ul style="list-style-type: none"> ➤ understanding of how to properly show our work in math problems ➤ previously covered perimeter and area ➤ understanding of why units might be squared (covered with area) 	
Instructional Strategies: <ul style="list-style-type: none"> ➤ non-linguistic representations through use of cubes ➤ cooperative learning ➤ teacher clarity with expectations and directions ➤ exit ticket 	
Stage 2: Determine Evidence for Assessing Learning	
Formative Assessment <ul style="list-style-type: none"> ➤ teacher observation and interaction during building and discussion ➤ exit ticket responses 	
Stage 3: Build Learning Plan	

Set (Engagement):**Length of Time:** 10 minutes

- Ask students what volume is, guiding toward the answer that it is a measure of how much something can hold.
- Give students some cubes and ask them to build a rectangular prism, writing down the dimensions of the prism they create (length, width and height).
- After a few minutes ask students to count the total number of cubes they used in their design.
- Next, ask students how they can use the dimensions they recorded earlier to quickly determine the number of cubes in their design. Don't give them ANY prompting other than that simple question.

Development:**Time:** 40 minutes

- Start with playing the [Study Jams Video on Volume](#)
- After the video, engage students in a discussion about what they learned.
- Explain that in order to help them better understand the concept of volume, we are going to spend some time creating various rectangular prisms with the cubes and record our findings.
- First, have students build 2 prisms based on lengths, widths, and heights that you have given them and to record what they think the volume is. Write the dimensions on the board for reference and allow 5 minutes or so for them to complete.
- Come back as a group and ask for someone to share what they calculated the volume to be for each one and how they did it. Ask if anyone else got a different volume or used a different method to calculate it.
- Next, give students 5-7 minutes (depending on engagement) to "free build" rectangular prisms and then record the length, width, height, and the volume of the prism.
- Come back as a group and ask if there is anyone who would like to share the prism they created and how they calculated the volume. Ask if there is anyone else whose shape has the same volume, but whose prism looks different.
- Give students the recording sheet for [Building A Rectangular Prism](#) (page 5 & 6 only) and have them work in pairs or groups of 3 to create as many prisms as they can with the number of blocks specified (24 or 36) and record their findings on the chart.
- Walk the room and ensure students are understanding what to do, the concepts and are staying on task. Allow 10-15 minutes or so but adjust based on student need and engagement. For those who finish quickly, challenge them to try again but with more blocks.
- When most are finished, instruct groups place their paper face up in front of the spot along with one of their shapes and have everyone walk around looking at the shapes others with the same number of cubes were able to create.
- After a few minutes, have everyone return to their seat.

Learning Closure:**Time:** 10 minutes

- Ask students what they noticed about the shapes with the same volume. Did they all have the same dimensions?
- What about how we can calculate volume? Did anyone figure out a way to use the dimensions of an object to calculate their shape?
- Have students complete the [Volume Exit Slip](#)

Materials/Resources:

- ☐ laptop connected to projector
- ☐ [StudyJams Video on Volume](#) cued
- ☐ Recording sheets printed, enough for each student from [Building A Rectangular Prism](#) (page 5&6 only)
- ☐ cubes (centimeter or snap cubes)
- ☐ pencils and paper to record findings
- ☐ [Volume Exit Tickets](#) printed

Possible Adaptations/**Differentiation:**

- Allow students to spread out to a quieter alternate space such as the commons area to work during building times.
- Provide larger size cubes and adult direct assistance for students who may experience challenges with the motor tasks and recording.
- If alternate quiet space is unavailable, have students build structures on the carpet to prevent noise from blocks falling for students with auditory sensitivity.
- consider reducing or increasing the number of blocks used in the group challenge to meet student needs.

Management Strategies:

- review with students before group work expectations (remain on task, be respectful of each other and use appropriate volume of voice)
- consider using a [digital timer](#) for building/work times to signal when to come back as a group.
- walk to the room continuously to ensure students are remaining on task and behaving appropriately.
- watch for visual cues such as increase in volume to signal students are ready to come back as a group and move on.

Safety Considerations:

- if using floor space, ensure a clear path to exit in case of emergency.
- watch for blocks on the floor which may pose a hazard.
- allow students to work alone if needed.

Stage 4: Reflection

Backwards by Design Lesson Plan Template