Unit 3 Volume Concepts

Content Area: **Math**
Course(s): **Sample Course**
Time Period: **NovDec**
Length: **5 weeks & Grade 5**
Status: **Published**

Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Volume Concepts

GRADE 5

Belleville Board of Education

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Board Approved: August 30, 2017

Unit Overview

- Model volume.
- Develop a volume formula.
- Volume of prisms.
- Combine volume of prisms.
- Solve word problems using volume.
- Use appropriate tools.
- **Use extra week to build in Assssment for each Topic and or Unit, as well as Re-teaching and Enrichment.**

NJSLS

MA.5.MD.C.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
MA.5.MD.C.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units.
MA.5.MD.C.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
MA.5.MD.C.3a	A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
MA.5.MD.C.3b	A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
MA.5.MD.C.5a	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying

	the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
MA.5.MD.C.5b	Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.
MA.5.MD.C.5c	Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Exit Skills

By the end of Grade 5 Mathematics, students in the Belleville Public Schools will be able to:

- **Develop fluency with addition and subtraction of fractions, and develop understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions):**
  Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.).
- **Extend division to two-digit divisors, integrating decimal fractions into the place value system and develop understanding of operations with decimals to hundredths, develop fluency with whole number and decimal operations:**
  Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.
- **Develop an understanding of volume:**
  Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real-world and mathematical problems.

Enduring Understanding

- Volume can be measured by counting the number of cubic units needed to fill a three dimensional figure.

- Formulas can be used to find volume of rectangular prisms and cubes.
- Find the volume of a solid figure that is a combination of two or more rectangular prisms.
- Use models, prior knowledge of volumes, and previously learned strategies to solve word problems.
- Use previously learned knowledge about volumes to choose the appropriate tools to solve volume problems.

Essential Questions

- What is the meaning of volume of a solid?
- How can the volume of a rectangular prism be found?
- What types of items can be measured for volume?

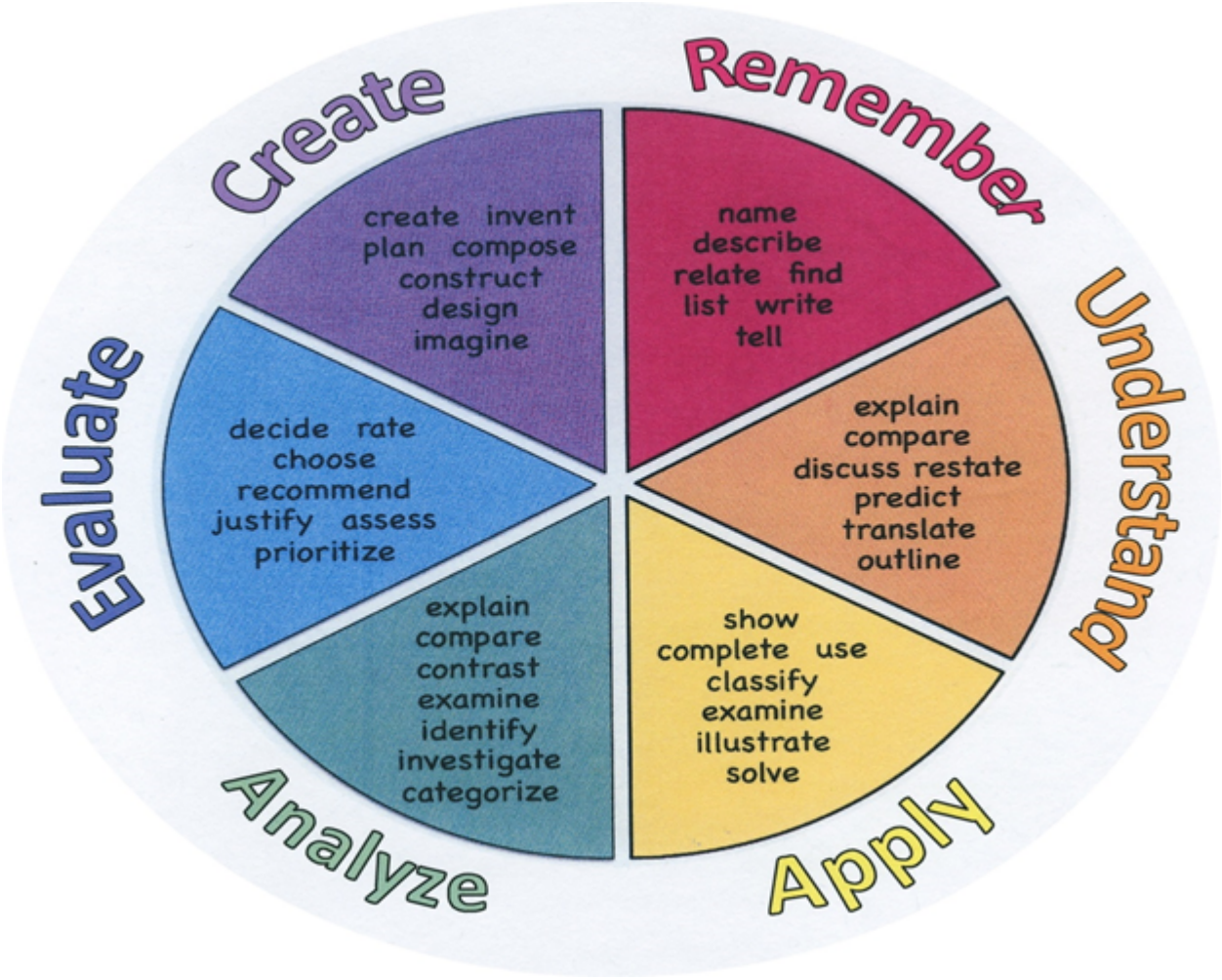
Learning Objectives

After understanding basic computation, students will be able to:

- **Recognize** the computation required to **demonstrate** and **calculate** finding volume of solid figures.
- To **illustrate** the finding of volume, unit cubes can be used to **measure** the amount of units, in order to **organize** unit cubes to confirm computation.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose

Repeat Reproduce	Summarize Tell Translate Associate Compute Convert Discuss Estimate Extrapolate Generalize Predict	Discover Divide Examine Graph Interpolate Manipulate Modify Operate Subtract	Separate		Reconstruct Revise Rewrite Transform



Interdisciplinary Connections

LA.K-12.NJSLSA.R	Reading
LA.K-12.NJSLSA.W	Writing
SOC.6.1.8.C	Economics, Innovation, and Technology
TECH.8.1.5.A	Technology Operations and Concepts: Students demonstrate a sound understanding of

	technology concepts, systems and operations.
TECH.8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
TECH.8.1.5.A.CS1	Understand and use technology systems
TECH.8.1.5.A.CS2	Select and use applications effectively and productively.

Alignment to 21st Century Skills & Technology

- English, reading or language arts
- World languages
- Arts
- Mathematics
- Economics
- Science
- Geography
- History
- Government and Civics

21st Century/Interdisciplinary Themes

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

21st Century Skills

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

Technology Infusion

- Smart Board
- Student Lap-top

Differentiation

Utilize **Quick Check** in order to determine differentiation of instruction. **Assess and differentiate** page will prescribe the differentiated instruction activity.

- Intervention activity.
- Reteach.
- Technology center.
- On-level and advanced activity center.
- Leveled Assignment.

Resources:

- NJDOE: Instructional Supports and Scaffolds for Success in Implementing the Common Core State Standards http://www.state.nj.us/education/modelcurriculum/success/math/k2/

Special Education

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format

- modified test length
- multiple test sessions
- multi-sensory presentation
- preferential seating
- preview of content, concepts, and vocabulary
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

ELL

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

Intervention Strategies

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to

reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.

- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Evidence of Student Learning-CFU's

- Admit Tickets
- Anticipation Guide
- Choral response
- Common benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar

- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Thumbs up
- Top 10 List
- Unit tests

Primary Resources

- en-Vision 2.0
- en-Vision 2.0 Digit Resources

Ancillary Resources

New Jersey Center for Teaching and Learning: www.njctl.org

PARCC site: www.parcconline.org

Khan Academy:
www.khanacademy.org

http://www.mathworksheets4kids.com/activities/4th-grade.html

http://www.education.com/worksheets/fourth-grade/math/

http://www.math-drills.com/privacy.php

http://www.internet4classrooms.com/printables/common_core/math_mathematics_4th_fourth_grade/

http://imathworksheets.com/geometry-worksheets-2complementary-angles-worksheets/volume-worksheets/volume-of-a-rectangular-prism/

http://illuminations.nctm.org/Search.aspx?view=search&type=ls&gr=3-5

http://www.k6-geometric-shapes.com/4th-grade-math-Worksheets.html

http://www.math-aids.com/

http://www.mathworksheetsland.com/

http://www.mathsisfun.com/worksheets/multiplication.php

http://www.softschools.com/mathg.jsp

http://interactivesites.weebly.com/addition.html

http://www.worksheetworks.com/math/geometry/measuring-figures/volume.html

http://www.math-salamanders.com/equivalent-fractions-worksheet.html

http://www.printable-math-worksheets.com/multiplication-array.html