Decimals and Volume

Topic 4 Overview

How is *Decimals and Volume* organized?

This topic builds on students' prior knowledge of volume, area, and decimal operations. Students are introduced to the language of prisms and pyramids so that distinctions can be made as they engage in discussions of volume and surface area.

Students begin this topic by building on their prior knowledge of volume of right rectangular prisms with whole-number side lengths in order to calculate volumes of right rectangular prisms with rational number dimensions. Next, students use their knowledge of area of composite figures from the previous topic to determine the surface area of three-dimensional solids by determining the area of their two-dimensional nets. Through the problem-solving activities with area and volume, students review operating with decimals with the eventual goal of fluency.

What is the entry point for students?

Students began learning about decimals in grades 4 and 5. They have experience using concrete models and place-value strategies to operate with decimals to the hundredths place.

In grade 5, students learned how to calculate the volume of a right rectangular prism by filling it with cubes and eventually by using the formulas $V = lwh$ and $V = Bh$. Students continue to build fluency in operating with positive rational numbers by solving area and volume problems with positive rational number dimensions.

How does a student demonstrate understanding?

Students will demonstrate understanding of the standards in this topic if they can:

- Fluently add, subtract, multiply, and divide positive rational numbers.
- Write equations that represent problems related to volume of right rectangular prisms where dimensions are positive rational numbers.
- Determine volume of right rectangular prisms where dimensions are positive rational numbers.
- Decompose rectangular and triangular prisms and pyramids into their two-dimensional nets composed of rectangles and/or triangles.
- Solve problems involving total surface area of a rectangular prism or pyramid, or a triangular prism or pyramid by determining the area of the shape's net.

Why is *Decimals and Volume* important?

This topic focuses on the fluency standards for grade 6 that students will practice

throughout the course. The remaining modules require decimal operations, particularly as students work through problem-solving scenarios. As part of distributed practice, students will revisit decimal operations when they solve equations in a later module. Fractions and decimals are encountered more frequently than whole numbers in daily life, so students should be comfortable and confident solving problems that require operating with these numbers.

How do the activities in *Decimals and Volume* promote student expertise in the mathematical process standards?

All Carnegie Learning topics are written with the goal of creating mathematical thinkers who are active participants in class discourse, so elements of the mathematical process standards should be evident in all lessons. Students are expected to make sense of problems and work toward solutions, reason using concrete and abstract ideas, and communicate their thinking while providing a critical ear to the thinking of others.

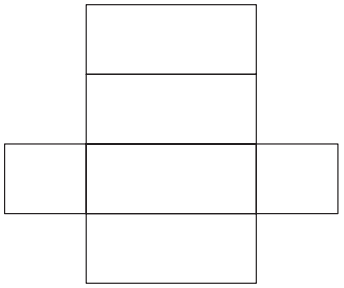
Throughout this topic, students develop their attention to precision as they compute with whole numbers and decimals. They draw from strategies for computing with decimals as they make estimates and judge the reasonableness of their answers. Students calculate volume and surface area of three-dimensional solids with positive rational number dimensions. They also attend to precision in language as they describe three-dimensional solids. Students also understand structure as they compose and decompose three-dimensional solids and their two-dimensional nets.

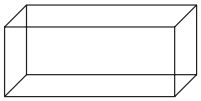
Materials Needed

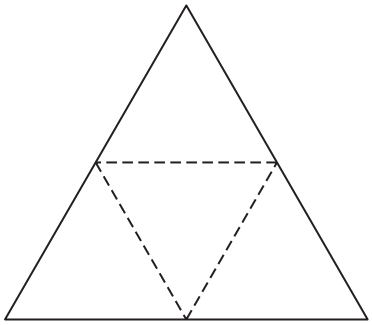
- Scissors
- Tape or glue sticks

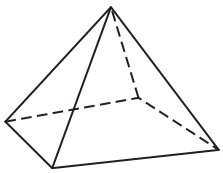
Concrete and Visual Representations Used

Nets of Right Rectangular Prisms and Pyramids









Learning Together

ELPS: 1.A, 1.B, 1.C, 1.D, 1.E, 1.F, 1.G, 1.H, 2.C, 2.D, 2.E, 2.G, 2.H, 2.I, 3.A, 3.B, 3.C, 3.D, 3.E, 3.F, 3.G, 3.J, 4.A, 4.B, 4.C, 4.D, 4.F, 4.G, 4.I, 4.K, 5.A, 5.B, 5.C, 5.D, 5.E, 5.F, 5.G

Lesson	Lesson Name	TEKS	Days	Highlights
1	Depth, Width and Length: Deepening Understanding of Volume	6.8C 6.8D	2	In this lesson, students are introduced to geometric solids. Students will investigate various figures and sort them based on the definition of a polygon or a polyhedron. The intent of this lesson is for students to determine the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths. In addition, they will review and practice decimal multiplication by calculating volumes of right rectangular prisms.
2	Which Warehouse?: Volume Composition and Decomposition	6.3E 6.8D	2	A scenario about building a bench is provided. Students review estimating sums and differences of decimals and how to add and subtract decimals by adding or subtracting the digits in like place values. They then determine the volume of the bench, a composite solid, using decomposition into smaller rectangular prisms and composition into a larger rectangular prism. The two different strategies require either addition or subtraction of decimals. Students practice solving problems requiring addition and subtraction of decimal volumes.
3	Breaking the Fourth Wall: Surface Area of Rectangular Prisms and Pyramids	7.9D	2	Students apply mathematical and spatial reasoning to determine the surface areas of prisms and pyramids using nets, drawings, and measurements. Students solve a variety of surface area problems and distinguish between volume and surface area measurements.
4	Dividend in the House: Dividing Whole Numbers and Decimals	6.3E 6.8D	2	In this lesson, students use the standard algorithm for long division with whole numbers. They demonstrate how the algorithm works for decimal dividends by relating it to a model and make sense of why the algorithm is modified to accommodate decimal divisors. Students solve area and volume problems requiring decimal division.

Suggested Topic Plan

*1 Day Pacing = 45 min. Session

Day 1	Day 2	Day 3	Day 4	Day 5
TEKS: 6.8C, 6.8D **LESSON 1** **Depth, Width, and Length** GETTING STARTED ACTIVITY 1	**LESSON 1** continued ACTIVITY 2 ACTIVITY 3 TALK THE TALK	TEKS: 6.3E, 6.8D **LESSON 2** **Which Warehouse?** GETTING STARTED ACTIVITY 1	**LESSON 2** continued ACTIVITY 2 TALK THE TALK	TEKS: 7.9D **LESSON 3** **Breaking the Fourth Wall** GETTING STARTED ACTIVITY 1
Day 6	**Day 7**	**Day 8**	**Day 9**	
LESSON 3 continued ACTIVITY 2 ACTIVITY 3 ACTIVITY 4 TALK THE TALK	TEKS: 7.9D **LESSON 4** **Dividend in the House** GETTING STARTED ACTIVITY 1 ACTIVITY 2 ACTIVITY 3 ACTIVITY 4	**LESSON 4** continued ACTIVITY 5 ACTIVITY 6 TALK THE TALK	**END OF TOPIC ASSESSMENT**	

Assessments

There is one assessment aligned to this topic: End of Topic Assessment.