Students learn to calculate the volume of a rectangular prism using the formula $V = l \times w \times h$. They also calculate the volume of composite figures that are made up of two or more rectangular prisms.

**COMMON CORE STANDARD(S)**

5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

5.MD.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.

5.MD.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.

5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.5 Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.

5.MD.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.

5.MD.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.

5.MD.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.

**DURATION**

Two 45-minute classroom periods
Engage and Explore, Explain, Elaborate page 1—one 45-minute classroom period
Elaborate page 2, Evaluate—second 45-minute classroom period
Draw a rectangle that is 6 inches by 8 inches on the board. Ask students what it means to find the area of this rectangle. Through discussion elicit that area means finding how much space is inside the rectangle. Ask students how we could do that. Some may say we could take 1-inch tiles and see how many could fit inside. Others might suggest measuring the length and width and then multiplying the length by the width. Let students know that both methods work, but that multiplying the length by the width is quicker and takes the same amount of time regardless of the size of the rectangle.

Ask students to give examples of when they might want to find the area of something. They might think of making a garden or measuring the fenced-in area for a pet.

Have students work with a partner to find the area of some rectangles. They toss a number cube twice to get measurements of the length and width of a rectangle, in centimeters. Students then find the area of their rectangle. Use the rectangle that you have drawn on the board as an example. Label the rectangle with a width of 6 centimeters and a length of 8 centimeters, telling students that numbers 6 and 8 came up when rolling a number cube twice. Have students talk about the area of the rectangle. Make sure they use the correct unit: some may say that the area is 48 centimeters. Remind students that since we are measuring area we use square units.

Give students time to find the area of a few different rectangles and then call them together to share some of their work.

Next, show students this composite figure. This figure is made up of two rectangles.

Ask students to find the total area of the shape. Then have students present their strategies. Through discussion, elicit that they can divide the figure into rectangles and then find the sum of the areas of the rectangles. Be sure to highlight that there are multiple correct ways to do this.

If students all divided the rectangle in one way, divide it the other way and do the calculations to show that you still get an area of 84 square meters.

Have students work with a partner again. Give each student a piece of graph paper. This time they each draw a figure on graph paper that is made up of two or more rectangles. Then they trade papers with their partners and find the area of each other’s figure. Tell them that each square on the graph paper represents one square unit. Ask them to find the area without counting the squares. Instead, they should use the length in units and width in units of each rectangle to find the area. Have some students share their work and have the class comment on the methods used and the results.
EXPLAIN

WATCH THE GENERATION GENIUS CALCULATE VOLUME ($L \times W \times H$) VIDEO AS A GROUP
Facilitate a conversation using the Discussion Questions.

ELABORATE

Direct students to use their new understanding to complete the practice problem worksheets. Page 1 contains bare mathematical problems to solidify understanding of the process. Page 2 contains application problems for students to apply the process to solve real-world problems.

EVALUATE

Have students gather in groups of 2 or 4 to compare and discuss their answers to the problems. Allow students enough time to communicate with their peers about their process and their thinking. Encourage students to use correct mathematical language when discussing their process. Have each group choose two questions they want more information about, or they want to discuss as a class.

When groups are ready take questions from students. Encourage groups to answer questions brought up by other groups.

Students can play the online Kahoot! quiz game located below the video. It provides downloadable scores at the end of the quiz game. Alternatively, you can use the paper quiz, or the exit ticket questions. All these resources are located below the video in the assessment section.