Unit 5
Addition and Multiplication with Volume and Area

Grade 5
Math

Description:

In this unit, students work with two-dimensional figures. They find the volume of rectangular prisms by counting unit cubes or by applying the formulas, $V = l \times w \times h$ and $V = b \times h$ using cubic centimeters, cubic inches, cubic feet, and other units. They apply their understanding of concepts and formulas as they solve real word and mathematical problems involving estimating and measuring volume.

Students classify two-dimensional figures according to their attributes. They also find the area of rectangles with fractional side lengths.

Standards:

Number and Operations - Fractions	
Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	
5.NF.4b	Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. b. Construct a model to develop understanding of the concept of multiplying two fractions and create a story context for the equation. [in general, $(m/n) \times (c/d) = (mc) / (nd)$.]
5.NF.6	Solve real world problems involving multiplication of fractions and mixed numbers, *e.g., by using visual fraction models or equations to represent the problem.*
Measurement and Data	
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition	
5.MD.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. 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. b. 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.

	a. 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.* b. 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. c. 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.
Geometry	
B. Classify two-dimensional figures into categories based on their properties.	
5.G.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*
5.G.4	Classify quadrilaterals in a hierarchy based on properties.

Enduring Understandings:

- Volume is represented in cubic units.
- A square unit could have fractional lengths. As long as the lengths of a square unit are the same, it is still considered a square unit.
- Plane shapes have many properties that make them different from one another. Polygons can be described and classified by their sides and angles.
- Any subcategory of a shape must also belong to the more general category of a shape.
- Two dimensional figures can be classified into categories based on their properties

Essential Questions:

- How do I use the language of math to make sense of/solve a problem?
- How can the volume of cubes and rectangular prisms be found?
- Why is volume represented with cubic units and area represented with square units?
- How do you find volume using fractional lengths?
- What is the best way to categorize a particular shape?
- What attributes do we use to classify shapes?