Unit Map 2012-2013

Monroe #2 - Orleans BOCES (Regional Collaboration)

Collaboration / Math 5* / Grade 5 (Math Regional Curriculum)

Wednesday, October 31, 2012, 11:26AM

Standard/Module: Proficiency in Measurement & Data 5.MD.4 (Week 28, 4 Weeks)

Stage 1: Desired Results

Standards Focus

- Major (70%) Connects to 5.MD.3, 5.MD.5, 5.G.3, and 5.G.4

5th Grade Map.pdf

Standards

NYS: CCLS:Mathematics, NYS: 5th Grade , Measurement & Data

5.MD Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

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

Enduring Understandings	Essential Questions
1. Mathematics content and practices can be applied to solve problems. 2. Some problems can be solved by using objects to act out the action in the problem. 3. Some problems can be solved by reasoning about conditions in the problem.	How can you use cubic objects to solve problems?

Critical Content

Volume

-counting unit cubes

Skills	Vocabulary
1. Students will use objects and reasoning to find the volume of solid figures. 2. Students will solve problems using cubic objects.	Tier 2- object, reasoning, solid, counting Tier 3- Three-dimensional shape, cube, edge, face, vertex, vertices, cone, cylinder, prism, pyramid, volume, cubic unit

Stage 2: Assessment Evidence

Assessments

Building Volume With Unit Cubes
Formative: Performance: Skill Demonstration

Students make models of prisms with snap cubes and justify the volume in terms of the cubes. Students present their models and show how to calculate the volume using both multiplication and justification of the multiplication with the model.

Stage 3: Learning Plan

Learning Activities	Resources
These standards (5.MD.3-5) represent the first time that students begin exploring the concept of volume. Their prior experiences with volume were restricted to liquid volume. In third grade, students begin working with area and covering spaces. The concept of volume should be extended from area with the idea that students are covering an area (the bottom of cube) with a layer of unit cubes and then adding layers of unit cubes on top of bottom layer. **Students should have ample experiences with concrete manipulatives before moving to pictorial representations**. As students develop their understanding of volume they recognize that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. This cube has a length of 1 unit, a width of 1 unit and a height of 1 unit and is called a cubic unit. This cubic unit is written with an exponent of 3 (e.g., in3, m3). Students connect this notation to their understanding of powers of 10 in our place value system. Models of cubic inches, centimeters, cubic feet, etc are helpful in developing an image of a cubic unit. Student's estimate how many cubic yards would be needed to fill the classroom or how many cubic centimeters would be needed to fill a pencil box.	www.illustrativemathematics.org www.illuminations.nctm.org 5th grade *Investigations* has a lot of nice activities for taking students through the conceptual understanding of volume.

Volume refers to the amount of space that an object takes up and is measured in cubic units such as cubic inches or cubic centimeters. Provide students with opportunities to find the volume of rectangular prisms by counting unit cubes, in metric and standard units of measure, before the formula is presented. Multiple opportunities are needed for students to develop the formula for the volume of a rectangular prism with activities similar to the one described below. Give students one block (a I- or 2-cubic centimeter or cubic-inch cube), a ruler with the appropriate measure based on the type of cube, and a small rectangular box. Ask students to determine the number of cubes needed to fill the box. Have students share their strategies with the class using words, drawings or numbers. Allow them to confirm the volume of the box by filling the box with cubes of the same size. By stacking geometric solids with cubic units in layers, students can begin understanding the concept of how *addition plays a part in finding volume*. This will lead to an understanding of the formula for the volume of a right rectangular prism, b x h, where b is the area of the base. A right rectangular prism has three pairs of parallel faces that are all rectangles. Have students build a prism in layers. Then, have students determine the number of cubes in the bottom layer and share their strategies. Students should use multiplication based on their knowledge of arrays and its use in multiplying two whole numbers. Ask what strategies can be used to determine the volume of the prism based on the number of cubes in the bottom layer. Expect responses such as —adding the same number of cubes in each layer as were on the bottom layer or multiply the number of cubes in one layer times the number of layers.	

Differentiation Opportunities

Sometimes students want to "double count" corner cubes. Multi-colored snap cubes are one way to build these layers because students can pull them apart to count them.

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