

Lesson plan format

1. Title of research lesson: Which Box Holds More Popcorn?

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3. Mathematical content/concepts addressed –

Foundation: required prior knowledge: Comparing like quantities, measurement (linear and area),

Focus: math content of lesson: Volume

Future: this lesson provides foundation for ... More advanced understanding of volume including formulas and cubic units

4. Objectives:

May address Lesson Goals, Unit Goals, broad mathematical as well as non-mathematical goals, long term goals, mission and vision statements. Students will work collaboratively to develop, use, and explain strategies for compare volume/capacity of similar rectangular prisms.

Students will...

- Make sense of problems and persevere in solving them.
- Construct viable arguments and critique the reasoning of others.
- Use appropriate tools strategically.

5. Research base:

Include resources and references as well as research questions, common student misconceptions to be addressed and specific teaching issues associated with this content.

- Teaching Student-Centered Mathematics – Van de Walle & Lovin
*suggested dimensions
*how focus area fits along K-12 spectrum and foundation for future grades
- Good Questions for Math Teaching – Sullivan & Lilburn
*how focus area fits along K-12 spectrum and foundation for future grades

6. Materials needed:

Boxes, square-inch cubes, ruler, calculator, string, section square-inch grid paper, packing peanuts,

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7. Additional information:

- Related standards

Convert like measurement units within a given measurement system.

- 1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

Represent and interpret data.

- 2. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*

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

- 3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
 - 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.
 - 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.
- 4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

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

Relevant mathematical vocabulary

- Volume
- Rectangular prism