Hawai'i State Alternate Assessments

HSA-Alt Interim Teacher Resource Guide – Mathematics

The HSA-Alt Interim assessment is a non-mandatory assessment option available to all HSA-Alt-identified students in grades 5 and 6 in this the first pilot year. The HSA-Alt Interim assessment is designed for students who have an established communication system. Although non-responsive students are allowed to take the assessment, the assessment is ideally suited for students who are able to attend to stimuli, engage in activities, and demonstrate understanding through actions, gestures, symbols, signs/signing, a communication device, or speech.

The purpose of an interim assessment is to gain a measure of student progress toward year-end targets for learning. The year-end targets for Hawaii's alternate assessment are found in the HSA-Alt Range PLDs. This pilot interim assessment focuses on a single standard within the Range PLDs, includes entry level skills for students at the earliest stage of skill development and is designed to link instruction and assessment for students with significant cognitive disabilities.

For more information on the characteristics of students with significant cognitive disabilities, see this 2021 report compiling Learner Characteristics teacher survey results for the 90,000 students who took the Dynamic Learning Maps Alternate Assessment in 2018-19: 2019 DLM Survey Results. For Hawaii's state-specific criteria for alternate assessment student identification, see the HSA-Alt Participation Guidelines.

The HSA-Alt Interim Teacher Resource Guide found here provides the following: 1) a materials list for each PLD-level activity in the interim assessment (Prerequisite through Exceeds levels); 2) the targeted Hawaii Common Core Standard, HSA-Alt Range PLD and Prerequisite Skill; and 3) information on the standard core concept, associated non-grade-level standards, key vocabulary, and a link to sample math and ELA instructional units from the National Center and State Collaborative (NCSC) Wiki.

Materials List

1. **Prerequisite Activity:**
   - 4 one-inch cubes

     a. **Prerequisite Accessibility Options (Activity and Multiple-Choice Item):**
        - Cubes with braille or velcro dots can be used.
        - Cubes may be substituted for graphics on the multiple-choice item.

2. **Well-Below Activity:**
   - 6 one-inch cubes
   - One-inch grid paper (available on the HSA-Alt portal)
   - Felt tip pens

a. **Well-Below Accessibility Options (Activity and Multiple-Choice Item):**
    - For students who are blind or have visual impairments (or students with tactile preferences): raised line graph paper, a geoboard with rubber bands and/or boxes to use as forms to fill in with cubes to form prisms.
    - Digital manipulatives
    - Cubes with braille or velcro dots can be used.
    - Cubes may be substituted for graphics on the multiple-choice item.

3. **Approaches Activity:**
    - 10 one-inch cubes
    - Primary ruler with inches
    - One-inch grid paper (available on the HSA-Alt portal)
    - One piece of prepared grid paper that has one one-inch square colored in

    a. **Approaches Accessibility Options (Activity and Multiple-Choice Item):**
        - Digital manipulatives
        - Braille dot on each cube
        - Velcro dots on the sides of cubes in each layer
        - Tactilely enhanced one-inch grid paper
        - Cubes may be substituted for graphics on the multiple-choice item.

4. **Meets Activity**
    - 12 one-inch cubes

    a. **Meets Accessibility Options (Activity and Multiple-Choice Item):**
        - Digital manipulatives
        - Cubes with braille or velcro dots can be used.
        - Cubes may be substituted for graphics on the multiple-choice item.

5. **Exceeds Activity**
    - 24 one-inch cubes
    - Two sorting trays to hold two sets of cubes

    a. **Exceeds Accessibility Options (Activity and Multiple-Choice Item):**
        - Digital manipulatives
        - Cubes with braille or velcro dots can be used.
        - Cubes may be substituted for graphics on the multiple-choice item.

Standard and Interim Test Targets:

Common Core Standard	Essence Statement
CCSS.Math.Content.5.MD.C.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 (i.e., to represent the associative property of multiplication).	Find the volume of right rectangular prisms with whole-number side-lengths by packing.

Well Below	Approaches	Meets	Exceeds
Identify the number of unit cubes that make up the base of the rectangular prism, given a visual.	Identify rectangular prisms with the same base area, given a visual. Suggested scaffolds: concrete materials or grid paper.	Find the volume of a rectangular prism that is packed with unit cubes. Prioritized focus: volumes of 12 cubic units or less.	Identify the rectangular prism with the same volume, given a rectangular prism with unit cubes shown.

Prerequisite Skill:
Count cubes in different orientations to build an understanding of volume as the number of cubes that fill an object.

Big Idea:
"The big idea we are learning about today is volume. To find volume, you can count the number of cubes that fill an object."

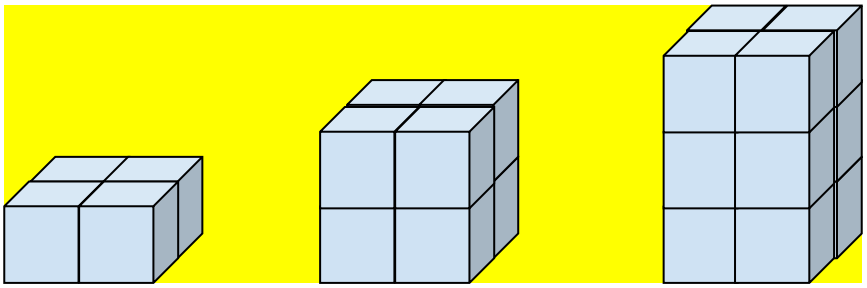
Standard Core Concept:
Volume is the amount of space inside a three-dimensional form. Three-dimensional forms are differentiated from two-dimensional forms by the fact that they have a third dimension (height). This third dimension allows 3-D forms to hold a liquid. To find the volume of a three-dimensional form you can measure the amount of liquid it holds or you can find out how many unit cubes fit inside the form. A unit cube has a side length of one unit and a volume of one cubic unit. The activities in this interim use cubes with a side length of one inch and a volume of one cubic inch. (Interesting note here: liquid measurement of one milliliter equals the geometric measurement of one cubic centimeter.)

Volume is first addressed in the Common Core standards by having students in Kindergarten distinguish two-dimensional (2-D) shapes from three-dimensional (3-D) solids, flat forms "lying in a plane" from those that can hold liquid volumes (K.G.3). The unit of measure for volume, the cube, is also introduced

in grade K as a shape for students to identify despite its orientation in space (K.G.2). In grades 1 and 2, students continue to work with 2-D and 3-D shapes, composing shapes (1.G.2) and identifying features of 3-D forms, e.g., “the equal faces of cubes” (2.G.1). Students in grade 3 treat volume as a measurement activity in which liquid volumes are measured, added, and subtracted (3.MD.2). Liquids in grade 3 are measured in liters (and milliliters). Liquid volume measurement reinforces number line concepts with the size of the container or graduated cylinder impacting the scale interval that students will encounter: one-to-one scale or counting by 5’s, 10’s, 50’s, or 100’s.

In grade 5, students begin to fill rectangular containers with cubes to find volume (5.MD.3, 5.MD.4, 5.MD.5a). The essential points in explorations that ask students to fill containers is to ensure students understand the cubes must be touching with no space between them, no extra space can be left inside the container that is not taken up by cubes, and the cubes must all be the same size. Due to the difficulty of finding containers with exact whole-inch dimensions, the activities inside this interim focus on building rectangular prisms from one-inch cubes.

The key to standard 5.MD.C.5a, is for students to understand that rectangular prisms can be built as layers of cubes that rest on the same base. For example, a rectangular prism can sit on one cube and be one layer (one cube tall), two layers (two cubes tall), three layers (three cubes tall), etc. As another example, a rectangular prism can sit on four cubes arranged in a 2 X 2 and be one layer (4 cubes in volume), two layers (8 cubes in volume), or three layers (12 cubes in volume), etc. Building prisms in layers is another way of reinforcing the number and operations concept of repeated addition/multiplication.



The idea of the base for a rectangular prism shows up in the second formula that students learn for volume. The first formula is l X w X h or “*length times width times height*.” The second formula is B X h or “*Base Area times height*.” (Note the B is capitalized and denotes Base Area, not base.)

One real-world example for understanding the concept of building in layers comes from areas in the world where real-estate prices are high; e.g., downtown Honolulu. In these areas, very tall buildings dominate the landscape because the cost of the real-estate is the limiting expenditure; to maximize revenue, buildings add layers upon layers (several floors) on top of a small base.

As a follow-up to this grade 5 math interim, students could be given multiple opportunities to build rectangular prisms from cubes, count the number of cubes used to build their prisms, find volume, and report out volume using cubic inches as the unit of measurement. Prisms with the same volume but different bases or prisms with the same base but different volumes could be built, taken apart, and compared. Immersing students in the academic vocabulary describing their actions on objects, object features, and the attributes of measure that they explore in these activities (e.g., length, area, volume) will support student understanding and achievement.

Key Vocabulary:

- Base – the bottom face of a prism, technically the base of a prism is identified through its pairing with an opposite parallel face that is congruent (the same shape and size)
- Base Area – how much flat space is found inside the base of a prism; how many squares are needed to cover the flat bottom surface of a prism
- Cube – prism with six square faces (all equal faces)
- Edge – where two faces meet in a 3-D shape
- Face – flat surface found in a 3-D shape
- Prism – a 3-D geometric solid with two bases that are identical and parallel
- Rectangular Prism – a six-sided prism with rectangles for all the faces
- Three-dimensional – solid; having three dimensions: length, width, and height
- Two-dimensional – flat; having two dimensions: length and width or base and height (triangle)
- Vertex (Vertices) – corner(s) of a 2-D shape where the sides meet or for a 3-D shape, where the edges meet
- Volume – how much space is found inside a three-dimensional form

Associated Non-grade-level Standards:

Mathematics K.G.2 – Correctly name shapes regardless of their orientations or overall size.
Mathematics K.G.3 – Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
Mathematics 1.G.2 – Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. (Students do not need to learn formal names such as "right rectangular prism.")
Mathematics 2.G.1 – Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. (Sizes are compared directly or visually, not compared by measuring.)
Mathematics 3.MD.2 – Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Excludes compound units such as cm^3 and finding the geometric volume of a container.)

NCSC Wiki – Instructional Units for Students with Significant Cognitive Disabilities:
https://wiki.ncscpartners.org/index.php/UDL_Instructional_Units