CONSTRUCTING TASK: Books, Books, and More Books!

STANDARDS FOR MATHEMATICAL CONTENT

MCC5.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.

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

MCC5.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.

STANDARDS FOR MATHEMATICAL PRACTICE

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

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BACKGROUND KNOWLEDGE

Students will need to have had practice finding the volume of a rectangular prism. They will also need to recognize that addition can be used to combine rectangular prisms, just like they combine quantities by adding. Also, they will need to understand that real world problems require a variety of problem solving strategies.

ESSENTIAL QUESTIONS

- How can you find the combined volume of two or more rectangular prisms?
- How can you determine if your solution is correct?

MATERIALS

- Pencils
- Recording sheet

GROUPING

Individual/Partners

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will determine the combined volume of three boxes of books. They will conclude that adding the volume of each box will give the combined volume.

Comments: To introduce this task, tell them that you need to take three boxes of books home with you, but you are not sure they will fit in your truck. Tell them that they can help you figure out if they will fit, by figuring their volume. You may need to remind them of the formula for volume.

Task Directions: Determine the volume of each box of books and decide if they will all fit in the teacher's truck. Use pictures, words, and numbers to show your work.

FORMATIVE ASSESSMENT QUESTIONS

- What information do you need to be able to solve this problem?
- What is the largest size box you could fit, if all three boxes were the same size?

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DIFFERENTIATION

Extension:

- Ask students if 4 boxes would fit?
- If your boxes were half the size of the originals, how many could you fit?

Intervention:

- Students may work with partners.
- Students may use calculators to determine volume.

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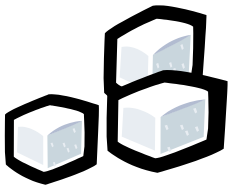
Name _____ **Date** _____



Books, Books, and More Books

Directions: Your teacher wants to take three boxes of books home from school. She needs to know if they will all fit in her truck, or if she needs to make two trips to get all the boxes home. Here is some information you will need:

- Two of the boxes are the same size. (2 ft. long, 3ft. wide, and 2 ft. high)
- One box is larger than the others. (3 ft. long, 3 ft. wide, and 3 ft. high)
- Your teacher's truck has 60 cu. ft of space.

Can your teacher take all three boxes in one load? Show how you know with pictures, words, and numbers.

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