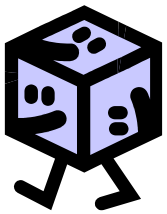
PRACTICE TASK: Rolling Rectangular Prisms

Adapted from K-5 Math Teaching Resources



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.

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.

MCC5.MD.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.

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.**

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson*****

BACKGROUND KNOWLEDGE

Students will need to know the names of the dimensions of rectangular prisms (length, width, height) and have some experience with the formulas $V = l \times w \times h$ and $V = b \times h$. Additionally,

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students will need to understand multiplication with 3 factors. They should also be familiar with converting metric units and customary units within systems.

Common Misconceptions:

Students may believe that converting customary units is like converting metric units; using the base ten system. They will need to be reminded of equivalent measures in customary units if they are confused.

ESSENTIAL QUESTIONS

- Do all the dimensions have to be the same in a rectangular prism?
- How are cubes and rectangular prisms the same? How are they different?
- How do you convert units from one measure to another?

MATERIALS

- Dice
- Recording sheet

GROUPING

- Individual/Partner Task

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will draw and label rectangular prisms and roll a die to determine the measurements to calculate its volume.

Comments: To introduce this task, remind them of the formula for volume and that precision is very important in calculating volume.

Task Directions: Model drawing a rectangular prism and have someone roll the die to determine its measurements (length, width, and height). Label the drawing and model multiplying the three measurements to determine the volume. Have the students follow the directions on the task sheet to complete the task.

Part two of the task asks them to convert units within a system (metric or customary). They are accustomed to converting square units, so the conversion between cubic units of the same system should be easier.

FORMATIVE ASSESSMENT QUESTIONS

- What do you notice about the measurements and the volume of the rectangular prisms?
- What is the greatest possible volume for a rectangular prism in this game?
- What do you do to convert from smaller units to larger ones?
- How do you convert units from larger ones to smaller ones?

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DIFFERENTIATION

Extension:

- Students may use both dice to increase the size of their rectangular prisms.
- Students may convert metric units of measure to millimeters.

Intervention:

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

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Name _____ **Date** _____

ROLLING A RECTANGULAR PRISM

Materials: dice, recording sheet
Directions:

1. **Draw a rectangular prism.**
2. **Roll a die three times to find the dimensions of the rectangular prism.**
3. **Label the dimensions.**
4. **Calculate the volume of the rectangular prism. Show your work.**
5. **Repeat steps 1-4 three times.**

Picture	Length	Width	Height	Volume

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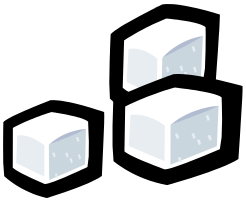

Name _____ Date _____

ROLLING A RECTANGULAR PRISM
(part 2) Converting Units

Metric
1 meter = 100 centimeters

Customary
1 yard = 3 feet =36 inches
1 foot = 12 inches

One student wrote the answers to the problems in cu. meters. What would his/her answers be in cu. centimeters?

1. Volume = 6 cu. meters Volume = _____cu. cm.
2. Volume = 3 cu. meters Volume = _____cu. cm.
3. Volume = 8 cu. meters Volume = _____cu. cm.
4. Volume = 11 cu. meters Volume = _____cu. cm.

One student wrote the answers to the problems in cu. feet. What would his/her answers be in cu. inches?

5. Volume = 4 cu. ft. Volume = _____cu. in.
6. Volume = 9 cu. ft. Volume =_____ cu. in.
7. Volume = 13 cu. ft. Volume = _____cu. in.
8. Volume = 7 cu. ft. Volume = _____cu. in.

One student wrote the answers to the problems in cu. inches. What would his/her answers be in cu. yards?

9. Volume = 36 cu. in. Volume = _____cu. yds.
10. Volume = 144 cu. in. Volume = _____cu. yds.
11. Volume = 72 cu. in. Volume= _____ cu. yds.
12. Volume = 108 cu. in. Volume= _____cu. yds.

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