



PRACTICE TASK: Toy Box Designs

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.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.**

BACKGROUND KNOWLEDGE

Students should know the formula for figuring volume. They should also be familiar with using a metric ruler to measure and draw rectangular prisms. Students should be able to use their knowledge of factors to determine the measurements for the box.

Common Misconceptions:

Some students may think that the box must be a cube. They need to understand that rectangular prisms (boxes) can have different measures of length, width, and height. They will need to consider which design would work best for a child. For example, they could decide to use a height of 10 meters, width of 1 meter and length of 3 meters. However, a child could not practically use a toy box that is 10 meters tall.

ESSENTIAL QUESTIONS

- Why can you use different measurements and still have the same total of volume?
- Why do some measurements work better than other?

MATERIALS

- Ruler
- Paper (grid paper works very nicely)
- Centimeter cubes (optional)

GROUPING

Individual/pairs

TASK DESCRIPTION, DEVELOPMENT, AND DISCUSSION

In this task, students will be designing a toy box for a child's bedroom. The box needs to hold 30 cubic meters of toys. They must design two boxes with appropriate dimensions and tell which box would be most suitable for use in a child's bedroom.

Comments: You might begin this task by asking them if they have ever seen a toy box (a box designed to hold toys) and let them describe what they know. Ask them why they think the height of toy boxes is usually less than their width. Lead a general discussion of how the size of the toy box needs to be appropriate for use by a child.

Task Directions: Draw and label two designs for a toy box. Decide which design is most appropriate for a child's bedroom. Explain your answer.

FORMATIVE ASSESSMENT QUESTIONS

- How could you determine which 3 numbers could be multiplied together to get 30?
- Is your answer reasonable? How do you know?

DIFFERENTIATION

Extension:

- Have students design another toy box with a capacity of 40 cubic feet.

Intervention:

- Students may work with partners.
- Students may use calculators.
- Students may use centimeter cubes to create a model.

Name _____

Date _____

Toy Box Designs

You are designing a toy box for child's bedroom. The toy box needs to be able to hold 30 cubic meters of toys. What might the dimensions be?



1. Draw and label two possible designs for the toy box.

2. Explain which design would work best in a child's bedroom and give reasons to support your choice.
