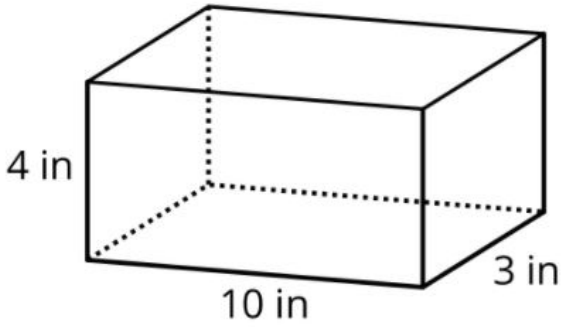
4-15: Learning Goals

- Let's look at the volume of prisms that have fractional measurements.

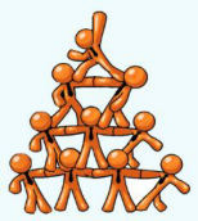
4-15-1: A Box of Cubes

1. How many cubes with an edge length of 1 inch fill this box?



2. If the cubes had an edge length of 2 inches, would more or fewer cubes be needed to fill the box? Explain how you know.

3. If the cubes had an edge length of $\frac{1}{2}$ inch, would more or fewer cubes be needed to fill the box? Explain how you know.



4-15-2: Cubes with Fractional Edge Lengths

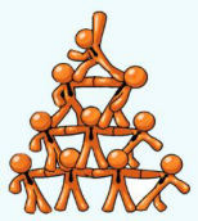
1. Diego correctly points out that 108 cubes with an edge length of $\frac{1}{3}$ inch are needed to fill a rectangular prism that is 3 inches by 1 inch by $1\frac{1}{3}$ inch. Explain or show how this is true. Draw a sketch, if needed.

2. What is the volume, in cubic inches, of the rectangular prism? Show your reasoning.

3. Lin and Noah are packing small cubes into a cube with an edge length of $1\frac{1}{2}$ inches. Lin is using cubes with an edge length of $\frac{1}{2}$ inch, and Noah is using cubes with an edge length of $\frac{1}{4}$ inch.

    a. Who would need more cubes to fill the $1\frac{1}{2}$-inch cube? Show how you know.

    b. If Lin and Noah use their small cubes to find the volume of the $1\frac{1}{2}$-inch cube, would they get the same value? Explain or show your reasoning.



4-15-3: Fish Tank and Baking Pan

1. A fish tank in a nature center has the shape of a rectangular prism. The tank is 10 feet long, $8\frac{1}{4}$ feet wide, and 6 feet tall.

   a. What is the volume of the tank in cubic feet? Explain or show your reasoning.

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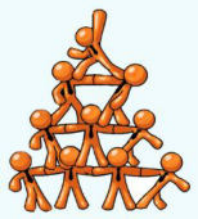
   b. The caretaker of the center filled $\frac{4}{5}$ of the tank with water. What was the volume of the water in the tank in cubic feet? What was the height of the water in the tank? Explain or show your reasoning.

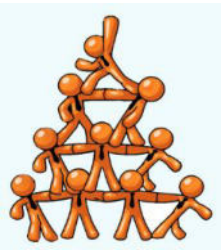
   c. One day, the tank was filled with 330 cubic feet of water. The height of the water was what fraction of the height of the tank? Show your reasoning.

2. Clare's recipe for banana bread won't fit in her favorite pan. The pan is $8\frac{1}{2}$ inches by 11 inches by 2 inches. The batter fills the pan to the very top, and when baking, the batter spills over the sides. To avoid spills, there should be about an inch between the top of the batter and the rim of the pan. Clare has another pan that is 9 inches by 9 inches by $2\frac{1}{2}$ inches. If she uses this pan, will the batter spill over during baking?



4-15: Lesson Synthesis

- How was finding the volume of a prism with fractional edge lengths like finding the volume of a prism with whole-number edge lengths? How is it different?
- When calculating volume, did you find it harder to work with mixed numbers than with fractions less than 1? Why or why not?
- How was the process of finding an unknown length of a rectangle the same or different than finding an unknown length of a prism?
- Were there certain parts of calculating a volume or an unknown length that you found challenging or were prone to making mistakes? If so, which parts?



4-15: Learning Targets

- I can solve volume problems that involve fractions.

4-15-4: Storage Box

A storage box has a volume of 56 cubic inches, and the base of the box is 4 inches by 4 inches.

1. What is the height of the box?

2. Lin's teacher uses the box to store her set of cubes with an edge length of $\frac{1}{2}$ inch. If the box is completely full, how many cubes are in the set?