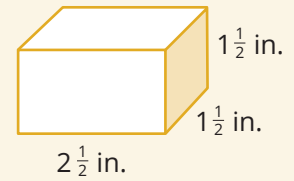


# Understanding Volume of Prisms With Fractions

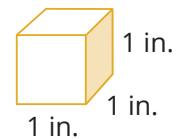
Chen wants to find the volume of the rectangular prism to the right. She fills the prism with cubes measuring 1 inch on each side, but she notices that there is empty space left over. She decides to use smaller cubes. Answer each question below to help Chen determine how to find the volume of this prism.



1 Chen fills the rectangular prism with cubes measuring  $\frac{1}{2}$  of an inch on each side.

- How many  $\frac{1}{2}$ -inch cubes can Chen fit along the  $1\frac{1}{2}$ -inch side length of the prism's base?  
**3**
- How many  $\frac{1}{2}$ -inch cubes can Chen fit along the  $2\frac{1}{2}$ -inch side length of the prism's base?  
**5**
- Chen covers the entire rectangular base of the prism with one layer of  $\frac{1}{2}$ -inch cubes. How many cubes does she use?  
**15**
- How many  $\frac{1}{2}$ -inch cubes can Chen fit inside of the rectangular prism in total?  
**45**

2 Chen needs to determine the volume of a  $\frac{1}{2}$ -inch cube next. She plans to use one of her 1-inch cubes from before to help.



- How many  $\frac{1}{2}$ -inch cubes can Chen fit along one of the side lengths of a 1-inch cube?  
**2**
- If Chen covered the entire square base of the 1-inch cube with one layer of  $\frac{1}{2}$ -inch cubes, how many cubes would she use?  
**4**
- How many  $\frac{1}{2}$ -inch cubes could Chen fit inside of the 1-inch cube in total?  
**8**
- In the sentences below, Chen explains how she determined the volume of a  $\frac{1}{2}$ -inch cube. Fill in the blanks in her explanation. Use your answer from above to help you.

The volume of a 1-inch cube is 1 cubic inch. Since **8**  $\frac{1}{2}$ -inch cubes fit inside of a 1-inch cube, the volume of a  $\frac{1}{2}$ -inch cube is  $\frac{1}{8}$  of a cubic inch.

# Understanding Volume of Prisms With Fractions

**Keep going!** Answer each question.

- 3 Chen knows that if you multiply the total number of identical cubes that fit inside of a prism by the volume of each cube, you get the volume of the prism! Find the volume of Chen's rectangular prism by filling in the equation below using answers from the previous page. Write the volume as a mixed number.

$$\underline{45} \frac{1}{2}\text{-inch cubes} \times \frac{1}{8} \text{ of a cubic inch per } \frac{1}{2}\text{-inch cube} = \underline{5\frac{5}{8}} \text{ cubic inches}$$

- 4 The formula for the volume of a rectangular prism is  $V = lwh$ . Use the formula to find the volume of Chen's rectangular prism. Write the volume as a mixed number, and check that the volume you find using the formula matches the volume you found above.

$$2\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2} = 5\frac{5}{8} \text{ cubic inches}$$

- 5 Chen's friend, Gabe, wants to learn how to find the volume of a rectangular prism using  $\frac{1}{2}$ -inch cubes.

- a. Explain how to find the volume of a rectangular prism using  $\frac{1}{2}$ -inch cubes. Start by explaining how to determine the number of  $\frac{1}{2}$ -inch cubes that fit in the prism. Then explain how to use that number to find the volume of the prism.

**Sample answer:** First, multiply the number of cubes that fit along the length of the prism by the number of cubes that fit along the width of the prism to find the number of cubes that fit in one layer at the base of the prism. Then, multiply that product by the number of cubes that fit along the height of the prism to find the total number of cubes that fit inside of the prism. Last, multiply that product by  $\frac{1}{8}$ , since each  $\frac{1}{2}$ -inch cube has a volume of  $\frac{1}{8}$  of a cubic inch.

- b. Gabe wants to find the volume of a rectangular prism using  $\frac{1}{2}$ -inch cubes. Show the work that he'll need to complete to do this for the prism to the right. Write the volume as a mixed number.

**Steps for solving may vary.**

**Number of  $\frac{1}{2}$ -inch cubes that fit in one base layer:  $4 \times 3 = 12$**

**Number of  $\frac{1}{2}$ -inch cubes that fit in the entire prism:  $12 \times 7 = 84$**

**Volume:  $84 \times \frac{1}{8} = \frac{84}{8} = 10\frac{4}{8}$  or  $10\frac{1}{2}$  cubic inches**

