Volume with Fractional Edges

ANSWER KEY • Amplify Alignment: Grade 6 Accelerated, Unit 3, Lesson 11

1. A rectangular prism measures $\frac{1}{2}$ inch by $3\frac{1}{3}$ inches by 4 inches. Which expression can be used to find its volume?

A $\frac{1}{2} + 3\frac{1}{3} + 4$

B $\frac{1}{2} \cdot 3\frac{1}{3} \cdot 4$

C $\frac{1}{2} + 3\frac{1}{3} \cdot 4$

D $\frac{1}{2} \cdot 3\frac{1}{3} + 4$

2. A cube has an edge length of 4 centimeters. Which expression tells how many cubes with an edge length of $\frac{1}{2}$ centimeter are needed to fill it?

A $4 \cdot 4 \cdot 4 \cdot \frac{1}{2}$

B $4\frac{1}{2} \cdot 4\frac{1}{2} \cdot 4\frac{1}{2}$

C $\frac{1}{2} \cdot 4^3$

D $(4 \cdot 2) \cdot (4 \cdot 2) \cdot (4 \cdot 2)$

3. For each prism, record how many $\frac{1}{3}$-inch cubes can be packed into it. Then find its volume.

Length (in.)	Width (in.)	Height (in.)	Number of $\frac{1}{3}$-in. Cubes	Volume (cu. in.)
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	1	$\frac{1}{27}$
1	$\frac{1}{3}$	$\frac{1}{3}$	3	$\frac{1}{9}$
1	1	1	27	1
$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	8	$\frac{8}{27}$
2	1	$\frac{2}{3}$	36	$1\frac{1}{3}$

4. Look at the table in Problem 3. What is the relationship between the volume and the number of $\frac{1}{3}$-inch cubes?

Each $\frac{1}{3}$-inch cube has a volume of $\frac{1}{27}$ cubic inch, so the volume = (number of cubes) × $\frac{1}{27}$, or the number of cubes ÷ 27.

5. Think about a cube with an edge length of 1 inch.

a How many cubes with an edge length of $\frac{1}{4}$ inch are needed to build it? Explain your thinking.

4 × 4 × 4 = 64 cubes (4 cubes along each edge)

b What is the volume, in cubic inches, of one cube with an edge length of $\frac{1}{4}$ inch?

$\frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{64}$ **cubic inch**

6. Maya is using wooden cubes with edge lengths of $\frac{1}{2}$ inch to build a larger cube with an edge length of 4 inches. How many small cubes does she need? Explain your thinking.

8 cubes fit along each 4-inch edge. 8 × 8 × 8 = 512 small cubes

7. A rectangular prism measures $1\frac{1}{2}$ inches by 2 inches by $3\frac{1}{2}$ inches.

a How many cubes with an edge length of $\frac{1}{2}$ inch would pack the prism? Explain your thinking.

3 cubes by 4 cubes by 7 cubes: 3 × 4 × 7 = 84 cubes

b Use your answer from part a to find the volume of the prism in cubic inches.

Each cube is $\frac{1}{8}$ cubic inch. 84 × $\frac{1}{8}$ = $10\frac{1}{2}$ cubic inches (check: $1\frac{1}{2} \cdot 2 \cdot 3\frac{1}{2} = 10\frac{1}{2}$)

8. Jo says that 1,500 cubes with an edge length of $\frac{1}{5}$ inch are needed to fill a rectangular prism that is 2 inches by 3 inches by $1\frac{2}{5}$ inches. Is Jo correct? Show or explain your thinking.

No. 10 cubes fit along 2 in., 15 along 3 in., and 7 along $1\frac{2}{5}$ in. 10 × 15 × 7 = 1,050 cubes