Volume with Fractional Edge Lengths

Volume with Fractional Edge Lengths: Models and Computation

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

A cube with edge $\frac{1}{2}$ cm occupies $\frac{1}{8}$ cm^3. Two half-centimeter edges fit along 1 cm. For a rectangular prism, count cubes along each dimension, then multiply the counts. For a missing height, find the volume of one known layer and count equal layers using a common denominator.

Worked example

A rectangular prism made of half-centimeter cubes is $1\frac{1}{2}$ cm long, 1 cm wide, and $1\frac{1}{2}$ cm tall. Count the cubes and find their volume.

1. Each $1\frac{1}{2}$ cm edge holds 3 half-centimeter edges. The 1 cm edge holds 2.

2. There are $3 \times 2 \times 3 = 18$ cubes. Each occupies $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ cm^3.

3. All 18 cubes occupy $18 \times \frac{1}{8} = \frac{18}{8} = \frac{9}{4}$ cm^3.

Answer: 18 cubes; $\frac{9}{4}$ cm^3.

Practice Problems

Show your thinking.

1. Find the volume of a rectangular prism $1\frac{1}{2}$ cm long, 2 cm wide, and $2\frac{1}{2}$ cm high.

2. A rectangular prism has a $2\frac{1}{2}$ cm by $1\frac{1}{2}$ cm base and is 3 cm high. Find the base area first, then the volume.

3. The inside of a box is a rectangular prism 3 cm long, $\frac{1}{2}$ cm wide, and $3\frac{1}{2}$ cm high. Cubes with $\frac{1}{2}$ cm edges fill it without gaps. Give the cube count and volume.

4. A student adds the dimensions $4\frac{1}{2}$ cm, 1 cm, and $1\frac{1}{2}$ cm of a rectangular prism and calls the sum its volume. Find the volume and explain why the sum does not work.

5. A rectangular prism has a $1\frac{1}{2}$ cm by $1\frac{1}{2}$ cm base and volume $\frac{9}{2}$ cm^3. How tall is it? Use equal 1 cm-high layers.

6. A mold has a rectangular prism interior measuring 1 cm by 2 cm by $1\frac{3}{4}$ cm. A full vial holds $\frac{13}{4}$ cm^3. Which holds more, and by how much?

Answer Key

1. $\frac{15}{2}$ cm^3.
2. Base area $\frac{15}{4}$ cm^2; volume $\frac{45}{4}$ cm^3.
3. 42 cubes; $\frac{21}{4}$ cm^3.
4. $\frac{27}{4}$ cm^3. Adding gives a length, not a volume.
5. 2 cm.
6. The mold holds $\frac{1}{4}$ cm^3 more.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The base area is $\frac{3}{2} \times 2 = 3$ cm^2.
2. Multiply by the height: $3 \times \frac{5}{2} = \frac{15}{2}$ cm^3.

Problem 2

1. Multiply the two base edges: $\frac{5}{2} \times \frac{3}{2} = \frac{15}{4}$ cm^2.
2. Each centimeter of height contributes $\frac{15}{4}$ cm^3. Three centimeters give $3 \times \frac{15}{4} = \frac{45}{4}$ cm^3.

Problem 3

1. Count half-centimeter edges: 3 cm is 6 halves, $\frac{1}{2}$ cm is 1 half, and $3\frac{1}{2}$ cm is 7 halves.
2. The count is $6 \times 1 \times 7 = 42$ cubes.
3. Each cube is $\frac{1}{8}$ cm^3, so $42 \times \frac{1}{8} = \frac{42}{8} = \frac{21}{4}$ cm^3.

Problem 4

1. Adding gives $\frac{9}{2} + 1 + \frac{3}{2} = 7$ cm. All terms are lengths.
2. Multiply the three dimensions instead: $\frac{9}{2} \times 1 \times \frac{3}{2} = \frac{27}{4}$ cm^3.

Problem 5

1. The base area is $\frac{3}{2} \times \frac{3}{2} = \frac{9}{4}$ cm^2, so one 1 cm-high layer occupies $\frac{9}{4}$ cm^3.
2. The total is $\frac{9}{2} = \frac{18}{4}$ cm^3. Two layers give $\frac{9}{4} + \frac{9}{4} = \frac{18}{4}$ cm^3.
3. Two 1 cm-high layers make 2 cm.

Problem 6

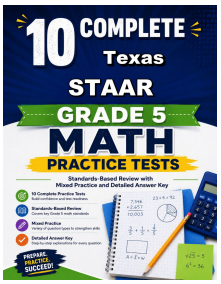
1. The mold holds $1 \times 2 \times \frac{7}{4} = \frac{14}{4}$ cm^3.
2. Compare in fourths: $\frac{14}{4} - \frac{13}{4} = \frac{1}{4}$ cm^3.

TESTINAR

Keep Building Grade 5 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 5 books



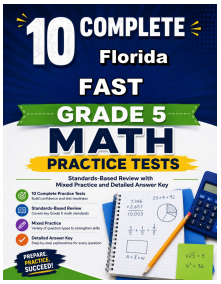
TEXAS STAAR

10 Full-Length Math Practice Tests

Build Grade 5 accuracy, confidence, and test stamina with 10 printable practice tests.

Printable eBook • Instant PDF access

View eBook



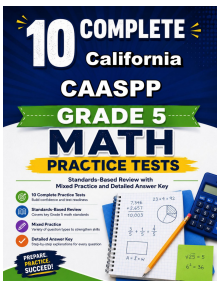
FLORIDA FAST

10 Full-Length Math Practice Tests

Build Grade 5 accuracy, confidence, and test stamina with 10 printable practice tests.

Printable eBook • Instant PDF access

View eBook



CALIFORNIA CAASPP

10 Full-Length Math Practice Tests

Build Grade 5 accuracy, confidence, and test stamina with 10 printable practice tests.

Printable eBook • Instant PDF access

View eBook

Need a different state?
Testinar has Grade 5 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/5