Volume with Unit Cubes

Layers, Base Area and Height

Count, investigate and explain



Visible cube models and clear layer reasoning

Original contexts and complete worked keys

26 pages | 39 multi-part items | Grade 5



TOUCHSTONE STANDARDS

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TOUCHSTONE STANDARDS

Grade 5 Volume with Unit Cubes

Georgia's K-12 Mathematics Standards

5.GSR.8.3

Investigate volume of right rectangular prisms by packing them with unit cubes without gaps or overlaps. Then, determine the total volume to solve problems.

5.GSR.8.4

Discover and explain how the volume of a right rectangular prism can be found by multiplying the area of the base times the height to solve authentic, mathematical problems.

Common Core crosswalk: written to Georgia's standards, these pages also practice 5.MD.C.3, 5.MD.C.4, 5.MD.C.5a and 5.MD.C.5b (right rectangular prisms).

Page map: practice / key

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Packed solids and layers

39 multi-part items and 12 worked examples. Unit cubes fill every pictured prism without gaps or overlaps, including hidden cubes. A cube edge one cm gives one cubic cm. All models share one oblique projection, not a true-size measuring scale.

Area and volume

Base area is in square units. Each unit-high layer has that many cubes; repeating it for the height gives cubic units. Connect base area times height with the three edge counts; no formula memorization.

Investigate and explain

List every prism for 12 or 18 cubes with length <= width <= height, counting rotations once. Page 13 spells VOLUME; extra 105 = P. Whole-number edges only; no surface area, composites, fractional edges or conversions. Wrong claims are labeled.

Follow Touchstone Standards on TPT. An honest review after use helps us improve.

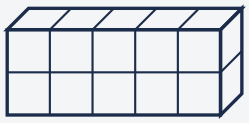
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Count Packed Unit Cubes

Name: _____

Count every cube, including hidden cubes. One unit cube fills one cubic unit.

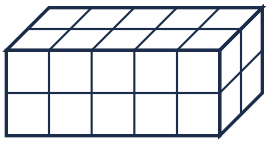
Strategy Spotlight



5 × 1 = 5
5 × 2 = 10
cubic units

Cube edge one unit; one cubic unit.

1.
Cube edge one cm; one cubic cm.

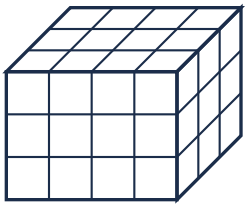


Volume: ☐ cubic cm

_____

_____

2.
Cube edge one in; one cubic in.

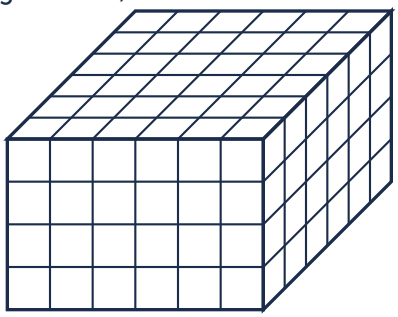


Volume: ☐ cubic in

_____

_____

3.
Cube edge one ft; one cubic ft.

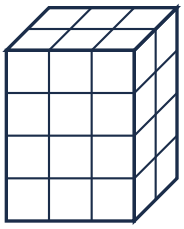


Volume: ☐ cubic ft

_____

_____

4.
Cube edge one unit; one cubic unit.



Volume: ☐ cubic units

_____

_____

All pictured prisms are completely filled, including hidden cubes.

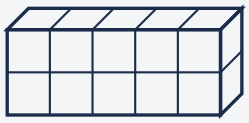
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Answer Key: Count Packed Unit Cubes

Student page 3

Count every cube, including hidden cubes. One unit cube fills one cubic unit.

Strategy Spotlight

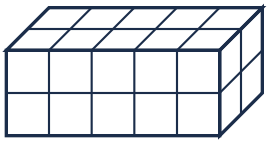


5 × 1 = 5
5 × 2 = 10
cubic units

Cube edge one unit; one cubic unit.

1.

Cube edge one cm; one cubic cm.

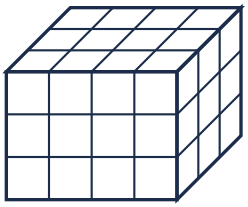


Volume: **20** cubic cm

5 × 2 = 10 square cm.
10 cubes/layer × 2 layers = 20 cubic cm.

2.

Cube edge one in; one cubic in.

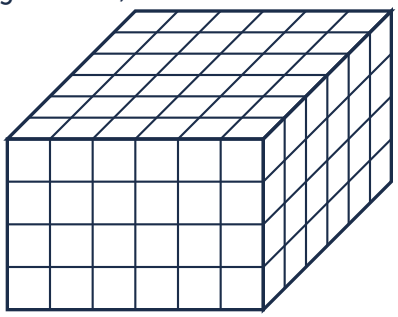


Volume: **36** cubic in

4 × 3 = 12 square in.
12 cubes/layer × 3 layers = 36 cubic in.

3.

Cube edge one ft; one cubic ft.

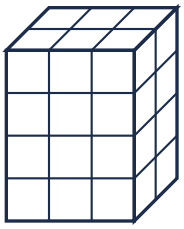


Volume: **144** cubic ft

6 × 6 = 36 square ft.
36 cubes/layer × 4 layers = 144 cubic ft.

4.

Cube edge one unit; one cubic unit.



Volume: **24** cubic units

3 × 2 = 6 square units.
6 cubes/layer × 4 layers = 24 cubic units.

All pictured prisms are completely filled, including hidden cubes.

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Rearrange the Cubes

Name: _____

List every different prism. Use length <= width <= height so rotations count once.

Strategy Spotlight

Use this many unit cubes:

8

$1 \times 1 \times 8 = 8$
$1 \times 2 \times 4 = 8$
$2 \times 2 \times 2 = 8$

Rotations count once.
Cube edge one unit; one cubic unit.

25.

12 unit cubes. Make every different prism.

Edges: units; area: square units; volume: cubic units.

Length	Width	Height	Base area	Volume

26.

18 unit cubes. Make every different prism.

Edges: units; area: square units; volume: cubic units.

Length	Width	Height	Base area	Volume

All pictured prisms are completely filled, including hidden cubes.

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Answer Key: Rearrange the Cubes

Student page 10

List every different prism. Use length <= width <= height so rotations count once.

Strategy Spotlight

Use this many unit cubes:

8

$$1 \times 1 \times 8 = 8$$
$$1 \times 2 \times 4 = 8$$
$$2 \times 2 \times 2 = 8$$

Rotations count once.
Cube edge one unit; one cubic unit.

25.

12 unit cubes. Make every different prism.

Edges: units; area: square units; volume: cubic units.

Length	Width	Height	Base area	Volume
1	1	12	1	12
1	2	6	2	12
1	3	4	3	12
2	2	3	4	12

First edge: 1 or 2 ($3 \times 3 \times 3 = 27 > 12$).
Try all factor pairs for the remaining two edges.

26.

18 unit cubes. Make every different prism.

Edges: units; area: square units; volume: cubic units.

Length	Width	Height	Base area	Volume
1	1	18	1	18
1	2	9	2	18
1	3	6	3	18
2	3	3	6	18

First edge: 1 or 2 ($3 \times 3 \times 3 = 27 > 18$).
Try all factor pairs for the remaining two edges.

All pictured prisms are completely filled, including hidden cubes.

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