Name _____

Volume of Rectangular Prisms

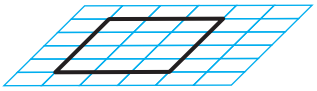
Essential Question How can you find the volume of a rectangular prism?

Measurement and Data—5.MD.5a, 5.MD.5b

MATHEMATICAL PRACTICES
MP.1, MP.7, MP.8

CONNECT The base of a rectangular prism is a rectangle. You know that area is measured in square units, or units^2, and that the area of a rectangle can be found by multiplying the length and the width.

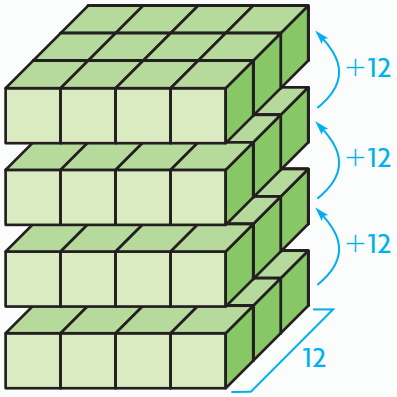
Volume is measured in cubic units, or units^3. When you build a prism and add each layer of cubes, you are adding a third dimension, height.



The area of the base is _____ sq units.

Unlock the Problem

Yuan built the rectangular prism shown at the right, using 1-inch cubes. The prism has a base that is a rectangle and has a height of 4 cubes. What is the volume of the rectangular prism that Yuan built?



You can find the volume of a prism in cubic units by multiplying the number of square units in the base shape by the number of layers, or its height.

Each layer of Yuan's rectangular prism is composed of _____ inch cubes.

Height (in layers)	1	2	3	4
Volume (in cubic inches)	12	24		

Multiply the height by _____.

1. How does the volume change as each layer is added?

_____

_____

2. What does the number you multiply the height by represent?

_____

_____

So, the volume of Yuan's rectangular prism is _____ in.^{3}

Relate Height to Volume

Toni stacks cube-shaped beads that measure 1 centimeter on each edge in a storage box. The box can hold 6 layers of 24 beads with no gaps or overlaps. What is the volume of Toni's storage box?

- What are the dimensions of the base of the box?

  _____

- What operation can you use to find the area of the base shape?

  _____

One Way Use base and height.

The volume of each bead is _____ cm^3.

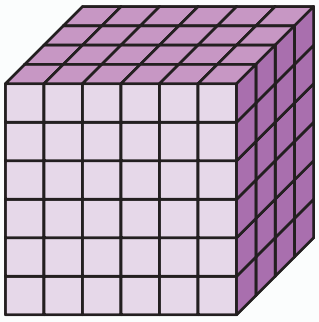
The storage box has a base with an area of _____ cm^2.

The height of the storage box is _____ centimeters.

The volume of the storage box is

(_____ × _____), or _____ cm^3.

Base area



Another Way Use length, width, and height.

You know that the area of the base of the storage box is 24 cm^2.

The base has a length of _____ centimeters

and a width of _____ centimeters. The height

is _____ centimeters. The volume of the storage box is

(_____ × _____) × _____, or _____ × _____, or _____ cm^3.

Base area

So, the volume of the storage box is _____ cm^3.

3. THINK SMARTER **What if** each cube-shaped bead measured 2 centimeters on each edge? How would the dimensions of the storage box change? How would the volume change?

_____

_____

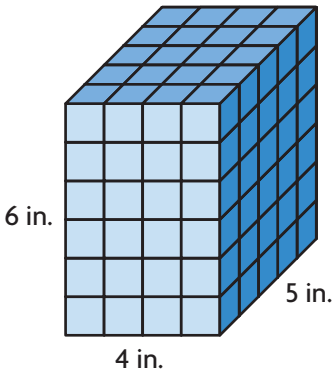
_____

Name _____

Share and Show

MATH BOARD

Find the volume.

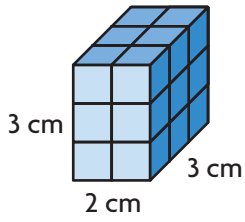


1. The length of the rectangular prism is _____.

The width is _____. So, the area of the base is _____.

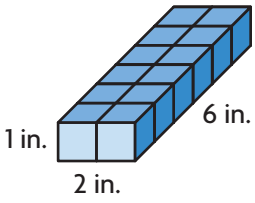
The height is _____. So, the volume of the prism is _____.

2.



Volume: _____

3.



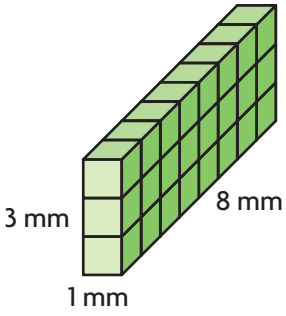
Volume: _____

Math Talk — **Mathematical Practices**

Explain why the exponent 2 is used to express the measure of area and the exponent 3 is used to express the measure of volume.

On Your Own

4. MATHEMATICAL PRACTICE 2 **Reason Quantitatively** Rachel, Timothy, and Robyn each make the rectangular prism shown. If they stand all of their prisms together, side by side, to make one large rectangular prism, what is the volume of the new prism? How did the dimensions change?

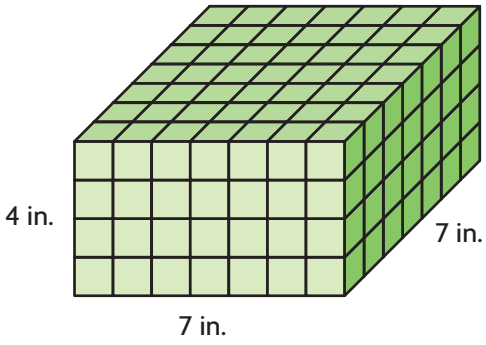


_____

_____

_____

5. GO DEEPER The rectangular prism is made of 1-inch cubes. If two more layers of cubes are placed on top of the rectangular prism, how many more cubes are added to the prism? What would be the volume of the new rectangular prism?



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