Understand Volume

Essential Question How can you use unit cubes to find the volume of a rectangular prism?

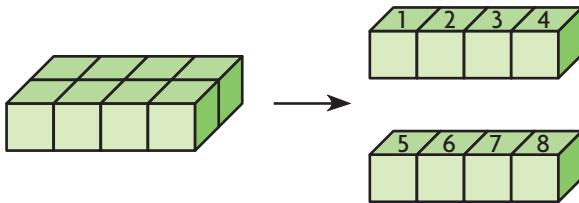Measurement and Data—
5.MD.3b, 5.MD.4
MATHEMATICAL PRACTICES
MP.3, MP.5, MP.6

Investigate

Hands On

CONNECT You can find the volume of a rectangular prism by counting unit cubes. **Volume** is the measure of the amount of space a solid figure occupies and is measured in **cubic units**. Each unit cube has a volume of 1 cubic unit.

The rectangular prism above is made up of _____ unit cubes

and has a volume of _____ cubic units.

Materials ■ rectangular prism net A ■ centimeter cubes

A. Cut out, fold, and tape the net to form a rectangular prism.

B. Use centimeter cubes to fill the base of the rectangular prism without gaps or overlaps. Each centimeter cube has a length, width, and height of 1 centimeter and a volume of 1 cubic centimeter.

- How many centimeter cubes make up the length of the first layer? the width? the height?

  length: _____ width: _____ height: _____

- How many centimeter cubes are used to fill the base? _____

C. Continue filling the rectangular prism, layer by layer. Count the number of centimeter cubes used for each layer.

- How many centimeter cubes are in each layer? _____

- How many layers of cubes fill the rectangular prism? _____

- How many centimeter cubes fill the prism? _____

So, the volume of the rectangular prism is _____ cubic centimeters.
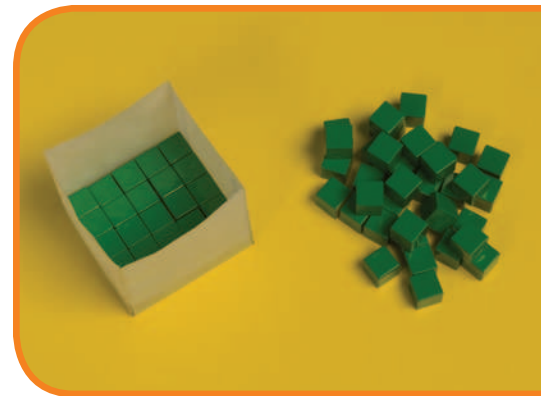
Draw Conclusions

1. Describe the relationship among the number of centimeter cubes you used to fill each layer, the number of layers, and the volume of the prism.

_____

_____

_____

2. **MATHEMATICAL PRACTICE ❸** **Apply** If you had a rectangular prism that had a length of 3 units, a width of 4 units, and a height of 2 units, how many unit cubes would you need for each layer? How many unit cubes would you need to fill the rectangular prism?

_____

Make Connections

To find the volume of three-dimensional figures, you measure in three directions. For a rectangular prism, you measure its length, width, and height. Volume is measured using cubic units, such as cu cm, cu in., or cu ft.
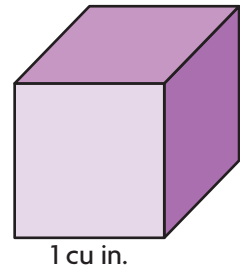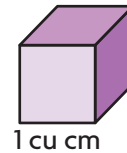
1 cu cm

1 cu in.

• Which has a greater volume, 1 cu cm or 1 cu in.? Explain.

_____

_____

Find the volume of the prism if each cube represents 1 cu cm, 1 cu in., and 1 cu ft.

2 units

6 units

3 units

_____ cu cm

_____ cu in.
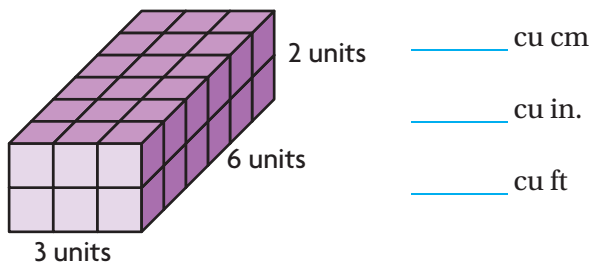
_____ cu ft

• **MATHEMATICAL PRACTICE ❻** Would the prism above be the same size if it were built with centimeter cubes, inch cubes, or foot cubes? **Explain**.
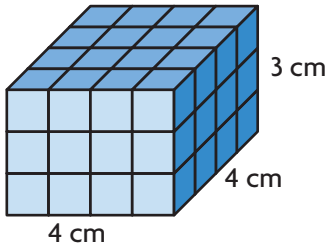
_____

_____

_____

Name _____

MATH BOARD

Use the unit given. Find the volume.

1.

3 cm

4 cm

4 cm

Each cube = 1 cu cm

Volume = _____ cu _____

2.

4 in.

2 in.

3 in.

Each cube = 1 cu in.

Volume = _____ cu _____

3.

3 ft

2 ft

6 ft
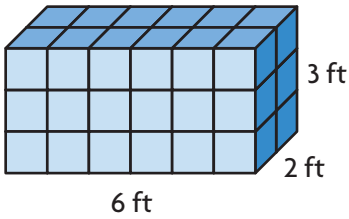
Each cube = 1 cu ft

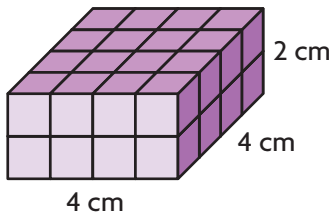Volume = _____ cu _____

4.

3 in.

4 in.

5 in.
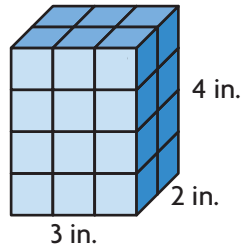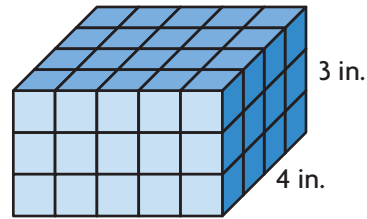
Each cube = 1 cu in.

Volume = _____ cu _____

Compare the volumes. Write < , >, or =.

5.

2 cm

4 cm

4 cm

Each cube = 1 cu cm

2 in.

4 in.

4 in.
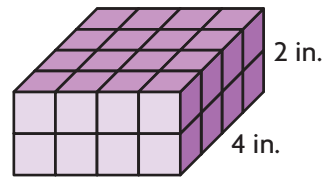
Each cube = 1 cu in.

_____ cu cm ◯ _____ cu in.

6.

3 ft

4 ft

9 ft

Each cube = 1 cu ft

2 ft

5 ft
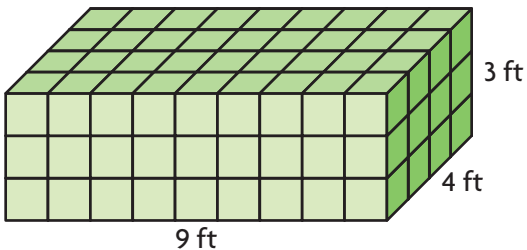
8 ft
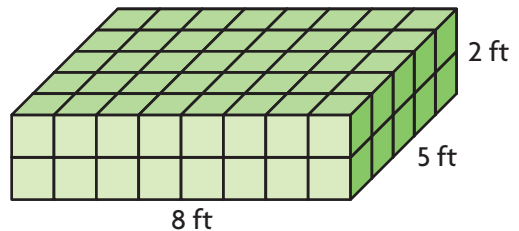
Each cube = 1 cu ft

_____ cu ft ◯ _____ cu ft

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Chapter 11 • Lesson 6   489