Dear Family,

This week your child is learning to find volume using unit cubes.

Suppose you want to find the volume of the rectangular prism shown at the right. One way to find the volume is to fill it with unit cubes that each have a volume of 1 cubic centimeter.

You can count all the cubes to find the volume. The prism has a volume of 18 cubic centimeters.

Another way to find the volume is to count the cubes in each layer and then add.

There are 6 cubes in each layer and 3 layers in all.

\[ 6 + 6 + 6 = 18 \text{ cubes} \]

The volume of the rectangular prism is 18 cubic centimeters. Using either method, the volume is the same.

Your child is also learning that unit cubes can be different sizes. So, it is important to know the size of the cube you are using when you find the volume of a figure.

- A unit cube with side lengths of 1 centimeter has a volume of 1 cubic centimeter.
- A unit cube with side lengths of 1 inch has a volume of 1 cubic inch.
- A unit cube with side lengths of 1 foot has a volume of 1 cubic foot.

Invite your child to share what he or she knows about different ways to find volume by doing the following activity together.
**ACTIVITY**

**FIND VOLUME USING UNIT CUBES**

Do this activity with your child to find volume with unit cubes.

*MATERIALS* scissors, tape, household containers shaped like rectangular prisms, such as cereal boxes and tissue boxes

- Cut out the cube pattern below on the solid lines. Fold on the dotted lines and tape into a cube. This cube represents 1 cubic unit of volume.

- Have your child use the unit cube to estimate the volume of one household container (the number of cubes that fit in the container). Because your child is finding an approximate volume, discuss that the cubes do not need to fill the length, width, and height of the container completely (with no gaps).

- Ask your child the questions below:
  
  *How many cubes would fit in the bottom of the box?*
  *How many layers of cubes would fit in the box?*
  *What is the approximate volume of the box?*

- Repeat for another container.
Previously, you learned that you can fill a solid figure with unit cubes to find its volume. Use what you know to try to solve the problem below.

Carl filled the clear box shown below with unit cubes to find its volume. The unit cubes Carl used all have side lengths of 1 foot. What is the volume of the box?

![Image of a box filled with unit cubes]

### TRY IT

**Math Toolkit**
- unit cubes
- grid paper
- isometric dot paper
- square sticky notes

**DISCUSS IT**

Ask your partner: How did you get started?

Tell your partner: I started by . . .
CONNECT IT

1 LOOK BACK
Describe the measurement unit Carl should use and explain how he can find the volume of the box.

2 LOOK AHEAD
Volume is measured in cubic units. Here are some cubic units you might use to measure volume.

<table>
<thead>
<tr>
<th>Unit of Volume</th>
<th>cubic inch</th>
<th>cubic centimeter</th>
<th>cubic foot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Cube</td>
<td><img src="image1" alt="1 in. 1 in. 1 in." /></td>
<td><img src="image2" alt="1 cm 1 cm 1 cm" /></td>
<td><img src="image3" alt="1 ft 1 ft 1 ft" /></td>
</tr>
</tbody>
</table>

Carl has another box as shown below. What is its volume?

3 REFLECT
What is the same and what is different about the volume of Carl’s two boxes?
1. Think about what you know about solid figures. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

<table>
<thead>
<tr>
<th>What Is It?</th>
<th>What I Know About It</th>
</tr>
</thead>
</table>

2. Instead of using cubic units to measure volume, Paulina wants to measure volume using boxes of pencils. What is the volume of this rectangular prism using boxes of pencils as the unit of measure?
3 Solve the problem. Show your work.

Jan filled the box shown below with unit cubes to find its volume. The unit cubes Jan used all have side lengths of 1 centimeter. What is the volume of the box?

![Diagram of a box filled with unit cubes]

1 cm 1 cm 1 cm

Solution

4 Check your answer. Show your work.
Read and try to solve the problem below.

Abigail uses cardboard to build a rectangular prism like the one shown below. What is the volume of the prism?

TRY IT

Math Toolkit
- unit cubes
- 1-cm grid paper
- isometric dot paper

DISCUSS IT
Ask your partner: Why did you choose that strategy?
Tell your partner: I knew ... so I ...
Explore different ways to understand finding the volume of a rectangular prism.

Abigail uses cardboard to build a rectangular prism like the one shown below. What is the volume of the prism?

![Diagram of a rectangular prism with dimensions 3 cm x 2 cm x 4 cm]

**PICTURE IT**
You can find the volume of the prism by filling it with unit cubes and counting the number of cubes.

Use unit cubes that are each 1 cubic centimeter.

![Unit cubes filling a 3 cm x 2 cm x 4 cm rectangular prism]

**MODEL IT**
You can also find the volume by counting the number of cubes in one layer and the number of layers.

Use unit cubes that are each 1 cubic centimeter.

![Diagram showing layers of unit cubes in a 3 cm x 2 cm x 4 cm rectangular prism]
CONNECT IT

Now you will use the problem from the previous page to help you understand how to find the volume of a rectangular prism.

1. Look at the model in Picture It on the previous page. Count the number of cubes in one layer. There are __________ cubes in one layer.

2. How could you find the number of cubes in one layer without counting the cubes?

3. Once you know how many cubes are in one layer, what else do you need to know to find the volume?

4. There are 8 cubes in each layer and there are 3 layers. What multiplication expression can you write to find the volume of the prism? ________________

5. What is the volume of Abigail’s rectangular prism? ________________

6. Explain how you can use multiplication to find the volume of a rectangular prism.

REFLECT

Look back at your Try It, strategies by classmates, and Picture It and Model It. Which models or strategies do you like best for finding the volume of a rectangular prism? Explain.
APPLY IT
Use what you just learned to solve these problems.

8 What is the volume of the rectangular prism at the right? Show your work.

Solution

9 Mr. Wong finds the volume of a box by filling it with 1-foot unit cubes, as shown below. What is the volume of Mr. Wong’s box? Show your work.

Solution

10 Jamila wants to find the volume of the rectangular box at the right. What is the volume of the box?

A 18 cubic units
B 30 cubic centimeters
C 36 cubic centimeters
D 36 cubic inches
Study the Example showing how to use layers to find the volume of a rectangular prism. Then solve problems 1–7.

**EXAMPLE**

Keith uses this box to store his colored markers. What is the volume of the box?

Think about filling the box with 1-inch cubes. One layer has 2 rows of 6 cubes, or 12 cubes. There are 4 layers of cubes.

\[12 + 12 + 12 + 12 = 48, \text{ or } 12 \times 4 = 48\]

The volume of the box is 48 cubic inches.

1. Prism G is filled with unit cubes that have side length 1 centimeter.
   There are \__________ layers with \__________ cubes in each layer.
   \__________ cubes + \__________ cubes = \__________ cubes
   The volume is \__________________________.

2. Prism H is filled with unit cubes that have side length 1 foot.
   There are \__________ layers with \__________ cubes in each layer.
   \__________ \times \__________ cubes = \__________ cubes
   The volume is \__________________________.
3. What is the volume of the rectangular prism at the right? Show your work.

![Rectangular Prism Diagram]

**Solution**

4. Jenn noticed that she can fit two juice boxes side by side on the bottom of this box. She can make two more layers like the one shown to fill the box. Using a juice box as a measure of volume, what is the volume of the larger box?

![Juice Box Diagram]

**Solution**

5. A box is 2 inches long, 1 inch wide, and 6 inches tall. What is the relationship between the volume of this box and the one in problem 4? Tell how you know.

6. Box D and Box E are made from unit cubes of the same size. Which has a greater volume, Box D or Box E? Explain.

![Unit Cubes Diagram]

7. Add a layer to Box D and compare the volume of the new Box D to the volume of Box E.
Complete the Example below. Then solve problems 1–9.

**EXAMPLE**

Pedro has a storage box with a volume of 36 cubic feet. He knows that the box is 4 feet long and 3 feet wide. How high is the box?

Look at how you could show your work using a drawing and multiplication facts.

```
  3 ft
/       |
|       |
  4 ft
```

4 \times 3 = 12

12 \times \square = 36

12 \times 3 = 36

**Solution**

PAIR/SHARE

Could you solve this problem another way?

**APPLY IT**

1. A box measures 6 centimeters long, 2 centimeters wide, and 4 centimeters high. What is the volume of the box? Show your work.

```
  2 cm
 /       |
|       |
  4 cm
```

Solution
2. Kamala made the figure below using cubes. What is the volume of Kamala's figure? Show your work.

![Diagram of a cube structure with dimensions.

Solution]

3. What is the volume of the rectangular prism below?

![Diagram of a rectangular prism with dimensions.]

A) 6 square feet
B) 6 cubic feet
C) 8 square feet
D) 8 cubic feet

Nam chose D as the correct answer. How did he get that answer?
4 How many 1-centimeter unit cubes are in the bottom layer of the rectangular prism at the right?

A. 3  
B. 6  
C. 12  
D. 24

5 Which expressions can be used to find the volume, in cubic feet, of the rectangular prism at the right?

A. $30 \times 4$  
B. $(5 + 6) \times 4$  
C. $30 + 30 + 30 + 30$  
D. $5 + 6 + 4$  
E. $30 + 4$

6 Flora has a rectangular gift box that has a volume of 24 cubic inches. The box is 2 inches tall. Determine if the gift box could have the given length and width.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length: 11 inches; Width: 11 inches</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Length: 4 inches; Width: 3 inches</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>Length: 10 inches; Width: 2 inches</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>Length: 6 inches; Width: 2 inches</td>
<td>G</td>
<td>H</td>
</tr>
<tr>
<td>Length: 12 inches; Width: 1 inch</td>
<td>I</td>
<td>J</td>
</tr>
</tbody>
</table>
7. Both figures are filled with unit cubes of the same size. Which rectangular prism has the greater volume, Figure A or Figure B? Show your work.

8. Part A: Mato drew the rectangular prism shown below. Draw and label a different rectangular prism with the same volume as Mato’s prism.

Part B: Explain how you know that the volume of your prism is the same as the volume of Mato’s prism.

9. Math Journal

Jorge uses 1-centimeter cubes to make a rectangular prism. Each layer of his prism is 5 cubes long and 2 cubes wide. His prism has 6 layers. Explain two ways to find the volume of Jorge’s prism.

Self Check: Go back to the Unit 1 Opener and see what you can check off.