GRADE 5 • MODULE 5
Addition and Multiplication with Volume and Area

Module Overview ........................................................................................................... i
Topic A: Concepts of Volume ......................................................................................... 5.A.1
Topic B: Volume and the Operations of Multiplication and Addition .................. 5.B.1
Topic C: Area of Rectangular Figures with Fractional Side Lengths ............... 5.C.1
Topic D: Drawing, Analysis, and Classification of Two-Dimensional Shapes .. 5.D.1
Module Assessments ................................................................................................... 5.S.1
Lesson 1 Problem Set

1. Use your centimeter cubes to build the figures pictured below on centimeter grid paper. Find the total volume of each figure you built, and explain how you counted the cubic units. Be sure to include units.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Volume</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Build 2 different structures with the following volumes using your cubic units. Then draw one of the figures on the dot paper. One example has been drawn for you.

   a. 4 cubic units  
   b. 7 cubic units  
   c. 8 cubic units

3. Joyce says that the figure below, made of 1-cm cubes, has a volume of 5 cubic centimeters. Explain her mistake.

4. Imagine that Joyce made the second layer of her structure identical to the first. What would its volume be then? Explain how you know.
Lesson 1 Exit Ticket

1. What is the volume of the figures pictured below?

A.  

B.  

2. Draw a picture of a figure with a volume of 3 cubic units on the dot paper.
1. The following solids are made up of 1-cm cubes. Find the total volume of each figure, and write it in the chart below.

<table>
<thead>
<tr>
<th>Figure</th>
<th>Volume</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Draw the figures on the dot paper with the given number of unit cubes.

   a. 3 cubic units
   b. 6 cubic units
   c. 12 cubic units

6. John built and drew a structure that has a volume of 5 cubic centimeters. His little brother tells him he made a mistake because he only drew 4 cubes. Help John explain to his brother why his drawing is accurate.

7. Draw another figure below that represents a structure with a volume of 5 cubic centimeters.
Lesson 1: Explore volume by building with and counting unit cubes.

Date: 1/10/14

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Lesson 2 Problem Set

Name ____________________________________________ Date ______________________

1. Shade the following figures on centimeter grid paper. Cut and fold each to make 3 open boxes, taping them so they hold their shapes. Pack each box with cubes. Write how many cubes fill the box.
   a. Number of cubes: ______________

   b. Number of cubes: ______________

   c. Number of cubes: ______________

2. Predict how many centimeter cubes will fit in each box and briefly explain your prediction. Use cubes to find the actual volume. (The figures are not drawn to scale.)
   a. Prediction: ______________

      Actual: ______________

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Lesson 2 Problem Set

b. Prediction: ______________
   Actual: ______________

c. Prediction: ______________
   Actual: ______________

3. Cut out the net in the template and fold it into a cube. Predict the number of 1-centimeter cubes that would be required to fill it. Test your prediction using as few cubes as possible. What did you discover?
   Prediction: ______________

   What I discovered:
1. If this net were to be folded into a box, how many cubes would fill it?

Number of cubes: ______________

2. Predict how many centimeter cubes will fit in the box, and briefly explain your prediction. Use cubes to find the actual volume. (The figure is not drawn to scale.)

Prediction: ______________
Actual: ______________
Lesson 2 Homework

Name ____________________________ Date __________________

1. Make the following boxes on centimeter grid paper. Cut and fold each to make 3 open boxes, taping them so they hold their shapes. How many cubes would fill each box? Explain how you found the number.

   a. Number of cubes: ______________

   ![Box](image)

   b. Number of cubes: ______________

   ![Box](image)

   c. Number of cubes: ______________

   ![Box](image)
2. How many centimeter cubes would fit inside each box? Explain your answer using words and diagrams on the box. (The figures are not drawn to scale; the first box is 3 centimeters across and 2 centimeters wide.)

a.  
   Number of cubes: ________________
   Explanation:

b.  
   Number of cubes: ________________
   Explanation:

c.  
   Number of cubes: ________________
   Explanation:

3. The box pattern below holds 24 1-cm cubes. Draw two different box patterns that would hold the same number of cubes.
Lesson 2:
Find the volume of a right rectangular prism by packing with cubic units and counting.

Date: 1/10/14
Lesson 2:
Find the volume of a right rectangular prism by packing with cubic units and counting.

Date: 1/10/14

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Use these rectangular prisms to record the layers that you count.
Lesson 3 Problem Set

1. Use the prisms to find the volume.
   - Build the rectangular prism pictured below to the left with your cubes, if necessary.
   - Decompose it into layers in three different ways, and show your thinking on the blank prisms.
   - Complete the missing information in the table.

   a. Number of Layers | Number of Cubes in Each Layer | Volume of the Prism (cubic cm)
   ---------------------|-------------------------------|------------------------
   |                    |                               |                        |
   |                    |                               |                        |
   |                    |                               |                        |

   b. Number of Layers | Number of Cubes in Each Layer | Volume of the Prism (cubic cm)
   ---------------------|-------------------------------|------------------------
   |                    |                               |                        |
   |                    |                               |                        |
   |                    |                               |                        |
2. Josh and Jonah were finding the volume of the prism to the right. The boys agree that 4 layers can be added together to find the volume. Josh says that he can see on the end of the prism that each layer will have 16 cubes in it. Jonah says that each layer has 24 cubes in it. Who is right? Explain how you know using words, numbers, and/or pictures.

3. Marcos makes a prism 1 inch by 5 inches by 5 inches. He then decides to create layers equal to his first one. Fill in the chart below, and explain how you know the volume of each new prism.

<table>
<thead>
<tr>
<th>Number of Layers</th>
<th>Volume</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Imagine the rectangular prism below is 6 meters long, 4 meters tall, and 2 meters wide. Draw horizontal lines to show how the prism could be decomposed into layers that are 1 meter in height.

It has _____ layers from bottom to top.
Each layer contains ______ cubic units.
The volume of this prism is __________.
Lesson 3: Compose and decompose right rectangular prisms using layers.

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Lesson 3: Compose and decompose right rectangular prisms using layers.

Name ___________________________ Date ___________________

1. Use the prisms to find the volume.

- The rectangular prisms pictured below were constructed with 1-cm cubes
- Decompose each prism into layers in three different ways, and show your thinking on the blank prisms.
- Complete each table

<table>
<thead>
<tr>
<th>Number of Layers</th>
<th>Number of Cubes in Each Layer</th>
<th>Volume of the Prism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>cubic cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cubic cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cubic cm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Layers</th>
<th>Number of Cubes in Each Layer</th>
<th>Volume of the Prism</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>cubic cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cubic cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cubic cm</td>
</tr>
</tbody>
</table>
2. Stephen and Chelsea want to increase the volume of this prism by 72 cubic centimeters. Chelsea wants to add eight layers and Stephen says they only need to add four layers. Their teacher tells them they are both correct. Explain how this is possible.

3. Juliana makes a prism 4 inches across and 4 inches wide, but only 1 inch tall. She then decides to create layers equal to her first one. Fill in the chart below and explain how you know the volume of each new prism.

<table>
<thead>
<tr>
<th>Number of Layers</th>
<th>Volume</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Imagine the rectangular prism below is 4 meters long, 3 meters tall, and 2 meters wide. Draw horizontal lines to show how the prism could be decomposed into layers that are 1 meter in height.

It has _____ layers from left to right.
Each layer contains _____ cubic units.
The volume of this prism is __________.
Lesson 4: Use multiplication to calculate volume.

1. Each rectangular prism is built from centimeter cubes. State the dimensions and find the volume.

   a. 

   Length: _____ cm  
   Width: _____ cm  
   Height: _____ cm  
   Volume: _____ cm$^3$

   b. 

   Length: _____ cm  
   Width: _____ cm  
   Height: _____ cm  
   Volume: _____ cm$^3$

   c. 

   Length: _____ cm  
   Width: _____ cm  
   Height: _____ cm  
   Volume: _____ cm$^3$

   d. 

   Length: _____ cm  
   Width: _____ cm  
   Height: _____ cm  
   Volume: _____ cm$^3$

2. Write a multiplication sentence that you could use to calculate the volume for each rectangular prism in Problem 1. Include the units in your sentences.

   a. ________________________________  
   b. ________________________________

   c. ________________________________  
   d. ________________________________
3. Calculate the volume of each rectangular prism. Include the units in your number sentences.

a. 

![Image](362x749)

\[ V = \text{______________________________} \]

b. 

![Image](406x749)

\[ V = \text{______________________________} \]

4. Tyron is constructing a box in the shape of a rectangular prism to store his baseball cards. It has a length of 10 centimeters, a width of 7 centimeters, and a height of 8 centimeters. What is the volume of the box?

5. Aaron says more information is needed to find the volume of the prisms. Explain why Aaron is mistaken, and calculate the volume of the prisms.

a. 

![Image](49x751)

\[ \text{Area} = 60 \text{ cm}^2 \]

\[ 5 \text{ cm} \]

\[ V = \text{______________________________} \]

b. 

![Image](362x749)

\[ \text{Area} = 20 \text{ in}^2 \]

\[ \text{12 in} \]

\[ V = \text{______________________________} \]
Calculate the volume of each prism.

a. 

Length: _____ mm
Width: _____ mm
Height: _____ mm
Volume: ____________ mm³

Write the multiplication sentence that shows how you calculated the volume. Be sure to include the units.

b. A rectangular prism has a top face with an area of 20 ft² and a height of 5 ft. What is the volume of this rectangular prism?
1. Each rectangular prism is built from centimeter cubes. State the dimensions and find the volume.

   a. 
   
   b. 
   
   c. 
   
   d. 

   Length: _____ cm  
   Width: _____ cm  
   Height: _____ cm  
   Volume: _____ cm^3

2. Write a multiplication sentence that you could use to calculate the volume for each rectangular prism in Problem 1. Include the units in your sentences.

   a. ________________________________  b. ________________________________
   
   c. ________________________________  d. ________________________________

   Length: _____ cm  
   Width: _____ cm  
   Height: _____ cm  
   Volume: _____ cm^3
3. Calculate the volume of each rectangular prism. Include the units in your number sentences.
   a. 
   ![Rectangular Prism](image1)
   Volume: ____________________________
   b. 
   ![Rectangular Prism](image2)
   Volume: ____________________________

4. Mrs. Johnson is constructing a box in the shape of a rectangular prism to store clothes for the summer. It has a length of 28 inches, a width of 24 inches, and a height of 30 inches. What is the volume of the box?

5. Calculate the volume of each rectangular prism using the information that is provided.
   a. Face area: 56 square meters, height: 4 meters.
Lesson 5:

Use multiplication to connect volume as packing with volume as filling.

Date: 1/10/14

1. Determine the volume of two boxes on the table using cubes and then confirm by measuring and multiplying.

<table>
<thead>
<tr>
<th>Box Number</th>
<th>Number of Cubes Packed</th>
<th>Length</th>
<th>Measurements</th>
<th>Width</th>
<th>Height</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Using the same boxes from Problem 1, record the amount of liquid that your box can hold.

<table>
<thead>
<tr>
<th>Box Number</th>
<th>Liquid the Box Can Hold</th>
<th>mL</th>
<th>mL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Shade to show the water in the beaker.

At first:   After 1 mL water added:   After 1 cm cube added:

________ mL  _______ mL  _______ mL

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
4. What conclusion can you draw about 1 cubic centimeter and 1 mL?

5. The tank, shaped like a rectangular prism, is filled to the top with water.

![Diagram of a rectangular prism with dimensions 13 cm x 10 cm x 8 cm]

Will the beaker hold all the water in the box? If yes, how much more will the beaker hold? If not, how much more will the cube hold than the beaker? Explain how you know.

6. A rectangular fish tank measures 26 cm by 20 cm by 18 cm. The tank is filled with water to a depth of 15 cm.
   a. What is the volume of the water in mL?
   
   b. How many liters is that?
   
   c. How many more mL of water will be needed to fill the tank to the top? Explain how you know.
   
   d. A rectangular container is 25 cm long and 20 cm wide. If it holds 1 liter of water when full, what is its height?
Lesson 5 Exit Ticket

1. a. Find the volume of the prism.

b. Shade the beaker to show how much liquid would fill the box.
1. Johnny filled a container with 30 centimeter cubes. Shade the beaker to show how much water the container will hold. Explain how you know.

2. A beaker contains 250 mL of water. Jack wants to pour the water into a container that will hold the water. Which of the containers pictured below could he use? Explain your choices.

3. On the back of this paper, describe the details of the activities you did in class today. Include what you learned about cubic centimeters and milliliters. Give an example of a problem you solved with an illustration.
Lesson 6 Problem Set

Name ____________________________ Date ________________

1. Find the total volume of the figures and record your solution strategy.
   a.  
   
   ![Diagram of a rectangular prism with dimensions 3 cm x 14 cm x 17 cm]  
   Volume: ______________________________  
   Solution Strategy: ____________________

   b.  
   
   ![Diagram of a rectangular prism with dimensions 6 in x 4 in x 15 in]  
   Volume: ______________________________  
   Solution Strategy: ____________________

c.  
   
   ![Diagram of a rectangular prism with dimensions 10 cm x 6 cm x 4 cm]  
   Volume: ______________________________  
   Solution Strategy: ____________________

d.  
   
   ![Diagram of a rectangular prism with dimensions 10 m x 8 m x 3 m]  
   Volume: ______________________________  
   Solution Strategy: ____________________
2. A sculpture (pictured below) is made of two sizes of rectangular prisms. One size measures 13 in by 8 in by 2 in. The other size measures 9 in by 8 in by 18 in. What is the total volume of the sculpture?

3. The combined volume of two identical cubes is 128 cubic centimeters. What is the side length of each cube?

4. A rectangular tank with a base area of 24 cm² is filled with water and oil to a depth of 9 cm. The oil and water separate into two layers when the oil rises to the top. If the thickness of the oil layer is 4 cm, what is the volume of the water?

5. Two rectangular prisms have a combined volume of 432 cubic feet. Prism A has half the volume of Prism B.
   a. What is the volume of Prism A? Prism B?
   b. If Prism A has a base area of 24 ft², what is the height of Prism A?
   c. If Prism B’s base is \( \frac{2}{3} \) the area of Prism A’s base, what is the height of Prism B?
1. Find the total volume of soil in the three planters. Planter A is 15 inches by 3 inches by 3 inches. Planter B is 9 inches by 3 inches by 4 inches.
1. Find the total volume of the figures and record your solution strategy.
   a. 
   b. 

   Volume: ______________________________ Volume: ______________________________
   Solution Strategy: ______________________________ Solution Strategy: ______________________________

c. 

d. 

   Volume: ______________________________ Volume: ______________________________
   Solution Strategy: ______________________________ Solution Strategy: ______________________________
2. A planting box (pictured below) is made of two sizes of rectangular prisms. One type of prism measures 3 inches by 6 inches by 14 inches. The other type measures 18 inches by 9 inches by 10 inches. What is total volume of three such boxes?

![Diagram of a planting box](image)

3. The combined volume of two identical cubes is 250 cubic centimeters. What is the measure of one cube’s edge?

4. A fish tank has a base area of 45 cm² and is filled with water to a depth of 12 cm. If the height of the tank is 25 cm, how much more water will be needed to fill the tank to the brim?

![Diagram of a fish tank](image)

5. Three rectangular prisms have a combined volume of 518 cubic feet. Prism A has one-third the volume of Prism B, and Prisms B and C have equal volume. What is the volume of each prism?
Geoffrey builds rectangular planters.

1. Geoffrey’s first planter is 8 feet long and 2 feet wide. The container is filled with soil to a height of 3 feet in the planter. What is the volume of soil in the planter? Explain your work using a diagram.

2. Geoffrey wants to grow some tomatoes in four large planters. He wants each planter to have a volume of 320 cubic feet, but he wants them all to be different. Show four different ways Geoffrey can make these planters, and draw diagrams with the planters’ measurements on them.
3. Geoffrey wants to make one planter that extends from the ground to just below his back window. The window starts 3 feet off the ground. If he wants the planter to hold 36 cubic feet of soil, name one way he could build the planter so it is not taller than 3 feet. Explain how you know.

4. After all of this gardening work, Geoffrey decides he needs a new shed to replace the old one. His current shed is a rectangular prism that measures 6 feet long by 5 feet wide by 8 feet high. He realizes he needs a shed with 480 cubic feet of storage.
   a. Will he achieve his goal if he doubles each dimension? Why or why not?
   b. If he wants to keep the height the same, what could the other dimensions be for him to get the volume he wants?
   c. If he uses the dimensions in Part (b), what could be the area of the new shed’s floor?
Name ________________________________ Date ____________________

1. A storage shed is a rectangular prism and has dimensions of 6 meters by 5 meters by 12 meters. If Jean were to double these dimensions, she believes she would only double the volume. Is she correct? Explain why or why not. Include a drawing in your explanation.
Wren makes some rectangular display boxes.

1. Wren's first display box is 6 inches long, 9 inches wide, and 4 inches high. What is the volume of the display box? Explain your work using a diagram.

2. Wren wants to put some artwork into three large display boxes. She knows they all need a volume of 60 cubic inches, but she wants them all to be different. Show three different ways Wren can make these boxes by drawing diagrams and labeling the measurements.

Shadow Box A

Shadow Box B

Shadow Box C
3. Wren wants to build a box to organize her scrapbook supplies. She has a stencil set that is 12 inches wide that needs to lay flat in the bottom of the box. The supply box must also be no taller than 2 feet. Name one way she could build a toy box with a volume of 72 cubic inches.

4. After all of this organizing, Wren decides she also needs more storage for her soccer equipment. Her current storage box measures 1 foot long by 2 feet wide by 2 feet high. She realizes she needs to replace it with a box with 12 cubic feet of storage, so she doubles the width.
   
   a. Will she achieve her goal if she does this? Why or why not?

   b. If she wants to keep the height the same, what could the other dimensions be for a 12-cubic-foot storage box?

   c. If she uses the dimensions in Part (b), what is the area of the new storage box’s floor?

   d. How has the area of the bottom in her new storage box changed? Explain how you know.
Name ___________________________ Date ___________________________

Using the box patterns, construct a sculpture containing at least 5 but not more than 7 rectangular prisms that meets the following requirements in the table below.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>My sculpture has 5 to 7 rectangular prisms.</td>
<td>Number of prisms: ____________</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Each prism is labeled with a letter, dimensions, and volume.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prism A</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prism B</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prism C</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prism D</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prism E</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prism __</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prism __</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Prism D has $\frac{1}{2}$ the volume of prism __.  
   Prism D Volume = ____________  
   Prism __ Volume = ____________

4. Prism E has $\frac{1}{3}$ the volume of prism __.  
   Prism E Volume = ____________  
   Prism __ Volume = ____________

5. The total volume of all the prisms is 1,000 cubic centimeters or less.  
   Total volume: ____________  
   Show calculations:
Lesson 8 Exit Ticket

Name ___________________________________________ Date ____________________

1. Sketch a rectangular prism that has a volume of 36 cubic cm. Label the dimensions of each side on the prism. Fill in the blanks that follow.

   Height: _______ cm

   Length: _______ cm

   Width: _______ cm

   Volume: _______ cubic cm
1. I have a prism with the dimensions of 6 cm by 12 cm by 15 cm. Calculate the volume of the prism, then give the dimensions of three different prisms that have \( \frac{1}{3} \) of the volume.

<table>
<thead>
<tr>
<th></th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Original Prism</strong></td>
<td>6 cm</td>
<td>12 cm</td>
<td>15 cm</td>
<td></td>
</tr>
<tr>
<td><strong>Prism 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prism 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prism 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Sunni’s bedroom has the dimensions of 11 ft by 10 ft by 10 ft. Her den has the same height, but double the volume. Give two sets of the possible dimensions of the den and the volume of the den.
Project Requirements

1. Each project must include 5 to 7 rectangular prisms.
2. All prisms must be labeled with a letter (beginning with A), dimensions, and volume.
3. Prism D must be \( \frac{1}{2} \) the volume of another prism.
4. Prism E must be \( \frac{1}{3} \) the volume of another prism.
5. The total volume of all of the prisms must be 1,000 cubic centimeters or less.
Note: Be sure to set printer to Actual Size before printing.
Lesson 8:
Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.

Date: 1/10/14
Lesson 8: Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.

Date: 1/10/14

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Lid patterns

Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.

Date: 1/10/14
Lesson 8: Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.

Date: 1/10/14

### Lesson 8 Evaluation Rubric

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completeness of Personal Project and Classmate Evaluation</td>
<td>All components of the project are present and correct, and a detailed evaluation of a classmate’s project has been completed.</td>
<td>Project is missing 1 component, and a detailed evaluation of a classmate’s project has been completed.</td>
<td>Project is missing 2 components, and an evaluation of a classmate’s project has been completed.</td>
<td>Project is missing 3 or more components, and an evaluation of a classmate’s project has been completed.</td>
<td>(× 4)</td>
</tr>
<tr>
<td></td>
<td>____/16</td>
<td>____/16</td>
<td>____/16</td>
<td>____/16</td>
<td></td>
</tr>
<tr>
<td>Accuracy of Calculations</td>
<td>Volume calculations for all prisms are correct.</td>
<td>Volume calculations include 1 error.</td>
<td>Volume calculations include 2–3 errors.</td>
<td>Volume calculations include 4 or more errors.</td>
<td>(× 5)</td>
</tr>
<tr>
<td></td>
<td>____/20</td>
<td>____/20</td>
<td>____/20</td>
<td>____/20</td>
<td></td>
</tr>
<tr>
<td>Neatness and Use of Color</td>
<td>All elements of the project are carefully and colorfully constructed.</td>
<td>Some elements of the project are carefully and colorfully constructed.</td>
<td></td>
<td></td>
<td>(× 2)</td>
</tr>
<tr>
<td></td>
<td>____/4</td>
<td>____/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL:</td>
<td>____/40</td>
<td>____/40</td>
<td>____/40</td>
<td>____/40</td>
<td></td>
</tr>
</tbody>
</table>

© 2014 Common Core, Inc. Some rights reserved. commonscore.org
Lesson 9: Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.

I reviewed project number _________________.

Use the rubric below to evaluate your friend’s project. Ask questions and measure the parts to determine whether he or she has all the required elements. Respond to the prompt in italics in the third column. The final column can be used to write something you find interesting about that element if you like.

Space is provided beneath the rubric for your calculations.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Element present? (✓)</th>
<th>Specifics of Element</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sculpture has 5 to 7 prisms.</td>
<td></td>
<td># of prisms:</td>
<td></td>
</tr>
<tr>
<td>2 All prisms are labeled with a letter.</td>
<td></td>
<td>Write letters used:</td>
<td></td>
</tr>
<tr>
<td>3 All prisms have correct dimensions with units written on the top.</td>
<td></td>
<td>List any prisms with incorrect dimensions or units:</td>
<td></td>
</tr>
<tr>
<td>4 All prisms have correct volume with units written on top.</td>
<td></td>
<td>List any prism with incorrect dimensions or units:</td>
<td></td>
</tr>
<tr>
<td>5 Prism D has ( \frac{1}{2} ) the volume of another prism.</td>
<td></td>
<td>Record on next page:</td>
<td></td>
</tr>
<tr>
<td>6 Prism E has ( \frac{1}{3} ) the volume of another prism.</td>
<td></td>
<td>Record on next page:</td>
<td></td>
</tr>
<tr>
<td>7 The total volume of all the parts together is 1,000 cubic units or less.</td>
<td></td>
<td>Total volume:</td>
<td></td>
</tr>
</tbody>
</table>

Calculations:
8. Measure the dimensions of each prism. Calculate the volume of each prism and the total volume. Record that information in the table below. If your measurements or volume differ from those listed on the project, put a star by the prism label in the table below and record on the rubric.

<table>
<thead>
<tr>
<th>Prism</th>
<th>Dimensions</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>by by</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>by by</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>by by</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>by by</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>by by</td>
<td></td>
</tr>
</tbody>
</table>

9. Prism D’s volume is \( \frac{1}{2} \) that of Prism _____.
   Show calculations below.

10. Prism E’s volume is \( \frac{1}{3} \) that of Prism _____.
    Show calculations below.

11. Total volume of sculpture: __________.
    Show calculations below.
1. A student designed this sculpture. Using the dimensions on the sculpture find the dimensions of each rectangular prism. Then, calculate the volume of prism.

   a. Rectangular Prism Y

   Height: __________ inches
   Length: __________ inches
   Width: __________ inches
   Volume: __________ cubic inches

   b. Rectangular Prism Z

   Height: __________ inches
   Length: __________ inches
   Width: __________ inches
   Volume: __________ cubic inches

   c. Find the total volume of the sculpture. Label the answer.
Lesson 9 Homework

NYS COMMON CORE MATHEMATICS CURRICULUM

Lesson 9: Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.

Date: 1/10/14

Name ___________________________________________  Date _________________________

1. Find three rectangular prisms around your house. Describe the item you are measuring (cereal box, tissue box, etc.), then measure each dimension to the nearest whole inch and calculate the volume.
   a. Rectangular Prism A
      Item:  
      Height: ___________ inches
      Length: ___________ inches
      Width: ___________ inches
      Volume: ___________ cubic inches
   
   b. Rectangular Prism B
      Item:  
      Height: ___________ inches
      Length: ___________ inches
      Width: ___________ inches
      Volume: ___________ cubic inches
   
   c. Rectangular Prism C
      Item:  
      Height: ___________ inches
      Length: ___________ inches
      Width: ___________ inches
      Volume: ___________ cubic inches
Lesson 9: Apply concepts and formulas of volume to design a sculpture using rectangular prisms within given parameters.

Date: 1/10/14

Name ______________________________ Date __________________

### Evaluation Rubric

#### CATEGORY

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Completeness</strong>&lt;br&gt;of Personal Project and Classmate Evaluation</td>
<td>All components of the project are present and correct, and a detailed evaluation of a classmate’s project has been completed.</td>
<td>Project is missing 1 component, and a detailed evaluation of a classmate’s project has been completed.</td>
<td>Project is missing 2 components, and an evaluation of a classmate’s project has been completed.</td>
<td>Project is missing 3 or more components, and an evaluation of a classmate’s project has been completed.</td>
<td>(× 4) ____/16</td>
</tr>
<tr>
<td><strong>Accuracy of Calculations</strong></td>
<td>Volume calculations for all prisms are correct.</td>
<td>Volume calculations include 1 error.</td>
<td>Volume calculations include 2–3 errors.</td>
<td>Volume calculations include 4 or more errors.</td>
<td>(× 5) ____/20</td>
</tr>
<tr>
<td><strong>Neatness and Use of Color</strong></td>
<td>All elements of the project are carefully and colorfully constructed.</td>
<td>Some elements of the project are carefully and colorfully constructed.</td>
<td>(× 2) ____/4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL:** ____/40
Lesson 10 Problem Set

Name _____________________________ Date ______________

Sketch the rectangles and your tiling. Write the dimensions and the units you counted in the blanks. Then use multiplication to confirm the area. Show your work. We will do Rectangles A and B together.

1. Rectangle A:
   Rectangle A is
   ________ units long  ________ units wide
   Area = ________ units²

2. Rectangle B:
   Rectangle B is
   ________ units long  ________ units wide
   Area = ________ units²

3. Rectangle C:
   Rectangle C is
   ________ units long  ________ units wide
   Area = ________ units²

4. Rectangle D:
   Rectangle D is
   ________ units long  ________ units wide
   Area = ________ units²

5. Rectangle E:
   Rectangle E is
   ________ units long  ________ units wide
   Area = ________ units²

© 2014 Common Core, Inc. Some rights reserved. commoncore.org
This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
6. The rectangle to the right is composed of squares that measure $2\frac{1}{4}$ inches on each side. What is its area in square inches? Explain your thinking using pictures and numbers.

7. A rectangle has a perimeter of $35\frac{1}{2}$ feet. If the width is 12 ft, what is the area of the rectangle?
Emma's Rectangle:

_______ units long _______ units wide

Area = ________ units$^2$
1. John tiled some rectangles using square unit. Sketch the rectangles if necessary, fill in the missing information, and then confirm the area by multiplying.

a. **Rectangle A:**

Rectangle A is

$\text{3}\text{ units long }\text{2}\frac{1}{2}\text{ units wide}$

Area = $\text{________ units}^2$

b. **Rectangle B:**

Rectangle B is

$\text{_______ units long }\text{_______ units wide}$

Area = $\text{________ units}^2$

c. **Rectangle C:**

Rectangle C is

$\text{$\frac{3}{4}$ units long }\text{4 units wide}$

Area = $\text{________ units}^2$
d. **Rectangle D:**

Rectangle D is

\[ \frac{2}{\text{units long}} \quad \frac{3}{4} \text{ units wide} \]

Area = \[ \text{units}^2 \]

2. Rachel made a mosaic from different color rectangular tiles. Three tiles measured \(3 \frac{1}{2}\) inches \(\times\) 3 inches. Six tiles measured 4 inches \(\times\) \(3 \frac{1}{4}\) inches. What is the area of the whole mosaic in square inches?

3. A garden box has a perimeter of \(27 \frac{1}{2}\) feet. If the length is 9 feet, what is the area of the garden box?
Lesson 11:
Find the area of rectangles with mixed-by-mixed and fraction-by-fraction side lengths by tiling, record by drawing, and relate to fraction multiplication.

Date: 1/10/14

© 2014 Common Core, Inc. Some rights reserved. commoncore.org
This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.

Problem Set

NYS COMMON CORE MATHEMATICS CURRICULUM
5•5

Name ________________________________ Date __________________

Draw the rectangle and your tiling.
Write the dimensions and the units you counted in the blanks.
Then, use multiplication to confirm the area. Show your work.

1. Rectangle A: ________________________________

   Rectangle A is
   _______ units long   _______ units wide
   Area = _________ units²

2. Rectangle B: ________________________________

   Rectangle B is
   _______ units long   _______ units wide
   Area = _________ units²

3. Rectangle C: ________________________________

   Rectangle C is
   _______ units long   _______ units wide
   Area = _________ units²

4. Rectangle D: ________________________________

   Rectangle D is
   _______ units long   _______ units wide
   Area = _________ units²
5. Colleen and Caroline each built a rectangle out of square tiles placed in 3 rows of 5. Colleen used tiles that measured $1\frac{2}{3}$ cm squares. Caroline used tiles that measured $3\frac{1}{3}$ cm.
   a. Draw the girls’ rectangles, and label the lengths and widths of each.
   b. What are the areas of the rectangles in square centimeters?
   c. Compare the area of the rectangles.

6. A square has a perimeter of 51 inches. What is the area of the square?
1. To find the area, Andrea tiled a rectangle and sketched her answer. Sketch the rectangle, and find the area. Show your multiplication work.

Rectangle is

\[2 \frac{1}{2} \text{ units} \times 2 \frac{1}{2} \text{ units}\]

Area = _____________
1. Kristen tiled the following rectangles using square units. Sketch the rectangles, and find the areas. Then confirm the area by multiplying. Rectangle A has been sketched for you.

a. Rectangle A:

Rectangle A is

_______ units long × _______ units wide

Area = _________ units²

b. Rectangle B:

Rectangle B is

\(2\frac{1}{2}\) units long × \(\frac{3}{4}\) unit wide

Area = _________ units²

c. Rectangle C:

Rectangle C is

\(3\frac{1}{3}\) units long × \(2\frac{1}{2}\) units wide

Area = _________ units²
Lesson 11 Homework

2. A square has a perimeter of 25 inches. What is the area of the square?

Rectangle D:

Rectangle D is $3\frac{1}{2}$ units long $\times 2\frac{1}{4}$ units wide

Area = __________ units$^2$
Lesson 12

Objective: Measure to find the area of rectangles with fractional side lengths.

Suggested Lesson Structure

- Fluency Practice (10 minutes)
- Application Problem (3 minutes)
- Concept Development (37 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)

Fluency Practice (10 minutes)

- Multiplying Fractions 5.NF.4 (4 minutes)
- Find the Volume 5.MD.C (6 minutes)

Multiplying Fractions (4 minutes)

Materials: (S) Personal white boards

Note: This fluency prepares students for G5–M5–Lesson 13.

T: (Write $\frac{1}{3} \times \frac{1}{4}$.) Say the multiplication number sentence.

S: $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$.

T: (Write $\frac{1}{3} \times \frac{2}{5}$.) Say the multiplication number sentence.

S: $\frac{1}{3} \times \frac{2}{5} = \frac{2}{15}$.

T: (Write $\frac{3}{5} \times \frac{2}{3}$.) Beneath it, write = __.) On your boards, write the multiplication number sentence. Then, simplify the fraction.

S: $\frac{3}{5} \times \frac{2}{3} = \frac{6}{15}$ Beneath it, write $= \frac{2}{5}$.

Continue the process for the following possible sequence: $\frac{1}{2} \times \frac{1}{4}, \frac{1}{2} \times \frac{1}{4}, \frac{3}{4} \times \frac{2}{3}, \frac{5}{6} \times \frac{2}{3}$, and $\frac{3}{4} \times \frac{7}{8}$.
Lesson 12 Problem Set

Name _______________________________ Date _________________

1. Measure each rectangle with your ruler, and label the dimensions. Use the area model to find each area.

   a. 

   b. 

   c. 

   d. 

---------------------------------------------

Measure to find the area of rectangles with fractional side lengths.
2. Find the area. Explain your thinking using the area model.

   a. $1 \text{ ft} \times 1 \frac{1}{2} \text{ ft}$
   
   b. $1 \frac{1}{2} \text{ yd} \times 1 \frac{1}{2} \text{ yd}$

   c. $2 \frac{1}{2} \text{ yd} \times 1 \frac{3}{16} \text{ yd}$
3. Hanley is putting carpet in her house. She wants to carpet her living room, which measures 15 ft × $12\frac{1}{3}$ ft. She also wants to carpet her dining room, which is $10\frac{1}{4}$ ft × $10\frac{1}{3}$ ft. How many square feet of carpet will she need to cover both rooms?

4. Fred cut a $9\frac{3}{4}$ inch square of construction paper for an art project. He cut a square from the edge of the big rectangle whose sides measured $3\frac{1}{4}$ inches. (See picture below.)

   a. What is the area of the smaller square that Fred cut out?

   b. What is the area of the remaining paper?
Lesson 12 Exit Ticket

Name __________________________________________ Date _________________

Measure the rectangle with your ruler, and label the dimensions. Find the area.

1. 

---

Measure to find the area of rectangles with fractional side lengths.

1/10/14

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Name ___________________________ Date ________________

1. Measure each rectangle with your ruler, and label the dimensions. Use the area model to find the area.

   a. 

   b. 

   c. 

   d. 

   e. 

---

Lesson 12: Measure to find the area of rectangles with fractional side lengths. 

Date: 1/10/14
2. Find the area. Explain your thinking using the area model.

   a. \( \frac{3}{4} \text{yd} \times \frac{1}{4} \text{yd} \)  
   b. \( \frac{3}{2} \text{ft} \times \frac{1}{4} \text{ft} \)

3. Kelly buys a tarp to cover the area under her tent. The tent is 4 feet wide and has an area of 31 square feet. The tarp she bought is \( 5\frac{1}{3} \) feet by \( 5\frac{3}{4} \) feet. Can the tarp cover the area under Kelly’s tent? Draw a model to show your thinking.

4. Shannon and Leslie want to carpet a \( 16\frac{1}{2} \) ft by \( 16\frac{1}{2} \) ft square room. They can’t put carpet under an entertainment system that juts out. (See the drawing below.)

   a. In square feet, what is the area of the space with no carpet?

   b. How many square feet of carpet will Shannon and Leslie need to buy?
Name ____________________________ Date __________________

1. Find the area of the following rectangles. Draw an area model if it helps you.

   a. \( \frac{5}{4} \text{ km} \times \frac{12}{5} \text{ km} \)
   
   b. \( 16 \frac{1}{2} \text{ m} \times 4 \frac{1}{5} \text{ m} \)

   c. \( 4 \frac{1}{3} \text{ yd} \times 5 \frac{2}{3} \text{ yd} \)
   
   d. \( \frac{7}{8} \text{ mi} \times 4 \frac{1}{3} \text{ mi} \)

2. Julie is cutting rectangles out of fabric to make a quilt. If the rectangles are \( 2 \frac{2}{5} \) inches wide and \( 3 \frac{2}{3} \) inches long, what is the area of four such rectangles?
3. Mr. Howard’s pool is connected to his pool house by a sidewalk as shown. He wants to buy sod for the lawn, shown in grey. How much sod does he need to buy?
Lesson 13 Exit Ticket

Find the area. Draw an area model if it helps you.

1. \( \frac{7}{2} \text{ mm} \times \frac{14}{5} \text{ mm} \)
2. \( 5\frac{7}{8} \text{ km} \times 1\frac{3}{4} \text{ km} \)
1. Find the area of the following rectangles. Draw an area model if it helps you.

   a. \( \frac{8}{3} \text{ cm} \times \frac{24}{4} \text{ cm} \)  
   b. \( \frac{32}{5} \text{ ft} \times \frac{3}{8} \text{ ft} \)  
   c. \( \frac{5}{6} \text{ in} \times \frac{4}{5} \text{ in} \)  
   d. \( \frac{5}{7} \text{ m} \times \frac{6}{5} \text{ m} \)

2. Chris is making a table top from some leftover tiles. He has 9 tiles that measure \( 3 \frac{1}{8} \) inches long and \( 2 \frac{3}{4} \) inches wide. What is the area he can cover with these tiles?
3. A hotel is recarpeting a section of the lobby. Carpet covers the part of the floor as shown below in grey. How many square feet of carpeting will be needed?
Lesson 14 Problem Set

Name ___________________________ Date __________________

1. George decided to paint a wall with two windows. Both windows are $3\frac{1}{2}$ ft by $4\frac{1}{2}$ ft rectangles. Find the area the paint needs to cover.

![Diagram of windows](image)

2. Joe uses square tiles, some of which he cuts in half, to make the figure below. If each square tile has a side length of $2\frac{1}{2}$ inches, what is total area of the figure?

![Diagram of tiles](image)

3. All-In-One Carpets is installing carpeting in three rooms. How many square feet of carpet are needed to carpet all three?

![Diagram of rooms](image)
4. Mr. Johnson needs to buy sod for his front lawn.
   a. If the lawn measures $36\frac{2}{3}$ ft by $45\frac{1}{6}$ ft, how many square feet of sod will he need?
   b. If sod is only sold in whole square feet, how much will Mr. Johnson have to pay?

<table>
<thead>
<tr>
<th>Sod Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area</strong></td>
</tr>
<tr>
<td>First 1,000 sq ft</td>
</tr>
<tr>
<td>Next 500 sq ft</td>
</tr>
<tr>
<td>Additional square feet</td>
</tr>
</tbody>
</table>

5. Jennifer’s class decides to make a quilt. Each of the 24 students will make a quilt square that is 8 inches on each side. When they sew the quilt together, every edge of each quilt square will lose $\frac{3}{4}$ inch.
   a. Draw one way the squares could be arranged to make a rectangular quilt. Then find the perimeter of your arrangement.
   b. Find the area of the quilt.
1. Mr. Klimk made his wife a rectangular vegetable garden. The width is \( 5\frac{3}{4} \) ft and the length is \( 9\frac{4}{5} \) ft. What is the area of the garden?
1. Mr. Albano wants to paint menus on the wall of his café in chalkboard paint. The grey area below shows where the rectangular menus will be. Each menu will measure 6 feet wide and $7\frac{1}{2}$ ft long.

   a. How many square feet of menu space will Mr. Albano have?

   b. What is the area of wall space that is not covered by chalkboard paint?

2. Mr. Albano wants to put tiles in the shape of a dinosaur at the front entrance. He will need to cut some tiles in half to make the figure. If each square tile is $4\frac{1}{4}$ inches on each side, what will the total area of the figure be?
3. A-Plus Glass is making windows for a new house that is being built. The box shows the list of sizes they must make.
   
   a. How many square feet of glass will they need?

   
   b. Each sheet of glass they use to make the windows is 9 feet long and $\frac{1}{2}$ feet wide. How many sheets will they need in order to make the windows?

4. Mr. Johnson needs to buy seed for his backyard lawn.
   
   a. If the lawn measures $\frac{4}{5}$ ft by $\frac{2}{8}$ ft, how many square feet of seed will he need?

   
   b. One bag of seed will cover 500 square feet if he sets his seed spreader to its lowest setting and 300 square feet if he sets the spreader to its highest setting. How many bags of seed will he need if he uses the highest setting? The lowest setting?
1. The length of a flower bed is 4 times as long as its width. If the width is \(\frac{3}{8}\) meter, what is the area?

2. Mrs. Johnson’s grows herbs in square plots. Her basil plot measures \(\frac{5}{8}\) yd on each side.
   a. Find the total area of the basil plot.
   b. Mrs. Johnson puts a fence around the basil. If the fence is 2 ft from the edge of the garden on each side, what is the perimeter of the fence?
c. What is the total area that the fence encloses?

3. Janet bought 5 yards of fabric $2 \frac{1}{4}$ feet wide to make curtains. She used $\frac{1}{3}$ of the fabric to make a long set of curtains and the rest to make 4 short sets.

a. Find the area of the fabric she used for the long set of curtains.

b. Find the area of the fabric she used for each of the short sets.
Lesson 15: Solve real world problems involving area of figures with fractional side lengths using visual models and/or equations.

Date: 1/10/14

Lesson 15 Problem Set 5•5

4. Some wire is used to make 3 rectangles: A, B, and C. Rectangle B’s dimensions are $\frac{3}{5}$ cm larger than Rectangle A’s dimensions, and Rectangle C’s dimensions are $\frac{3}{5}$ cm larger than Rectangle B’s dimensions. Rectangle A is 2 cm by $3 \frac{1}{5}$ cm.

a. What is the total area of all three rectangles?

b. If a 40-cm coil of wire was used to form the rectangles, how much wire is left?
Wheat grass is grown in planters that are $3\frac{1}{2}$ inch by $1\frac{3}{4}$ inch. If there is a $6 \times 6$ array of these planters with no space between them, what is the area of the array?
1. The width of a picnic table is 3 times its length. If the length is $\frac{5}{6}$ yd long, what is the area in square feet?

2. A painting company will paint this wall. The homeowner gives them the following dimensions:

   - Window A is $6\frac{1}{4}$ ft $\times$ $5\frac{3}{4}$ ft
   - Window B is $3\frac{1}{8}$ ft $\times$ 4 ft
   - Window C is $9\frac{1}{2}$ ft square
   - Door D is 8 ft $\times$ 4 ft

What is the area of the painted part of the wall?
3. A decorative wooden piece is made up of four rectangles as shown to the right. The smallest rectangle measures $4 \frac{1}{2}$ inches by $7 \frac{3}{4}$ inches. If $2 \frac{1}{4}$ inches is added to each dimension as the rectangles get larger, what is the total area of the entire piece?
Lesson 16 Problem Set

The image contains a problem set with the title "Lesson 16: Draw trapezoids to clarify their attributes, and define trapezoids based on those attributes." The task is to draw a pair of parallel lines in each box and then use the parallel lines to draw a trapezoid with the following attributes.

1. **Draw a pair of parallel lines in each box.** Then use the parallel lines to draw a trapezoid with the following:

   - No right angles.
   - Only 1 obtuse angle.
   - 2 obtuse angles.
   - At least 1 right angle.

2. **Use the trapezoids you drew to complete the tasks below.**
   - **a.** Measure the angles of the trapezoid with your protractor, and record the measurements on the figures.
   - **b.** Use a marker or crayon to circle pairs of angles inside each trapezoid with a sum equal to 180°. Use a different color for each pair.

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
3. List the properties that are shared by all the trapezoids that you worked with today.

4. When can a quadrilateral also be called a trapezoid?

5. Follow the directions to draw one last trapezoid.
   a. Draw a segment $\overline{AB}$ parallel to the bottom of this page that is 5 cm long.
   b. Draw two 55° angles with vertices at $A$ and $B$ so that an isosceles triangle is formed with $\overline{AB}$ as the base of the triangle.
   c. Label the top vertex of your triangle as $C$.
   d. Use your set square to draw a line parallel to $\overline{AB}$ that intersects both $\overline{AC}$ and $\overline{BC}$.
   e. Shade the trapezoid that you drew.
Lesson 16 Exit Ticket

1. Use a ruler and a set square to draw a trapezoid.

2. What attribute must be present for a quadrilateral to also be a trapezoid?
1. Use a straightedge and the grid paper to draw:
   a. A trapezoid with exactly 2 right angles.
   b. A trapezoid with no right angles.

2. Kaplan incorrectly sorted some quadrilaterals into trapezoids and non-trapezoids as pictured below.
   a. Circle the shapes that are in the wrong group and tell why they are missorted.

   b. Explain what tools would be necessary to use to verify the placement of all the trapezoids.
3. Use a straightedge to draw an isosceles trapezoid on the grid paper.

a. Why is this shape called an isosceles trapezoid?
Lesson 16: Draw trapezoids to clarify their attributes, and define trapezoids based on those attributes.

Date: 1/10/14
Lesson 16: Draw trapezoids to clarify their attributes, and define trapezoids based on those attributes.  
Date: 1/10/14
Lesson 16:
Draw trapezoids to clarify their attributes, and define trapezoids based on those attributes.

Date: 1/10/14
1. Draw a parallelogram in each box with the attributes listed.

<table>
<thead>
<tr>
<th>No right angles.</th>
<th>At least 2 right angles.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal sides with no right angles.</td>
<td>All sides equal with at least 2 right angles.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Use the parallelograms you drew to complete the tasks below.
   a. Measure the angles of the parallelogram with your protractor, and record the measurements on the figures.
   b. Use a marker or crayon to circle pairs of angles inside each parallelogram with a sum equal to 180°. Use a different color for each pair.

3. Draw another parallelogram below.
   a. Draw the diagonals and measure their length. Record the measurements to the side of your figure.
   b. Measure the length of each of four segments of the diagonals from the vertices to the point of intersection of the diagonals. Color segments that have the same length the same color. What do you notice?

4. List the properties that are shared by all of the parallelograms that you worked with today.
   a. When can a quadrilateral also be called a parallelogram?
   b. When can a trapezoid also be called a parallelogram?
1. Draw a parallelogram.

2. When is a trapezoid also called a parallelogram?
1. $\angle A$ measures 60°. Extend the rays of $\angle A$ and draw parallelogram $ABCD$ on the grid paper.
   
   a. What are the measures of $\angle B$, $\angle C$, and $\angle D$?

   ![Diagram of parallelogram with angles and grid]

2. $WXYZ$ is a parallelogram not drawn to scale.
   
   a. Using what you know about parallelograms, give the measure of sides $XY$ and $YZ$.

   ![Diagram of parallelogram with labeled sides]

   b. $\angle WXY = 113^\circ$. Use what you know about angles in a parallelogram to find the measure of the other angles.

   $\angle XYZ = \_____^\circ$  $\angle YZW = \_____^\circ$  $\angle ZWX = \_____^\circ$

3. Jack measured some segments in Problem 2. He found that $WY = 4$ cm and $MZ = 3$ cm.

   Give the lengths of the following segments:

   $WM = \_____$ cm  $MY = \_____$ cm

   $XM = \_____$ cm  $XZ = \_____$ cm
4. Using the properties of the shapes, explain why all parallelograms are trapezoids.

5. Teresa says that because the diagonals of a parallelogram bisect each other, if one diagonal is 4.2 cm, the other diagonal must be half that length. Use words and pictures to explain Teresa’s error.
Lesson 17:

Draw parallelograms to clarify their attributes, and define parallelograms based on those attributes.

Date: 1/10/14
Lesson 17: Draw parallelograms to clarify their attributes, and define parallelograms based on those attributes.

Date: 1/10/14

5. D. 31

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Lesson 18: Draw rectangles and rhombuses to clarify their attributes, and define rectangles and rhombuses based on those attributes.

Name ___________________________ Date ______________

1. Draw the figures in each box with the attributes listed.

<table>
<thead>
<tr>
<th>Rhombus with no right angles.</th>
<th>Rectangle with not all sides equal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhombus with 1 right angle.</td>
<td>Rectangle with all sides equal.</td>
</tr>
</tbody>
</table>

2. Use the figures you drew to complete the tasks below.
   a. Measure the angles of the figures with your protractor and record the measurements on the figures.
   b. Use a marker or crayon to circle pairs of angles inside each figure with a sum equal to 180°. Use a different color for each pair.
3. Draw a rhombus and a rectangle below.

   a. Draw the diagonals and measure their length. Record the measurements on the figure.
   
   b. Measure the length of each segment of the diagonals from the vertex to the intersection point of the diagonals. Using a marker or crayon, color segments that have the same length. Use a different color for each different length.

4. a. List the properties that are shared by all of the rhombuses that you worked with today.

   b. List the properties that are shared by all of the rectangles that you worked with today.

   c. When can a trapezoid also be called a rhombus?

   d. When can a parallelogram also be called a rectangle?

   e. When can a quadrilateral also be called a rhombus?
Name ____________________________ Date ______________

1. Draw a rhombus.

2. Draw a rectangle.
1. Use the grid paper to draw.
   
a. A rhombus with no right angles.

![Rhombus with no right angles](image)

b. A rhombus with 4 right angles.

![Rhombus with 4 right angles](image)

c. A rectangle with not all sides equal.

![Rectangle with not all sides equal](image)

d. A rectangle with all sides equal.

![Rectangle with all sides equal](image)
2. A rhombus has a perimeter of 217 cm. What is the length of each side of the rhombus?

3. List the properties that all rhombuses share.

4. List the properties that all rectangles share.
Lesson 18:

Draw rectangles and rhombuses to clarify their attributes, and define rectangles and rhombuses based on those attributes.

Date:

1/10/14
Lesson 18: Draw rectangles and rhombuses to clarify their attributes, and define rectangles and rhombuses based on those attributes.

Date: 1/10/14

© 2014 Common Core, Inc. Some rights reserved. commoncore.org

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.
Lesson 19: Draw kites and squares to clarify their attributes, and define kites and squares based on those attributes.

1. Draw the figures in each box with the attributes listed. If your figure has more than one name, write it in the box.

   - Rhombus with 2 right angles.
   - Kite with all sides equal.
   - Kite with 4 right angles.
   - Kite with 2 pairs of adjacent sides equal. (The pairs are not equal to each other.)

2. Use the figures you drew to complete the tasks below.
   a. Measure the angles of the figures with your protractor, and record the measurements on the figures.
   b. Use a marker or crayon to circle pairs of angles inside each figure with a sum equal to 180°. Use a different color for each pair.
3.
   a. List the properties shared by all of the squares that you worked with today.

   b. List the properties shared by all of the kites that you worked with today.

   c. When can a rhombus also be called a square?

   d. When can a kite also be called a square?

   e. When can a trapezoid also be called a kite?
1. List the property that must be present to call a rectangle a square.

2. Excluding rhombuses and squares, explain the difference between parallelograms and kites.
Lesson 19 Homework

Name _____________________________ Date ________________

1. 
   a. Draw a kite that is not a parallelogram on the grid paper.

   b. List all the properties of a kite.

   c. When can a parallelogram also be a kite?

2. If rectangles must have right angles, explain how a rhombus could also be called a rectangle.

3. Draw a rhombus that is also a rectangle on the grid paper.
4. Kirkland says that figure $EFGH$ below is a quadrilateral because it has four points in the same plane and four segments with no three endpoints collinear. Explain his error.
Draw kites and squares to clarify their attributes, and define kites and squares based on those attributes.

Date: 1/10/14
Lesson 19:

Draw kites and squares to clarify their attributes, and define kites and squares based on those attributes.

Date: 1/10/14
Name ____________________________          Date __________________

1. True or false. If the statement is false, rewrite it to make it true.

<table>
<thead>
<tr>
<th></th>
<th>T</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. All trapezoids are quadrilaterals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. All parallelograms are rhombuses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. All squares are trapezoids.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. All rectangles are squares.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Rectangles are always parallelograms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. All parallelograms are trapezoids.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. All rhombuses are rectangles.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Kites are never rhombuses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. All squares are kites.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. All kites are squares.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k. All rhombuses are squares.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Fill in the blanks.
   a. $ABCD$ is a trapezoid. Find the measurements listed below.
      $\angle A = \underline{\hspace{2cm}}^\circ$
      $\angle D = \underline{\hspace{2cm}}^\circ$
      What other names does this figure have?

   b. $RECT$ is a rectangle. Find the measurements listed below.
      $TE = \underline{\hspace{2cm}}$
      $RC = \underline{\hspace{2cm}}$
      $CT = \underline{\hspace{2cm}}$
      $\angle ERM = \underline{\hspace{2cm}}^\circ$
      $\angle CTR = \underline{\hspace{2cm}}^\circ$
      What other names does this figure have?

   c. $PARL$ is a parallelogram. Find the measurements listed below.
      $AL = \underline{\hspace{2cm}}$
      $PR = \underline{\hspace{2cm}}$
      $\angle ARL = \underline{\hspace{2cm}}^\circ$
      $\angle PAR = \underline{\hspace{2cm}}^\circ$
      $\angle RLP = \underline{\hspace{2cm}}^\circ$
      What other names does this figure have?
Name ________________________________ Date ________________

Use your tools to draw a square in the space below. Then fill in the blanks with an attribute. There is more than one answer to some of these.

a. Because a square is a kite, it must have ________________________________.

b. Because a square is a rhombus, it must have ________________________________.

c. Because a square is a rectangle, it must have ________________________________.

d. Because a square is a parallelogram, it must have ________________________________.

e. Because a square is a trapezoid, it must have ________________________________.

f. Because a square is a quadrilateral, it must have ________________________________.
1. Follow the flow chart and put the name of the figure in the boxes.

- Quadrilateral
  - 4 right angles
    - 4 sides of equal length
      - YES
      - NO
    - 2 sets of opposite angles the same size
      - YES
      - NO
    - at least 1 pair of parallel sides
      - YES
      - NO
  - NO

---

Name ___________________________  Date _________________
2. \(SQRE\) is a square with area 49 cm\(^2\) and \(RM = 4.95\) cm. Find the measurements using what you know about the properties of squares.

a. \(RS = \underline{\hspace{1cm}}\) cm
b. \(QE = \underline{\hspace{1cm}}\) cm
c. Perimeter = \(\underline{\hspace{1cm}}\) cm
d. \(m\angle QRE = \underline{\hspace{1cm}}^\circ\)
e. \(m\angle RMQ = \underline{\hspace{1cm}}^\circ\)
Lesson 20: Classify two-dimensional figures in a hierarchy based on properties.

<table>
<thead>
<tr>
<th>Quadrilaterals</th>
<th>Trapezoids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallelograms</td>
<td>Rectangles</td>
</tr>
<tr>
<td>Rhombuses</td>
<td>Kites</td>
</tr>
<tr>
<td>Squares</td>
<td>Polygons</td>
</tr>
</tbody>
</table>
Lesson 20:
Classify two-dimensional figures in a hierarchy based on properties.

Date: 1/10/14
Lesson 20: Classify two-dimensional figures in a hierarchy based on properties.

Date: 1/10/14
Lesson 21: Draw and identify varied two-dimensional figures from given attributes.

Date: 1/10/14

1. Write the number on your task card and a summary of the task in the blank. Then draw the figure in the box. Label your figure with as many names as you can. Circle the most specific name.

Task #1: ____________________________

Task #2: ____________________________

Task #3: ____________________________

Task #4: ____________________________
2. John says that because rhombuses do not have perpendicular sides, they cannot be rectangles. Explain his error in thinking.

3. Jack says that because kites don’t have parallel sides, a square is not a kite. Explain his error in thinking.
1. Use the word bank to fill in the blanks.  
   
   All ______________ are ______________, but not all ______________ are ______________.

   trapezoids parallelograms

2. Use the word bank to fill in the blanks.  
   
   All ______________ are ______________, but not all ______________ are ______________.

   kites rhombuses
1. Answer the questions by checking the box.

   Sometimes                        Always

   a. Is a square a rectangle?       
   b. Is a rectangle a kite?        
   c. Is a rectangle a parallelogram?
   d. Is a square a trapezoid?      
   e. Is a parallelogram a trapezoid? 
   f. Is a trapezoid a parallelogram? 
   g. Is a kite a parallelogram?     
   h. For each statement that you answered with “sometimes,” draw and label an example that justifies your answer.

2. Use what you know about quadrilaterals to answer each question below
   a. Explain when a trapezoid is not a parallelogram. Sketch an example.

   b. Explain when a kite is not a parallelogram. Sketch an example.
<table>
<thead>
<tr>
<th>Task 1:</th>
<th>Task 2:</th>
<th>Task 3:</th>
<th>Task 4:</th>
<th>Task 5:</th>
<th>Task 6:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draw a trapezoid with a right angle.</td>
<td>Draw a rectangle with a length that is twice its width.</td>
<td>Draw a quadrilateral with 2 pairs of equal sides and no parallel sides.</td>
<td>Draw a rhombus with right angles.</td>
<td>Draw a parallelogram with two pairs of perpendicular sides.</td>
<td>Draw a rhombus with 4 equal angles.</td>
</tr>
</tbody>
</table>

Lesson 21: Draw and identify varied two-dimensional figures from given attributes.

Date: 1/10/14
Lesson 21: Draw and identify varied two-dimensional figures from given attributes.

Date: 1/10/14

Task 7: Draw a quadrilateral with four equal sides.

Task 8: Draw a parallelogram with right angles.

Task 9: Draw a parallelogram with a side of 4 cm and a side of 6 cm.

Task 10: Draw an isosceles trapezoid.

Task 11: Draw a parallelogram with no right angles.

Task 12: Draw a rectangle that is also a rhombus.
<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.</td>
<td>Draw a kite that is also a parallelogram.</td>
</tr>
<tr>
<td>17.</td>
<td>Draw a parallelogram with a 60° angle.</td>
</tr>
<tr>
<td>18.</td>
<td>Draw a rectangle that is not a rhombus.</td>
</tr>
<tr>
<td>13.</td>
<td>Draw a quadrilateral that has at least one pair of equal opposite angles.</td>
</tr>
<tr>
<td>14.</td>
<td>Draw a quadrilateral that has only one pair of equal opposite angles.</td>
</tr>
<tr>
<td>15.</td>
<td>Draw a trapezoid with four right angles.</td>
</tr>
</tbody>
</table>
Lesson 21: Draw and identify varied two-dimensional figures from given attributes.

Date: 1/10/14

Task 19: Draw a rhombus that is not a rectangle.

Task 20: Draw a parallelogram that is not a rectangle.

Task 21: Draw a kite that is not a parallelogram.

Task 22: Draw a quadrilateral whose diagonals bisect each other at a right angle.

Task 23: Draw a trapezoid that is not a parallelogram.

Task 24: Draw a quadrilateral whose diagonals do not bisect each other.
1. Tell the volume of each solid figure made of 1-inch cubes. Specify the correct unit of measure.
   
   a. 
   b. 

2. Jack found the volume of the prism pictured to the right by multiplying $5 \times 8$ and then adding: $40 + 40 + 40 = 120$. He says the volume is 120 cubic inches.
   a. Jill says he did it wrong. He should have multiplied the bottom first ($3 \times 5$) and then multiplied by the height. Explain to Jill why Jack’s method works and is equivalent to her method.
   
   b. Use Jack’s method to find the volume of this right rectangular prism.
3. If the figure below is made of cubes with 2-cm side lengths, what is its volume? Explain your thinking.

![Cubes](image)

4. The volume of a rectangular prism is 840 in\(^3\). If the area of the base is 60 in\(^2\), find its height. Draw and label a model to show your thinking.

5. The following structure is composed of two right rectangular prisms that each measure 12 inches by 10 inches by 5 inches, and one right rectangular prism that measures 10 inches by 8 inches by 36 inches. What is the total volume of the structure? Explain your thinking.

![Structure](image)
6. a. Find the volume of the rectangular fish tank. Explain your thinking.

   ![Diagram of a rectangular fish tank with dimensions 45 cm x 20 cm x 10 cm]

   b. If the fish tank is completely filled with water, and then 900 cubic centimeters are poured out, how high will the water be? Give your answer in centimeters, and show your work.

7. Juliet wants to know if the chicken broth in this beaker will fit into this rectangular food storage container. Explain how you would figure it out without pouring the contents in. If it will fit, how much more broth could the storage container hold? If it will not fit, how much broth would be left over? (Remember 1 cm³ = 1 mL.)

   ![Diagram of a beaker and a storage container]
1. Use your ruler to draw a rectangle that measures $4\frac{1}{2}$ by $2\frac{3}{4}$ inches, and find its area.

2. Heather has a rectangular yard. She measures it and finds out it is $24\frac{1}{2}$ feet long by $12\frac{4}{5}$ feet wide.
   a. She wants to know how many square feet of sod she will need to completely cover the yard. Draw the yard and label the measurements.

   b. How much sod will Heather need to cover the yard?

   c. If each square foot of sod costs 65 cents, how much will she have to pay to cover her yard?
3. A rectangular container that has a length of 30 cm, a width of 20 cm, and a height of 24 cm is filled with water to a depth of 15 cm. When an additional 6.5 liters of water is poured into the container, some water overflows. How many liters of water overflow the container? Use words, pictures, and numbers to explain your answer. *(Remember 1 cm$^3 = 1$ mL)*

4. Jim says that a $2 \frac{1}{2}$-inch by $3 \frac{1}{4}$-inch rectangle has a section that is 2 inches × 3 inches and a section that is $\frac{1}{2}$ inch × $\frac{1}{4}$ inches. That means the total area is just the sum of these two smaller areas, or $6 \frac{1}{8}$ in$^2$. Why is Jim incorrect? Use an area model to explain your thinking. Then give the correct area of the rectangle.

5. Miguel and Jacqui built towers out of craft sticks. Miguel’s tower had a 4-inch square base. Jacqui’s tower had a 6-inch square base. If Miguel’s tower had a volume of 128 cubic inches, and Jacqui’s had a volume of 288 cubic inches, whose tower was taller? Explain your reasoning.
6. Read the statements. Circle “True” or “False.” Explain your choice for each using words and/or pictures.

a. All parallelograms are quadrilaterals. True False

b. All squares are rhombuses. True False

c. Squares are rhombuses, but not rectangles. True False

d. The opposite angles in a parallelogram have the same measure. True False

![Parallelogram](image)

e. Because the angles in a rectangle are $90^\circ$, it is not a parallelogram. True False

f. The sum of the angle measures of any trapezoid is greater than the sum of the angle measures of any parallelogram. True False

g. The following figure is a parallelogram. True False

![Parallelogram](image)
Equal Opportunity Notice
CA BOCES hereby advises students, parents, employees and the general public that it offers employment, programs and educational opportunities, including vocational education opportunities, without regard to gender, race, color, national origin, handicap or any other legally protected status. Inquiries regarding this non-discrimination policy and grievance procedures may be directed to:
Human Resources Director, Cattaraugus-Allegany BOCES, 1825 Windfall Road, Olean, NY 14760; 716-376-8237.