VOLUME UNIT

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highlighted selections are included in this sample

VOLUME
Student Handouts

This file has been organized for double-sided printing. Blank pages are left intentionally.

STANDARDS

7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

7.G.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Included in this unit you will find the following:

Unit Overview
a sample pacing calendar, ideas and tips for teaching/introducing the concepts, unit vocabulary, big ideas, vertical alignment, and common misconceptions

Student Handouts
student-friendly notes and practice problems, homework/independent practice, quizzes, unit review, and unit assessment (Note: Figures are not drawn to scale.)

Student Handouts as Google Slides
a Google Slide version of the unit (excluding assessments)

Answer Keys
an answer key for each page of the unit

Editable Unit Assessment
a PPT file of the unit test has been provided for you to make modifications

Need to get in touch? Please direct all questions to contact@maneuveringthemiddle.com.

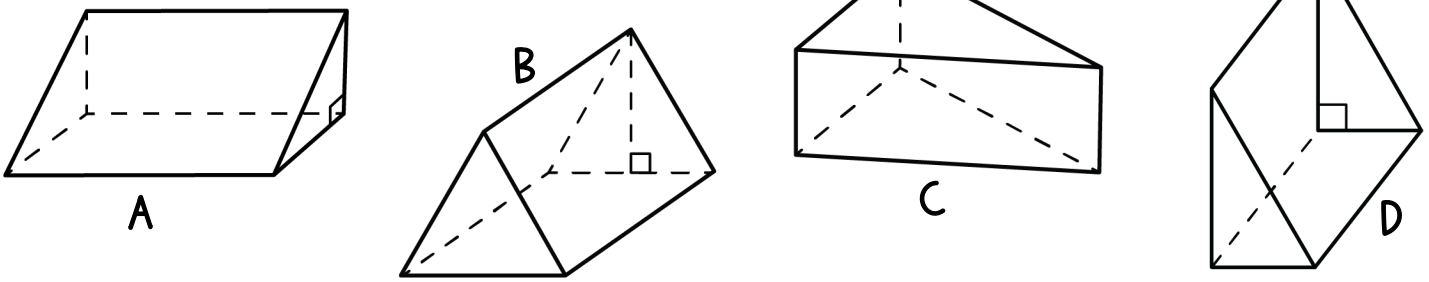
Unit: Volume
Student Handout 3

Name _____

Date _____Pd_____

VOLUME OF TRIANGULAR PRISMS

Mr. Romano states, "Prisms are always named by their base, thus a rectangular prism has a rectangular shaped base." Use this information to shade the bases of the triangular prisms below.



a. Mr. Romano's student states that only C is a triangular prism, since it is the only prism with a triangular base. Is the student correct? Explain.

b. Mr. Romano then says, "The height of the prism is the distance between the two bases." Label the height of each triangular prism above.

TRIANGULAR PRISMS

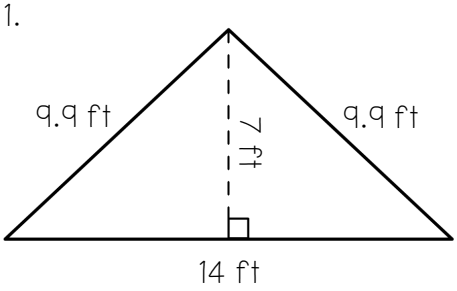
- A triangular prism uses the same formula as a rectangular prism, V=Bh.
- However, the base is a _____, so B is equal to the _____ of a triangle.

  B = _____ , _____

  h = _____
- The height of the prism is the _____ between the bases.

Find the area of the triangles below.

1.

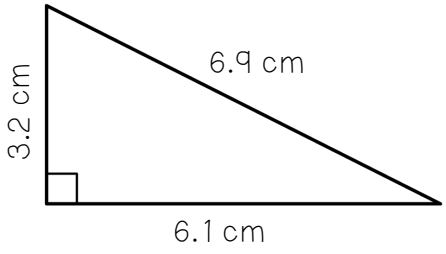


Formula: _____

Plug in Values: _____

Area: _____

2.

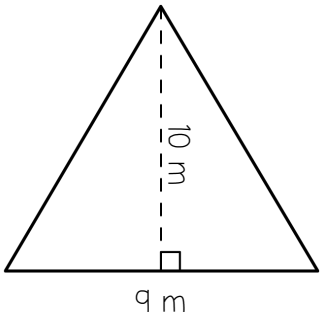


Formula: _____

Plug in Values: _____

Area: _____

3.



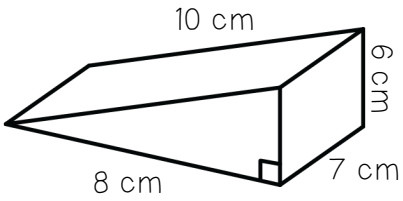
Formula: _____

Plug in Values: _____

Area: _____

Use your understanding of volume to find the volume of the triangular prisms below.

4.

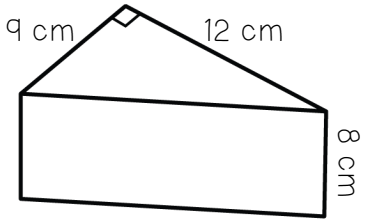


Formula: _____

Plug in Values: _____

Volume: _____

5.

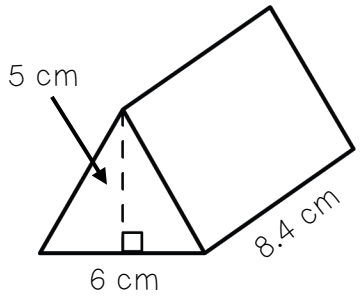


Formula: _____

Plug in Values: _____

Volume: _____

6.



Formula: _____

Plug in Values: _____

Volume: _____

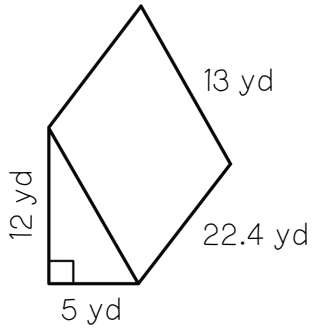
Draw a picture, set up an equation using a formula, and solve each of the problems below.

7. The base of a triangular prism has an area of 18 square inches. If the height of the prism is 9.5 inches, then what is the volume of the prism?

8. A triangular prism has a volume of 240 m^3. The area of the base is 16 m^2. What is the height of the triangular prism?

Apply your understanding of the volume of prisms to answer the question below.

9. Karolina was solving for the volume of the triangular prism below. Describe her mistake in the process and justify your reasoning.



$V = B\,h$

$V = \frac{1}{2}(5 \cdot 13)(22.4)$

$V = \frac{1}{2}(65)(22.4)$

$V = 728\ yd^3$

_____

_____

_____

_____

_____

Summarize today's lesson:

Unit: Volume
Homework 3

Name _____

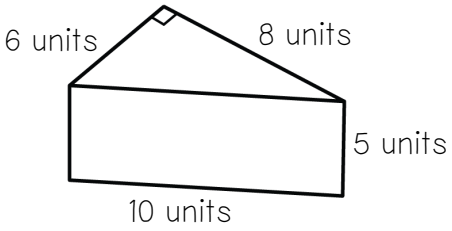
Date _____Pd_____

VOLUME OF TRIANGULAR PRISMS

Each of the cards on the left has the same solution as one of the cards on the right. Find the cards with matching solutions to complete the sentences below. Matches can include questions solving for volume, missing side lengths or the area of the base.

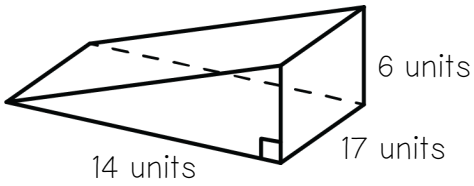
A

Determine the volume.



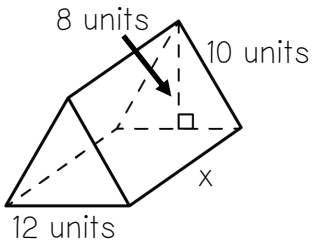
B

Calculate the volume of the prism.



C

The volume of the prism is 2,688 cubic units. What is the value of the missing side?

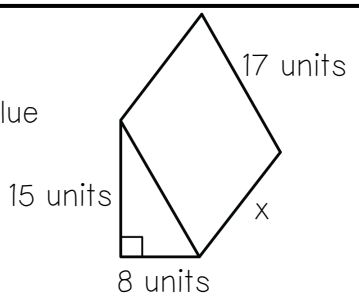


D

A triangular prism has a volume of 27.36 cubic units. The prism is 2.88 units tall. What is the area of the triangular base?

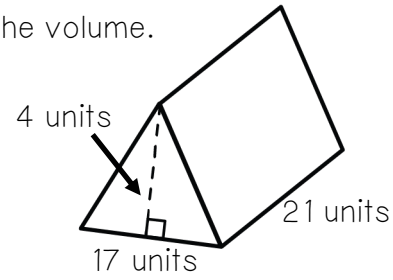
E

The volume of the prism is 3,360 cubic units. What is the value of the missing side?



F

Determine the volume.

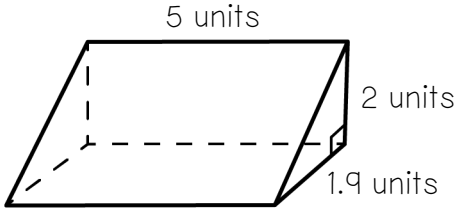


G

A gardener uses a triangular prism shaped clay pot to plant flowers. The triangular base is 3 units along the base and 5 units high. The pot has a height of 16 units. What is the volume of the pot?

H

Solve for the volume of the prism.



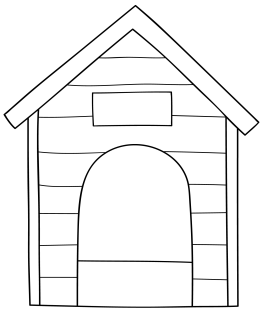
1. Card A and Card _____ have the same solution of _____.
2. Card B and Card _____ have the same solution of _____.
3. Card C and Card _____ have the same solution of _____.
4. Card D and Card _____ have the same solution of _____.

Unit: Volume
Student Handout 4

Name _____

Date _____Pd_____

3D COMPOSITE FIGURES



Ruby wants to calculate how much space her dog Otis has in his doghouse by finding the total volume of the doghouse. The shape of the doghouse is shown.

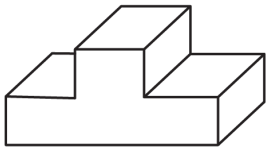
a. What two 3D figures could Ruby divide the house into to help her find the total volume?

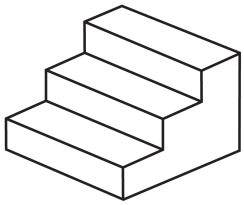
b. Describe the steps Ruby would need to take and include which formulas would help.

COMPOSITE FIGURES

- A 3D composite figure consists of _____ or more 3D shapes.
- The volume of a composite figure can be found by decomposing the object, finding the volume of its different 3D shapes and _____ or _____ the volume of each shape.

For each composite figure at the right, sketch line(s) to show how it could be decomposed into smaller 3D shapes. List the names of the 3D shapes under the figure.





1. Use the composite 3D figure below to answer a-b.

a. Name the decomposed 3D figures that could be used to find the total volume.

b. Use the table to fill in the formula, values and volume of each figure. Then, find the total volume of the figure.

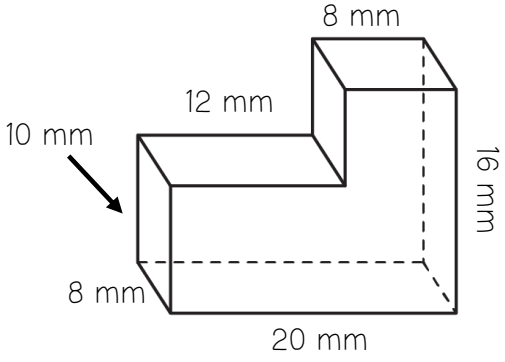


	FIGURE 1	FIGURE 2
FORMULA		
PLUG IN VALUES		
VOLUME		

Total Volume: _____

In 2-3, find the total volume of each composite figure. Record your work in each table.

2.

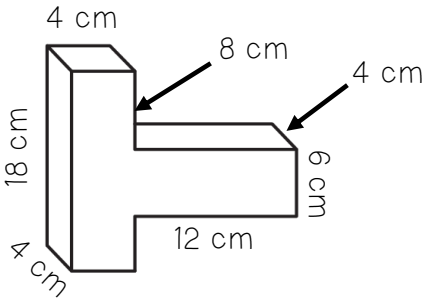


	FIGURE 1	FIGURE 2
FORMULA		
VALUES		
VOLUME		

Total Volume: _____

3.

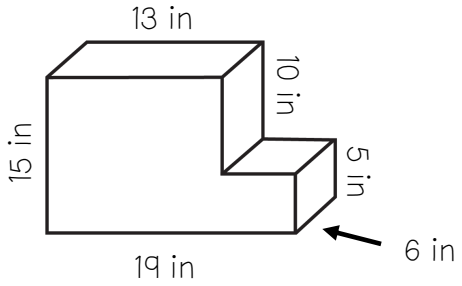
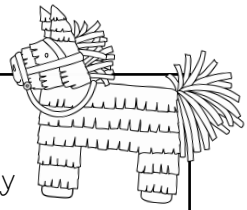


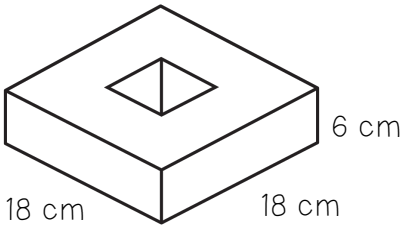
	FIGURE 1	FIGURE 2
FORMULA		
VALUES		
VOLUME		

Total Volume: _____

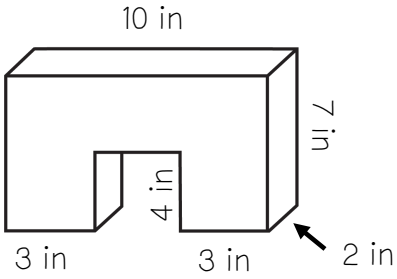
Apply your knowledge of volume of composite figures to answer 4-6.



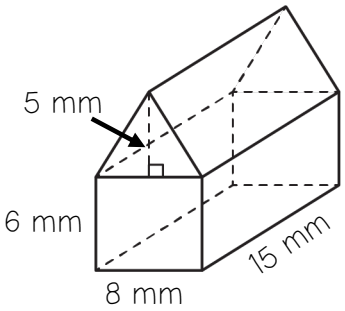
4. A prism has a cube-shaped hole in the middle of it. The cube measures 6 cm by 6 cm by 6 cm. What is the volume of the prism?



5. The portion of a pinata that holds candy has the dimensions shown below. Find the total volume of candy that the pinata will hold.



6. Loretta's work to find the total volume of the composite figure is shown. Describe Loretta's error and find the correct total volume.



RECTANGULAR PRISM	TRIANGULAR PRISM
$V = Bh$ $V = (8 \cdot 15)(6)$ $V = 720\ mm^3$	$V = Bh$ $V = (8 \cdot 5)(15)$ $V = 600\ mm^3$

TOTAL VOLUME: 1,320 mm^3

Unit: Volume
Homework 4

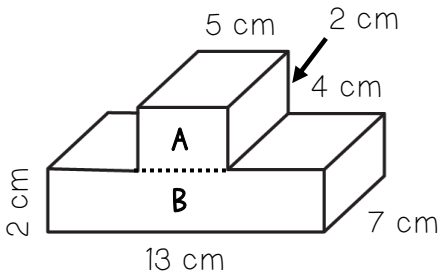
Name _____

Date _____ Pd _____

3D COMPOSITE FIGURES

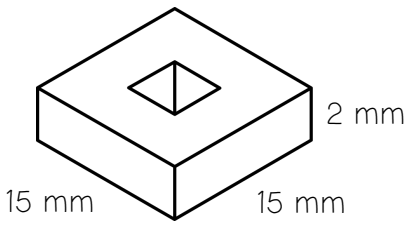
Three statements were made about the volume of the figures below. Two are true and one is false. Mark each statement as true or false and rewrite the false statement to make it true.

1 Dan found the volume of the figure by dividing it into figures A and B as shown.



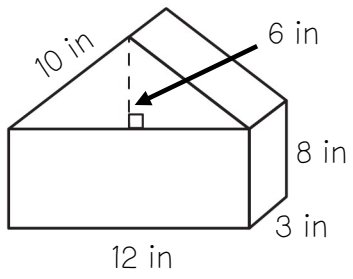
STATEMENT	T/F?
The volume of figure A can be found by multiplying $(5 \cdot 4)(2)$.	
The volume of figure B can be found by multiplying $(13 \cdot 7)(2)$.	
The total volume of the figure is 252 cm^3.	
REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:	

2 The figure shown has a cube-shaped hole in the middle of it. The cube measures 2 mm on each edge.



STATEMENT	T/F?
The figure's volume can be found by subtracting the volume of the hole from the volume of the rectangular prism.	
The volume of the cube shaped hole is 8 mm^3.	
The total volume of the figure is 458 mm^3.	
REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:	

3 Tara found the volume of the figure by dividing it into a triangular prism and a rectangular prism.



STATEMENT	T/F?
The volume of the rectangular prism is 288 in^3.	
The volume of the triangular prism is 90 in^3.	
The total volume of the figure is 396 in^3.	
REWRITE THE FALSE STATEMENT TO MAKE IT TRUE:	

Unit: Volume
Student Handout 5

Name _____

Date _____ Pd _____

VOLUME APPLICATION

Volume can be used to solve real-world problems. Consider thinking through the questions below to help you organize the information as you solve each problem.

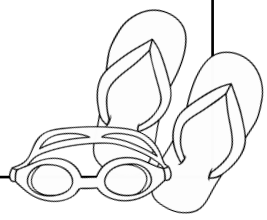
What information are you given?

What are you solving for? Volume? A missing dimension?

Does your solution make sense in the context of the problem?

1. The neighborhood swimming pool is a rectangular prism with a length of 30 feet, a width of 18 feet and a depth of 4 feet. If there are seven gallons of water in a cubic foot, how many gallons of water can the swimming pool hold?

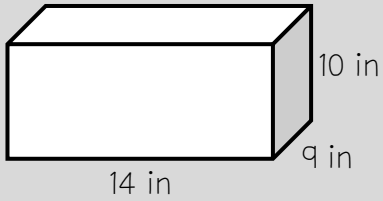
I KNOW:	I NEED TO KNOW:
PLAN AND WORK:	SOLUTION:



2. A refrigerator box in the shape of a rectangular prism is 78 inches tall, 48 inches wide, and 24 inches deep. How many cubic feet will the box hold?

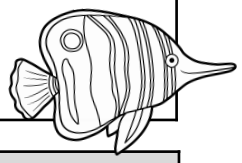
I KNOW:	I NEED TO KNOW:
PLAN AND WORK:	SOLUTION:

3. The fish tank shown at the right needs to be cleaned. The cleaning product instructions state that three drops should be added to the tank for every 140 cubic inches of water. How many drops should be used to clean the tank?



I KNOW:	I NEED TO KNOW:

PLAN AND WORK:	SOLUTION:

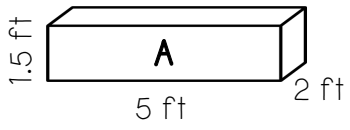


4. A layered birthday cake has three rectangular prism layers. The base layer measures 10 inches by 8 inches. Each layer is two inches smaller in width and length than the previous layer. All of the layers are 5 inches tall. What is the volume of the cake?

I KNOW:	I NEED TO KNOW:

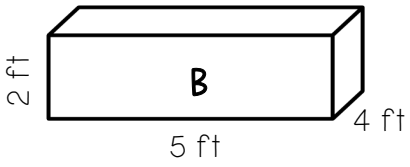
PLAN AND WORK:	SOLUTION:

5. Andrew is building a sandbox in the shape of a rectangular prism. In order to determine the dimensions he'll use, he wants to compare the cost of filling each design with sand. If sand costs $6 per cubic foot, mark each statement as true or false. Correct any false statements.



A. Design B will hold 25 more cubic feet of sand than Design A.

B. Design B will cost about $4.16 more to fill with sand than Design A.



Unit: Volume
Homework 5

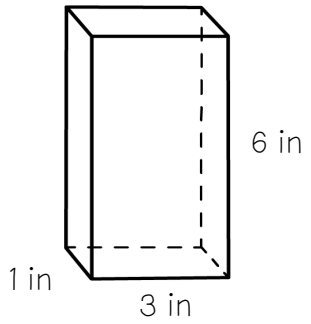
Name _____

Date _____ Pd _____

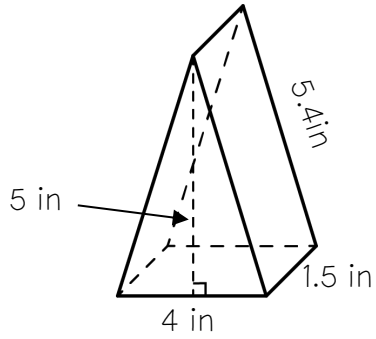
VOLUME APPLICATION

A fruit juice company is trying to differentiate themselves in the market. Their advertising team suggests changing the shape of the box to help them stand out. Use the original design and the proposed new design below to answer 1-5.

ORIGINAL DESIGN



NEW DESIGN



1. Find the volume of each juice container.

a. Original design: _____

b. New design: _____

2. If juice costs the company $0.12 per cubic inch, find the cost of filling each container design with juice.

a. Original design: _____

b. New design: _____

3. The original container of juice is sold for $3.28. How much profit does the original container earn per juice container?

4. The marketing team suggests that the proposed container will sell for a higher price of $3.97 but will cost an additional $0.50 each to make. How much profit would the new design earn per juice container?

5. Which design do you think the juice company should use? Explain your choice.

_____

_____

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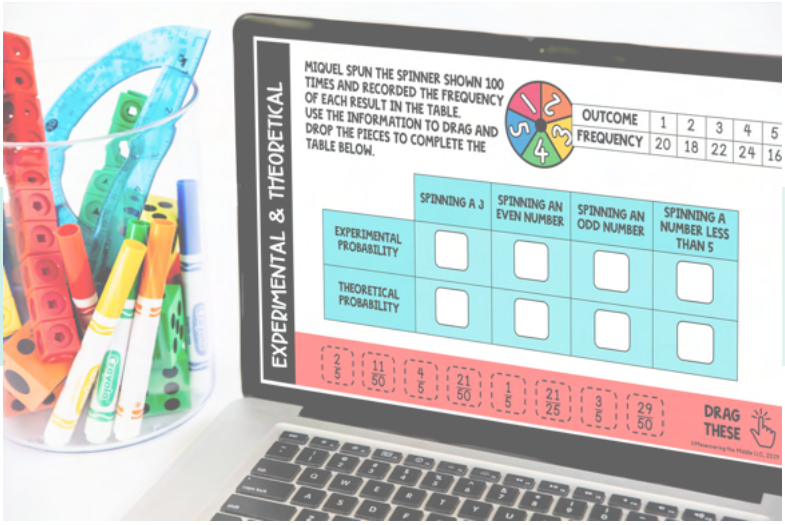

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