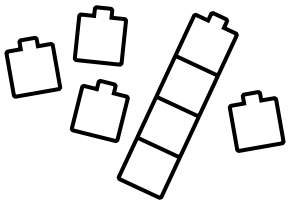
VOLUME

learning roadmap

1. Identify volume and informally compare volume
2. Pack and count unit cubes to measure volume
3. Develop the volume formula
4. Apply the volume formula
5. Understand volume as additive

helpful math tools

Different Sized Containers



Connecting Cubes

volume sort

LEARNING GOAL

The goal of this activity is for students to be able to identify volume as an attribute of three-dimensional figures and compare the volume of objects using estimation and critical thinking.

SUGGESTED USE

Whole Group	Small Group	Partners	Independent
○	☑	☑	○

This activity should be used early on in students' learning of volume. Because this activity is meant to spark great discussions, it might be helpful to have students work with a partner to sort the cards and share their thinking with another partner group.

MATERIALS & PREP

- Volume Sort pages
- Scissors

Print the Volume Sort pages single-sided so students can cut out the cards and sort them.

DIRECTIONS

Each student or pair of students will begin the activity by cutting out the cards on the right side of the page and sorting them according to the directions. Students will then document their thinking by answering the questions on the page. If you choose to place students in small groups, they can share their thinking with another student or pair of students.

While this activity looks simple, the real learning lies in the conversations and explanations that students share. Be sure to encourage as much discussion as possible in the small groups! If groups of students sorted them similarly, push students to consider why someone else might have sorted them differently. Some students may sort the objects using area. This is a great first step and opens up the activity for lots of discussion around the differences and similarities of area and volume.

After the activity, bring the whole class together so groups can share their thinking in how they sorted the objects. You may wish to ask students the following questions...

- How would the order in which you sorted the cards be different if you sorted them by their areas instead of their volumes? What about if we sorted them by their lengths?
- How does volume help us measure how "big" an object is?
- How did you figure out the volume of the rectangular prisms? How are the unit cubes related to the volume of the prisms?

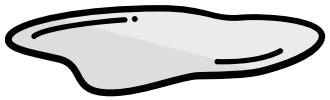
NAME: _____

volume sort

Sort the objects in the pictures from smallest to biggest. Use the discussion prompts to explain why you sorted the objects the way you did.

Why did you sort the objects the way you did?

Is there a different way you could sort the objects? Explain your thinking.

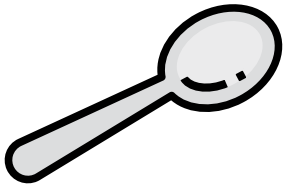


puddle

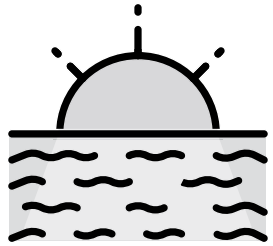
bucket

mug

bathtub



teaspoon



ocean

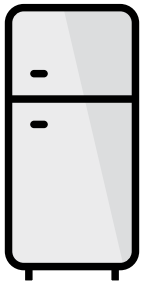
NAME: _____

volume sort

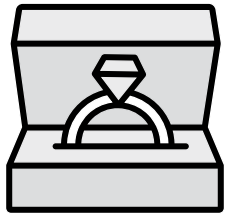
Sort the objects in the pictures from smallest to biggest. Use the discussion prompts to explain why you sorted the objects the way you did.

Why did you sort the objects the way you did?

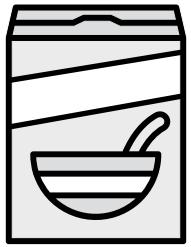
Is there a different way you could sort the objects? Explain your thinking.



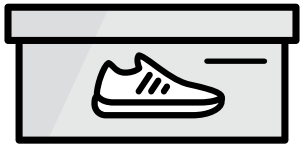
refrigerator



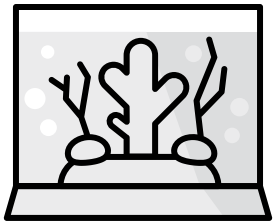
ring box



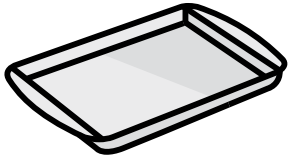
cereal box



shoebox



aquarium



baking tray

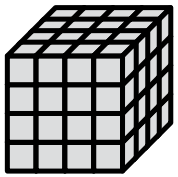
NAME: _____

volume sort

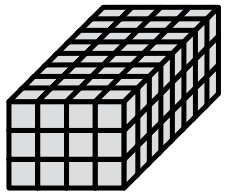
Sort the prisms from smallest to biggest. Use the discussion prompts to explain why you sorted the prisms the way you did.

Why did you sort the prisms the way you did?

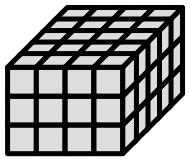
Is there a different way you could sort the prisms? Explain your thinking.



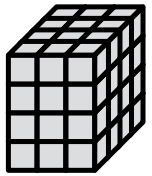
prism one



prism two

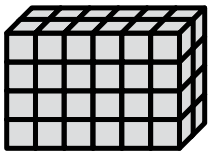


prism three



prism four

prism five



prism six

building prisms

LEARNING GOAL

The goal of this activity is to reinforce the idea that the volume of rectangular prisms can be found by counting the number of unit cubes it is made up of, while also providing students an opportunity to discover a formula that can be used to determine the volume of a rectangular prism.

SUGGESTED USE

Whole Group	Small Group	Partners	Independent
○	○	☑	☑

This activity is best used after students have an understanding of what volume is and what a unit cube represents, but before they've been introduced to any standard formula(s) for volume. With enough experience, students will discover the volume formula(s) themselves.

MATERIALS & PREP

- Connecting Cubes
- Station Cards
- Building Prism activity page

Print the station cards and the recording pages. Place 16, 24, 32, or 48 connecting cubes in small containers or bags. The number of cubes in each container will depend on the station card it is paired with.

DIRECTIONS

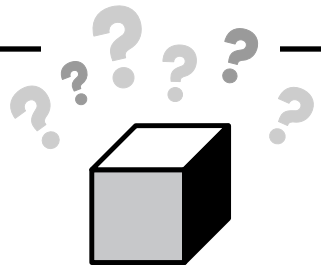
Place the Station Cards and the matching containers of connecting cubes at different stations around the room. Pair students up and allow them to travel around the classroom to each station, building rectangular prisms with a given volume each time and recording their answers on their Building Prims activity page.

After a set amount of time or after students have completed a set number of stations, encourage students to stop and discuss the patterns they notice from their activity page. Give students an opportunity to share their discoveries with the class. This activity should re-emphasize that the number of unit cubes that makes up a rectangular prism is its volume. It should also move students towards discovering a volume formula (length × width × height) by noticing the connection between the side lengths of the prism and its volume.

An appropriate extension to this activity is giving students the opportunity to create their own rectangular prisms to test if this "formula" always works and see if they can explain why multiplying the side lengths leads to the volume (as opposed to adding the side lengths together). Again, allow students to share their thoughts with the class to help solidify their discoveries.

VOLUME

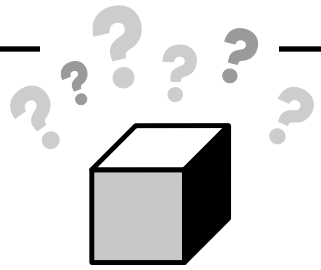
16 cubic units



Using **16 unit cubes**, build as many different rectangular prisms as you can.

VOLUME

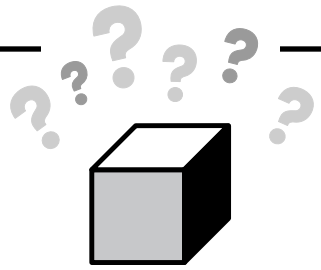
24 cubic units



Using **24 unit cubes**, build as many different rectangular prisms as you can.

VOLUME

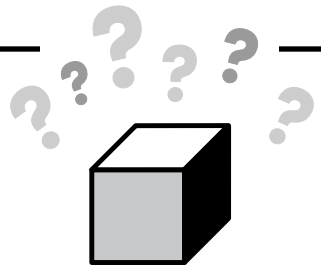
32 cubic units



Using **32 unit cubes**, build as many different rectangular prisms as you can.

VOLUME

48 cubic units



Using **48 unit cubes**, build as many different rectangular prisms as you can.

NAME: _____

building prisms

Build as many different rectangular prisms as you can with the given volume. For each prism you build, record the length, width, height, and volume in the table on the recording page. *It's possible that not all lines in the table will be filled.*

VOLUME
16 cubic units

	AREA OF THE BASE length	width	height	volume
A				
B				
C				
D				
E				

VOLUME
24 cubic units

	AREA OF THE BASE length	width	height	volume
A				
B				
C				
D				
E				

VOLUME
32 cubic units

	AREA OF THE BASE length	width	height	volume
A				
B				
C				
D				
E				

VOLUME
48 cubic units

	AREA OF THE BASE length	width	height	volume
A				
B				
C				
D				
E				

NAME: _____

building prisms

1. What pattern(s) do you notice about the side lengths of the rectangular prisms and the volume of the rectangular prisms?

2. Do you think you would notice the same pattern(s) if the prisms had different volumes?

3. Let's test it! Use the cubes to create a new rectangular prism with a different volume than the ones you've already made. Record the dimensions and volume below.

length	width	height	volume

4. Sketch your new prism and label its dimensions

5. Does the pattern you noticed still hold true for the new prism?

6. Do you think the pattern will be true for any rectangular prism? Why or why not?

ANSWER KEY

building prisms

Build as many different rectangular prisms as you can with the given volume. For each prism you build, record the length, width, height, and volume in the table on the recording page. *It's possible that not all lines in the table will be filled.*

VOLUME
16 cubic units

	AREA OF THE BASE			
	length	width	height	volume
A				
B				
C				
D				
E				

Possible sizes include:

2 × 4 × 2
4 × 4 × 1
1 × 16 × 1
8 × 1 × 2

VOLUME
24 cubic units

	AREA OF THE BASE			
	length	width	height	volume
A				
B				
C				
D				
E				

Possible sizes include:

2 × 4 × 3
2 × 2 × 6
4 × 6 × 1
12 × 1 × 2
8 × 3 × 1
1 × 1 × 24

VOLUME
32 cubic units

	AREA OF THE BASE			
	length	width	height	volume
A				
B				
C				
D				
E				

Possible sizes include:

2 × 4 × 4
2 × 2 × 8
2 × 1 × 16
1 × 1 × 32
1 × 4 × 8

VOLUME
48 cubic units

	AREA OF THE BASE			
	length	width	height	volume
A				
B				
C				
D				
E				

Possible sizes include:

1 × 1 × 48
1 × 2 × 24
1 × 3 × 16
1 × 4 × 12
1 × 6 × 8
2 × 2 × 12
2 × 3 × 8
2 × 4 × 6
3 × 4 × 4

capture the squares

LEARNING GOAL

The goal of this game is for students to understand the connections between a rectangular prism's volume and the different ways the prism could be represented.

SUGGESTED USE

Whole Group	Small Group	Partners	Independent
○	☑	☑	○

Because drawings of three-dimensional figures on a two-dimensional surface can be challenging for students to wrap their brains around, this game is perfect for helping students transition from finding the volume of concrete prisms (made up of unit cubes) to pictorial representations of prisms.

MATERIALS & PREP

- Game boards
- Game keys
- Two dice per game
- Dry erase markers (two colors)

Print the game boards and place them in dry-erase pockets so that students can play the games more than once. Laminate the game keys so that the game can be reused year after year.

DIRECTIONS

Give each pair of students a game board, a game key, two dice, and two different colored dry erase markers. The game is played by each player taking turns rolling the dice, finding the sum of the dice, and looking at the game key to match which rectangular prism they will be looking for on the game board. For example, if a student rolls a 3 and 4, they would add 3 + 4 to equal 7, then find the prism shown next to the 7 on the game key.

Then, the player must find a matching prism on the game board and draw one line on the side of that game square. Prisms can be matched based on the drawings, the dimensions, or the volume. Players continue alternating turns until all squares are captured. To capture a square, a player must draw the final line around that square. They color it in with their color marker or write their initials on it. The player who captures the most squares wins!

GAME ONE

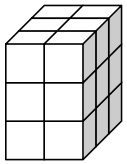
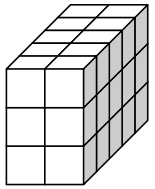
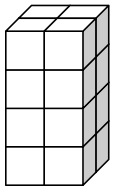
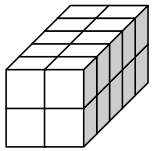
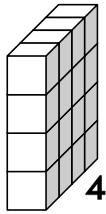
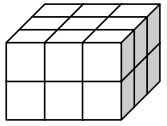
capture the squares

DIRECTIONS

Take turns rolling the dice, finding the sum of the dice, and looking at the game key to see which rectangular prism you will be looking for on the game board. Find a matching prism, dimensions, or volume on the game board and draw one line on the side of that game square.

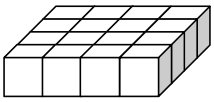
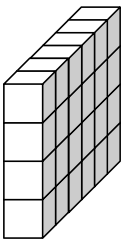
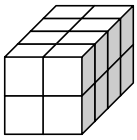
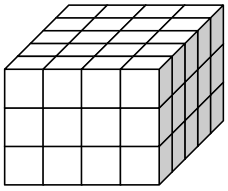
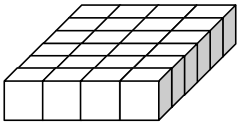
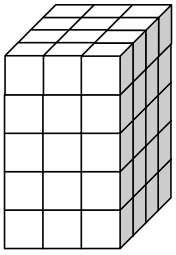
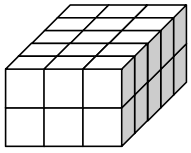
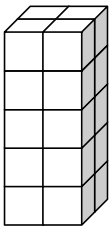
To capture a square, you must draw the final line around that square. Once it's captured, color it in with your color or write your initials.

The player who captures the greatest number of squares wins!

ROLL THE DICE	**2** 	**3** 4 units × 4 units × 1 unit	**4** 
5 24 cubic units	**6** 60 cubic units	**7** 	**8** 
9 6 units × 1 unit × 4 units	**10** 3 units × 5 units × 2 units	**11** 1 unit  4 units 4 units	**12** 

capture THE squares

GAME ONE

20 cubic units	30 cubic units		
	18 cubic units	$3 \text{ units} \times 2 \text{ units} \times 3 \text{ units}$	
16 cubic units	$4 \text{ units} \times 5 \text{ units} \times 3 \text{ units}$	16 cubic units	24 cubic units
			

GAME TWO

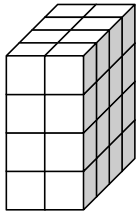
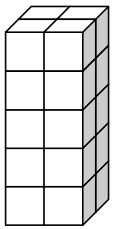
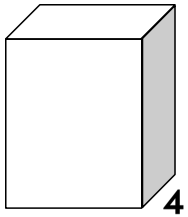
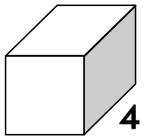
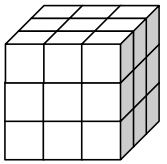
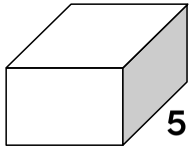
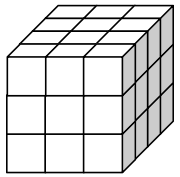
capture the squares

DIRECTIONS

Take turns rolling the dice, finding the sum of the dice, and looking at the game key to see which rectangular prism you will be looking for on the game board. Find a matching prism, dimensions, or volume on the game board and draw one line on the side of that game square.

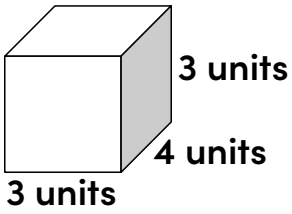
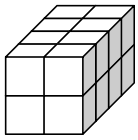
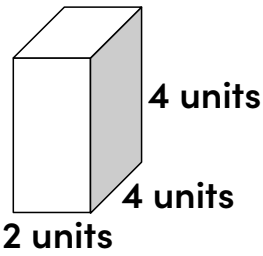
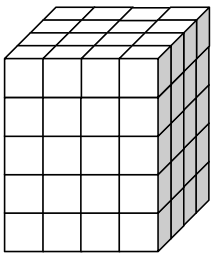
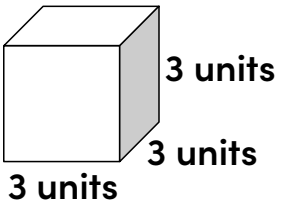
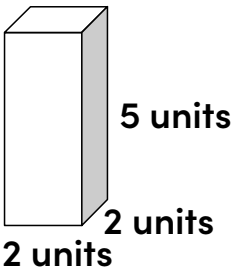
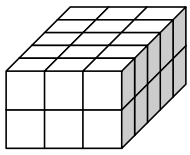
To capture a square, you must draw the final line around that square. Once it's captured, color it in with your color or write your initials.

The player who captures the greatest number of squares wins!

ROLL THE DICE	**2** 	**3** 4 units × 3 units × 3 units	**4** 3 units × 5 units × 2 units
5 	**6**  5 units 4 units 4 units	**7**  2 units 4 units 2 units	**8** 
9 20 cubic units	**10**  2 units 5 units 3 units	**11** 	**12** 2 units × 4 units × 4 units

capture THE squares

GAME TWO

3 units × 3 units × 3 units	30 cubic units		2 units × 2 units × 5 units
	32 cubic units	2 units × 4 units × 2 units	80 cubic units
36 cubic units			
	4 units × 4 units × 5 units		27 cubic units

additive volume

LEARNING GOAL

The goal of this activity is for students to understand that volume is additive by recognizing that the volume of a composite figure made up of two rectangular prisms is equivalent to the sum of the number of unit cubes needed to make each individual prism.

SUGGESTED USE

Whole Group	Small Group	Partners	Independent
○	○	☑	☑

This activity can be used in the very early stages of developing students' understanding of finding the volume of composite figures because it builds on what they already know about the volume of rectangular prisms.

MATERIALS & PREP

- Figure Cards
- Recording Sheet
- Connecting Cubes
- Extension Pages

Print and cut the figure cards vertically and place one at different tables around the room along with a small container of connecting cubes (at least 52 cubes per container). Provide each student with their own recording sheet. If you wish to use one of the extension pages, print those as well.

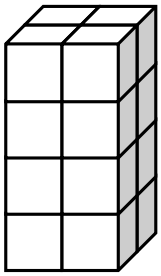
DIRECTIONS

Whether you choose to have students travel from table to table or work through this activity on their own, each student will need a recording sheet to document their work as they build two rectangular prisms, combine them to make a composite figure, and then find the volume.

After the activity, give students the opportunity to discuss how they might go about finding the volume of a composite figure without building the figure with cubes first. Ultimately, we want students to come to the conclusion that they need to decompose (break apart) a composite figure and then find the volume of each individual rectangular prism. This is essentially working backwards from the activity they just completed. Two extension pages are included that you can use after the activity to solidify and apply students' learning about volume being additive.

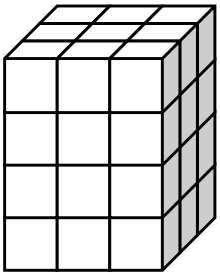
figure #1

Build the rectangular prism below using unit cubes.



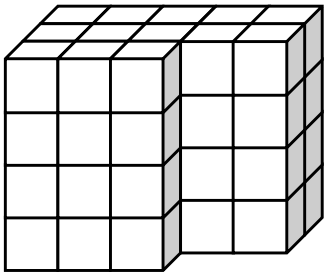
What is the volume of the rectangular prism?

Build the rectangular prism below using new unit cubes.



What is the volume of the rectangular prism?

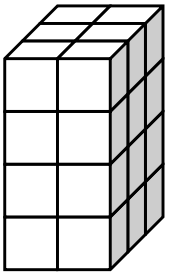
Combine the two rectangular prisms to make the figure below.



What is the volume of the new composite figure?

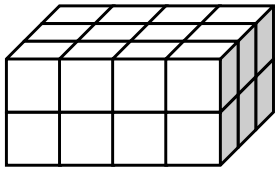
figure #2

Build the rectangular prism below using unit cubes.



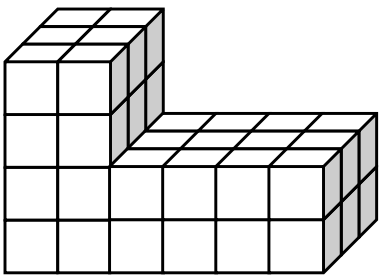
What is the volume of the rectangular prism?

Build the rectangular prism below using new unit cubes.



What is the volume of the rectangular prism?

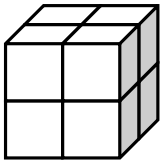
Combine the two rectangular prisms to make the figure below.



What is the volume of the new composite figure?

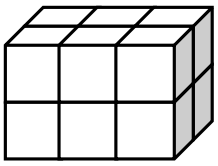
figure #3

Build the rectangular prism below using unit cubes.



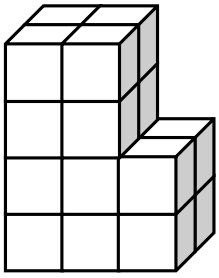
What is the volume of the rectangular prism?

Build the rectangular prism below using new unit cubes.



What is the volume of the rectangular prism?

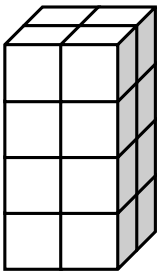
Combine the two rectangular prisms to make the figure below.



What is the volume of the new composite figure?

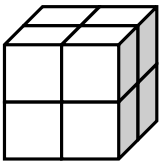
figure #4

Build the rectangular prism below using unit cubes.



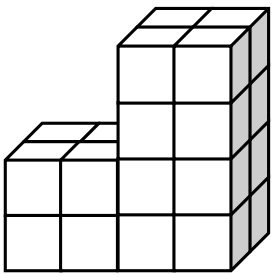
What is the volume of the rectangular prism?

Build the rectangular prism below using new unit cubes.



What is the volume of the rectangular prism?

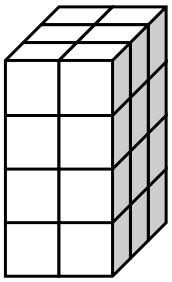
Combine the two rectangular prisms to make the figure below.



What is the volume of the new composite figure?

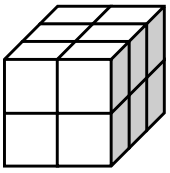
figure #5

Build the rectangular prism below using unit cubes.



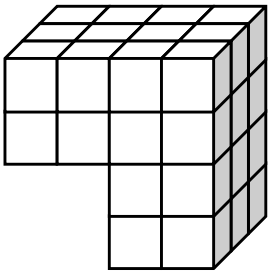
What is the volume of the rectangular prism?

Build the rectangular prism below using new unit cubes.



What is the volume of the rectangular prism?

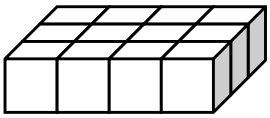
Combine the two rectangular prisms to make the figure below.



What is the volume of the new composite figure?

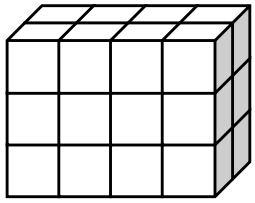
figure #6

Build the rectangular prism below using unit cubes.



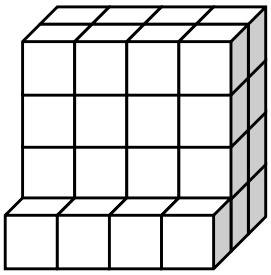
What is the volume of the rectangular prism?

Build the rectangular prism below using new unit cubes.



What is the volume of the rectangular prism?

Combine the two rectangular prisms to make the figure below.



What is the volume of the new composite figure?

NAME: _____

additive volume

Use the space below to keep track of your work as you find the volume of each figure.

1

Length: _____
Width: _____
Height: _____
Volume: _____

Length: _____
Width: _____
Height: _____
Volume: _____

What is the volume of the composite figure?

2

Length: _____
Width: _____
Height: _____
Volume: _____

Length: _____
Width: _____
Height: _____
Volume: _____

What is the volume of the composite figure?

3

Length: _____
Width: _____
Height: _____
Volume: _____

Length: _____
Width: _____
Height: _____
Volume: _____

What is the volume of the composite figure?

4

Length: _____
Width: _____
Height: _____
Volume: _____

Length: _____
Width: _____
Height: _____
Volume: _____

What is the volume of the composite figure?

5

Length: _____
Width: _____
Height: _____
Volume: _____

Length: _____
Width: _____
Height: _____
Volume: _____

What is the volume of the composite figure?

6

Length: _____
Width: _____
Height: _____
Volume: _____

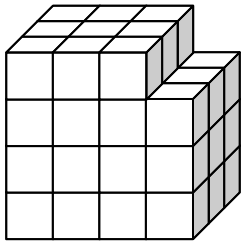
Length: _____
Width: _____
Height: _____
Volume: _____

What is the volume of the composite figure?

NAME: _____

additive volume

Build the figure shown below.



Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

_____

_____

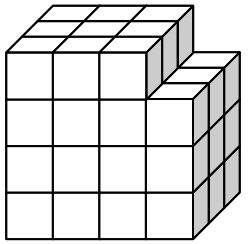
_____

Find the volume of the figure.
Show your thinking below.

NAME: _____

additive volume

Build the figure shown below.



Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

_____

_____

_____

Find the volume of the figure.
Show your thinking below.

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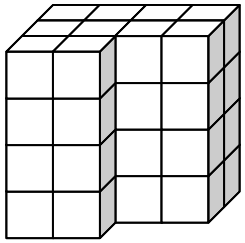
NAME: _____

additive volume

Build the figure shown below.



Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

_____

_____

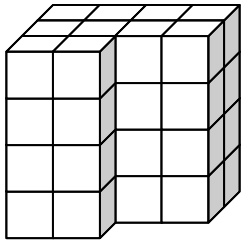
_____

Find the volume of the figure.
Show your thinking below.

NAME: _____

additive volume

Build the figure shown below.



Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

_____

_____

_____

Find the volume of the figure.
Show your thinking below.

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ANSWER KEY

additive volume

Use the space below to keep track of your work as you find the volume of each figure.

1

Length: 2 units³
Width: 2 units³
Height: 4 units³
Volume: 16 units³

Length: 3 units³
Width: 3 units³
Height: 4 units³
Volume: 36 units³

What is the volume of the composite figure?
16 units³ + 36 units³ = 52 units³

2

Length: 2 units³
Width: 3 units³
Height: 4 units³
Volume: 24 units³

Length: 4 units³
Width: 3 units³
Height: 2 units³
Volume: 24 units³

What is the volume of the composite figure?
24 units³ + 24 units³ = 48 units³

3

Length: 2 units³
Width: 2 units³
Height: 2 units³
Volume: 8 units³

Length: 3 units³
Width: 2 units³
Height: 2 units³
Volume: 12 units³

What is the volume of the composite figure?
8 units³ + 12 units³ = 20 units³

4

Length: 2 units³
Width: 2 units³
Height: 4 units³
Volume: 16 units³

Length: 2 units³
Width: 2 units³
Height: 2 units³
Volume: 8 units³

What is the volume of the composite figure?
16 units³ + 8 units³ = 24 units³

5

Length: 2 units³
Width: 3 units³
Height: 4 units³
Volume: 24 units³

Length: 2 units³
Width: 3 units³
Height: 2 units³
Volume: 12 units³

What is the volume of the composite figure?
24 units³ + 12 units³ = 36 units³

6

Length: 4 units³
Width: 3 units³
Height: 1 units³
Volume: 12 units³

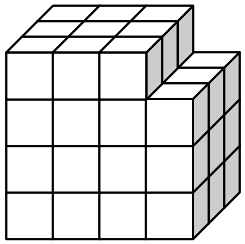
Length: 4 units³
Width: 2 units³
Height: 3 units³
Volume: 24 units³

What is the volume of the composite figure?
12 units³ + 24 units³ = 36 units³

ANSWER KEY

additive volume

Build the figure shown below.



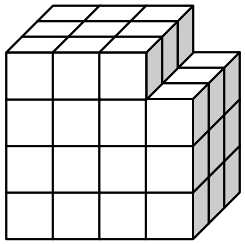
Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

Find the volume of the figure. Show your thinking below.

V = 45 units³

additive volume

Build the figure shown below.



Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

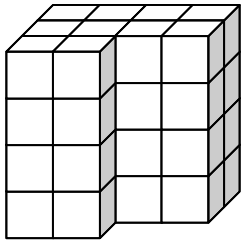
Find the volume of the figure. Show your thinking below.

V = 45 units³

ANSWER KEY

additive volume

Build the figure shown below.



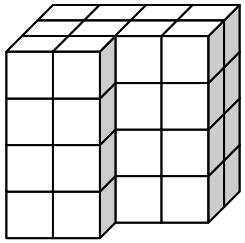
Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

Find the volume of the figure. Show your thinking below.

V = 40 units³

additive volume

Build the figure shown below.



Use what you learned in the previous activity to explain how you would find the volume of the figure you built.

Find the volume of the figure. Show your thinking below.

V = 40 units³

task cards

LEARNING GOAL

The goal of this activity is for students to apply what they know about volume to a variety of real-world situations or situations in which they are required to use their understanding in a creative way.

SUGGESTED USE

Whole Group	Small Group	Partners	Independent
○	☑	☑	☑

This activity is designed to extend students' thinking. Therefore, this activity is best used once students have a solid understanding of what volume is, how it is measured using unit cubes, how to use the dimensions of a prism to find its volume, and finding the volume of composite figures.

MATERIALS & PREP

- **Task Cards**
- **Think Sheet**
- **Connecting Cubes (optional)**

Print and cut the task cards. If you'd like to reuse the task cards, print them on cardstock and laminate them prior to cutting. Print one "think sheet" for every student so that they can document their thinking as they solve the task cards. Give students the option to use connecting cubes if they need to.

DIRECTIONS

In this activity, students will be solving a variety of volume problems that require them to think critically. The problems become progressively more challenging throughout the task card set, which is helpful for meeting the various learning needs of students.

While there are countless ways to use this set of task cards, one option is to place them in various stations around the room and allow students to rotate around to solve each problem. Students should document their thinking for each card that they solve on the "think sheet."

Because many of the problems have a variety of correct solutions and lend themselves to different approaches, allow students to share their thinking with others in a whole group setting, small groups, or with a partner. Prompt students to identify similarities and differences in the various approaches to deepen their understanding of the concept.

1 MEASUREMENT

You were asked to design different-sized boxes that could each hold exactly 18 unit cubes inside them. How many different boxes could you design?

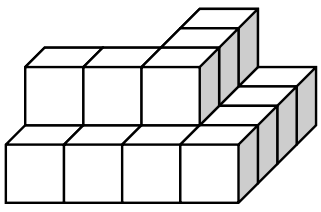
What would be the dimensions of each box?

2 MEASUREMENT

Brady built a structure with 12 unit cubes. The structure was two layers high and does not have the same number of cubes in each layer. Draw a sketch showing what Brady's tower might look like.

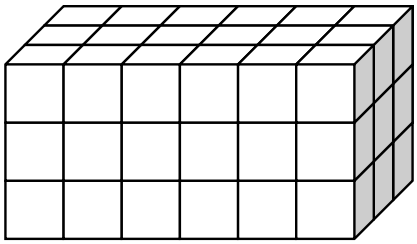
3 MEASUREMENT

Hassan thinks the figure below has a volume of 12 cubic units. Explain to Hassan why that is incorrect and how he could correctly find the volume of this figure.



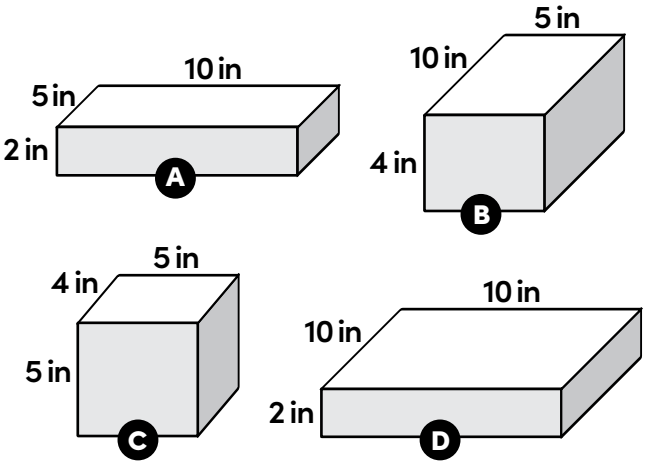
4 MEASUREMENT

Samantha found the volume of the prism below by multiplying 18 × 3. What is a different expression she could write to find the volume of the prism?



5 MEASUREMENT

A bakery sells a layered cake with a volume of exactly 300 inches³. Which combination of cake layers could have been used to make the cake?



6 MEASUREMENT

A new shark tank is being built. It needs to hold exactly 1,000 cubic feet of water. Which dimensions would be best for the tank? Explain.

A. 200 feet long, 5 feet wide, and 10 feet deep

B. 80 feet long, 40 feet wide, and 10 feet deep

C. 50 feet long, 20 feet wide, and 10 feet deep

7 MEASUREMENT

A standard gold brick is 6 inches long, 3 inches wide, and 2 inches high. If you were to design a new gold brick with double the volume of a standard brick, what could its dimensions be?

8 MEASUREMENT

Draw two different rectangular prisms that each have a volume of 20 cubic units and label their dimensions.

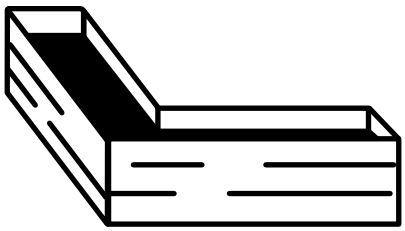
Which of the two prisms that you created would be the best design for a box of rulers? Explain your reasoning.

9 MEASUREMENT

A standard cereal box is about 8 inches long, 12 inches tall, and 2 inches wide. If you created a tiny cereal box with exactly ¼ the volume of the standard box, what could be its dimensions? Show your thinking.

10 MEASUREMENT

You are hired to design and build an L-shaped garden bed with a total volume of 30 cubic feet. What could be the possible dimensions for the garden bed?

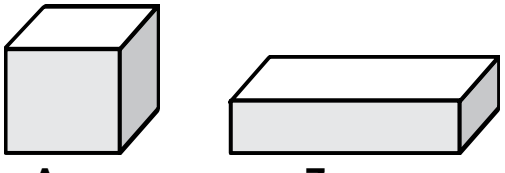


11 MEASUREMENT

Three cubes are stacked on top of each other. They are all different sizes. The medium-sized cube has a volume of 64 inches^3 and the smallest cube has a volume of 27 inches^3. All three cubes combined have a volume of 216 inches^3. What are the dimensions of each cube?

12 MEASUREMENT

Zane and Ana each have fish tanks. Zane says his tank holds more water because the length is twice as long as Ana's. Ana says her tank holds more water because it's twice as deep as Zane's. The width of both tanks are the same. Whose tank holds more water?



Ana **Zane**

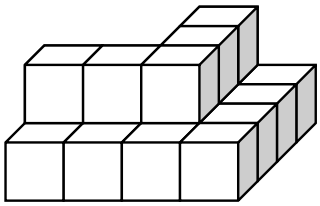
NAME: _____

THINK SHEET

1.

2.

3.



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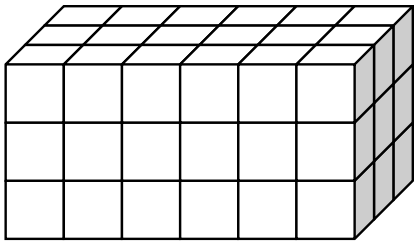


NAME: _____

THINK SHEET

5.

6.

7.

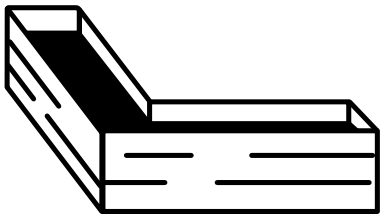
8.

NAME: _____

THINK SHEET

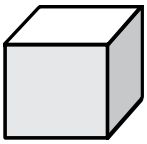
9.

10.

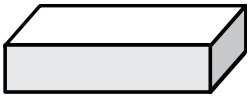


11.

12.



Ana



Zane

ANSWER KEY

NAME: _____

THINK SHEET

1. You were asked to design different-sized boxes that could each hold exactly 18 unit cubes inside them. How many different boxes could you design?

Three different box sizes.

What would be the dimensions of each box?

1 × 1 × 18

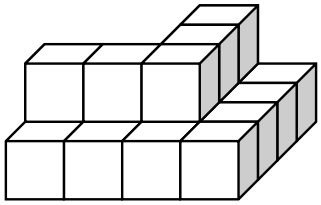
1 × 2 × 9

2 × 3 × 3

2. Brady built a structure with 12 unit cubes. The structure was two layers high and does not have the same number of cubes in each layer. Draw a sketch below showing what Brady's tower might look like.

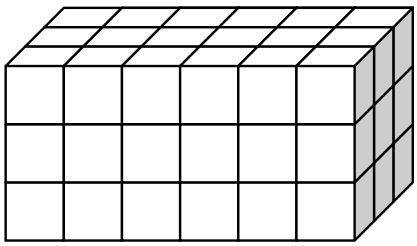
Answers will vary.

3. Hassan thinks the figure below has a volume of 12 cubic units. Explain to Hassan why that is incorrect and how he could correctly find the volume of this figure.



He is incorrect because there has to be a layer of hidden blocks sitting below the back row. The volume should be 17 cubic units.

4. Samantha found the volume of the prism below by multiplying 18 × 3. What is a different expression she could write to find the volume of the prism?



Possible answers include:

6 × 3 × 3

9 × 6

18 × 3

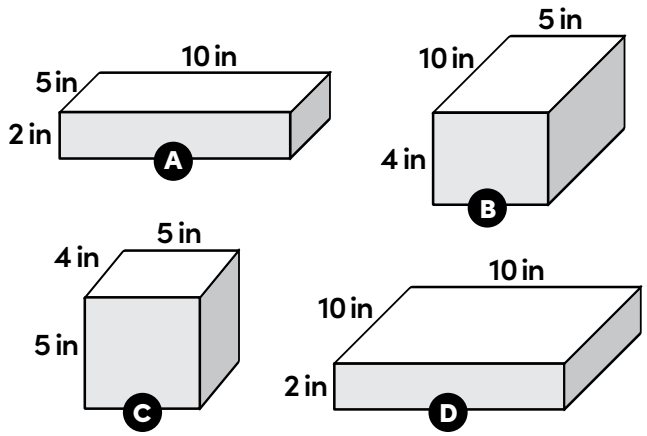
18 + 18 + 18

ANSWER KEY

NAME: _____

THINK SHEET

5. A bakery sells a layered cake with a volume of exactly 300 inches³. Which combination of cake layers could have been used to make the cake?



Possible answers include:

Layer A + Layer B **Layer B + Layer C**

Layer A + Layer D **Layer C + Layer D**

6. A new shark tank is being built. It needs to hold exactly 1,000 cubic feet of water. Which dimensions would be best for the tank? Explain.

A. 200 feet long, 5 feet wide, and 10 feet deep

B. 80 feet long, 40 feet wide, and 10 feet deep

C. 50 feet long, 20 feet wide, and 10 feet deep

C is the best choice because the 5-foot width of choice A is too narrow for sharks, and the dimensions for B do not create a volume of 1,000 cubic feet.

7. A standard gold brick is 6 inches long, 3 inches wide, and 2 inches high. If you were to design a new gold brick with double the volume of a standard brick, what could its dimensions be?

Possible answers include:

12 × 3 × 2

6 × 6 × 2

6 × 3 × 4

72 × 1 × 1

9 × 8 × 1

36 × 2 × 1

etc...

8. In the space below, draw two different rectangular prisms that each have a volume of 20 cubic units and label their dimensions.

Answers will vary but could include a 20×1×1 prism, 5×4×1 prism, 10×2×1 prism, 5×2×2 prism

Which of the two prisms that you created would be the best design for a box of rulers? Explain your reasoning.

20×1×1 or 10×2×1 because rulers are long, skinny, and flat.

ANSWER KEY

NAME: _____

THINK SHEET

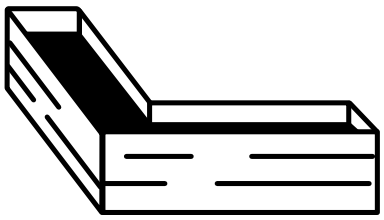
9. A standard cereal box is about 8 inches long, 12 inches tall, and 2 inches wide. If you created a tiny cereal box with exactly ¼ the volume of the standard box, what could be its dimensions? Show your thinking.

Possible answers include:

- 2 × 12 × 2
- 24 × 2 × 1
- 4 × 6 × 2
- 48 × 1 × 1
- 8 × 3 × 2
- 4 × 12 × 1
- 8 × 6 × 1

10. You are hired to design and build an L-shaped garden bed with a total volume of 30 cubic feet. What could be the possible dimensions for the garden bed? Mark them on the figure below.

Answers will vary, but look for students to show an understanding that the garden



bed could be split into two rectangular prisms (one longer, one shorter) and the additive volumes equal 30 ft³.

11. Three cubes are stacked on top of each other. They are all different sizes. The medium-sized cube has a volume of 64 inches³ and the smallest cube has a volume of 27 inches³. All three cubes combined have a volume of 216 inches³. What are the dimensions of each cube?

Small cube: 3 × 3 × 3

Medium cube: 4 × 4 × 4

Large cube: 5 × 5 × 5

12. Zane and Ana each have fish tanks. Zane says his tank holds more water because the length is twice as long as Ana's. Ana says her tank holds more water because it's twice as deep as Zane's. The width of both tanks are the same. Whose tank holds more water?

They will hold the same amount of water because the volumes are equal. Zane's is twice as long as Ana's but Ana's is twice as deep as Zane's. Since the widths are the same, the volumes are equal.

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