

The Aquarium Builder Quest

Volume of Rectangular Prisms: Find the volume of right rectangular prisms by packing them with unit cubes, and apply $V = l \times w \times h$ and $V = B \times h$ to solve real-world problems.

Learning target: I can find the volume of rectangular prisms and composite figures and explain what volume means.

Success looks like: Students use the vocabulary correctly, complete the quest, and score 80% or higher on the evidence-based exit ticket.

Materials: Student devices, the printed lesson worksheet (one per student), projector for the mini-lesson presenter.

LESSON AT A GLANCE

60 minutes

Time	Part	Teacher does	Students do
0:00-0:08	Warm-up	Project the warm-up. Circulate, then call on 2-3 students. Save question 3 for the debrief.	Answer Part 2 of the lesson worksheet; share with a partner.
0:08-0:20	Mini-lesson	Teach with the 4-step presenter. Run each quick check with the whole class.	Complete worksheet Parts 4-11 as each slide appears; answer checks with fingers.
0:20-0:48	Quest	Launch The Aquarium Builder Quest. Assign mission levels; circulate with the answer key.	Play solo or in pairs; record code pieces; complete any written evidence task.
0:48-0:52	Debrief	Ask 2 debrief questions and revisit warm-up question 3.	Finish worksheet Part 13 (prediction check + one thing learned).
0:52-1:00	Exit ticket	Hand out the exit ticket. Collect and sort with the mastery guide.	Answer with evidence independently.

Key vocabulary

Word	Student-friendly definition
Volume	The amount of space inside a 3-D figure, measured in cubic units.
Cubic unit	A cube 1 unit on each side (cm^3 , in^3 , ft^3).
Rectangular prism	A 3-D figure with 6 rectangular faces, like a box.
Base (B)	The area of the bottom face: length $\times$ width.
Composite figure	A solid made of two or more prisms joined together.

1. WARM-UP

0:00–0:08 · 8 min

Warm-up expectations (post these): Answer in Part 2 of the lesson worksheet (or on this sheet). Number each answer to match the question. Answer in complete sentences. For math, show your work. Work silently for 5 minutes, then share with a partner for 2 minutes. Be ready to share one answer with the class.

#	Question	Look for
1	What is the area of a rectangle 5 cm long and 3 cm wide?	15 cm ² .
2	What is the difference between area and volume?	Area covers a flat surface (square units). Volume fills a space (cubic units).
3	About how many sugar cubes could fit in a small box? How could you find out?	Answers vary. Find how many fit in one layer, then multiply by the number of layers.

2. MINI-LESSON

0:08–0:20 · 12 min

Project the Lesson presenter from the room page. It runs the whole hour: target and agenda, warm-up with timer, hook vote, 4 teaching steps (key idea, interactive tool, turn and talk, check for understanding), I do / we do / you do, a work-time screen with a timer and expectations, debrief, and the exit ticket. Press N for teacher notes, T to pause the timer, and P to pick a student.

Hook (1 min): How could you find how many sugar cubes fill a box without filling it? Class vote: Count one layer, then multiply / Guess / Measure the outside only

Step 1 (3 min): Volume fills space

Teach	Area counts squares that cover a flat surface. Volume counts cubes that fill a space. Units are cubed: cm ³ .
Interactive tool	Visual: A prism made of 1-cm cubes
Students do	Count the cubes in the prism by layers.
Turn and talk	Why is volume measured in cubic units instead of square units?
Worksheet Part 5A	Volume counts CUBES that fill a space. It is measured in CUBIC units.
Check for understanding	How many cubes are in the prism? Answer: 24

Step 2 (3 min): Layers: $V = l \times w \times h$

Teach	Build one layer: length $\times$ width cubes. Stack layers: multiply by height.
Interactive tool	Board and notes
Students do	Write $V = l \times w \times h$ and solve for a $5 \times 2 \times 3$ box.

Turn and talk	Does it matter which face you call the base? Why or why not?
Worksheet Part 6A	Volume = LENGTH $\times$ WIDTH $\times$ HEIGHT.
Check for understanding	A box is 5 cm $\times$ 2 cm $\times$ 3 cm. Volume? Answer: 30

Step 3 (3 min): $V = B \times h$

Teach	B is the area of the base. $V = B \times h$ means base area times the number of layers.
Interactive tool	Board and notes
Students do	Find V for a box with base 6 cm ² and height 4 cm.
Turn and talk	How is $V = l \times w \times h$ the same as $V = B \times h$?
Worksheet Part 7A	$V = B \times h$, where B is the area of the BASE.
Check for understanding	Base area = 12 cm ² , height = 5 cm. Volume? Answer: 60

Step 4 (3 min): Composite figures

Teach	Split a composite figure into rectangular prisms, find each volume, then add.
Interactive tool	Visual: A composite figure: two prisms side by side
Students do	Split the figure into two prisms and find each volume.
Turn and talk	How would you find the volume of an L-shaped room?
Worksheet Part 8A	For a COMPOSITE figure, split it into prisms and ADD the volumes.
Check for understanding	Prism A is 4 $\times$ 2 $\times$ 2. Prism B is 2 $\times$ 2 $\times$ 4. Total volume? Answer: 32

I do: worked example (shown one step at a time)

1. Problem: a prism 4 cubes long, 3 wide, and 5 tall.
2. Step 1: One layer: $4 \times 3 = 12$ cubes.
3. Step 2: There are 5 layers.
4. Step 3: $12 \times 5 = 60$.
5. Answer: 60 cubic units. Formula: $V = l \times w \times h$.

What to say on every slide is in the presenter script PDF.

We do: guided practice

A fish tank is 5 dm long, 3 dm wide, and 4 dm tall. How many liters does it hold? (1 dm³ = 1 liter)

1. One layer: $5 \times 3 = 15$ cubes.
2. Stack 4 layers: $15 \times 4 = 60$.
3. $V = 60$ dm³.
4. Since 1 dm³ = 1 liter, the tank holds 60 liters.

Answer: 60 liters

You do: independent check (2 min)

A box has a base of 20 cm² and a height of 6 cm. What is its volume?

Answer: 120. Students who miss it: 3-minute reteach at the teacher table, then start the room at the Explorer level.

Misconception: "Volume and area are the same." Area is 2-D square units; volume is 3-D cubic units.

Misconception: "Add the dimensions." Volume multiplies them.

Misconception: "Composite figures: multiply all the numbers you see." Split into separate prisms first.

3. QUEST: THE AQUARIUM BUILDER QUEST

0:20–0:48 · 28 min

Launch: project the start screen, read the story aloud, and assign mission levels (Explorer = extra support, Agent = on level, Legend = challenge). Students can open Supports any time for read-aloud, bigger text, a word bank, and a scratch pad.

- Levels unlock in order, like a video game. Celebrate "level-ups" out loud to keep energy high.
- Students who finish early can replay and aim for 100% first-try accuracy, which is shown on their certificate.
- If a student is stuck on a level, pair them with someone who has already cleared it to explain without giving the answer.

Students turn in: the completion code plus their copied "turn in your work" block (Canvas Text Entry).

4. DEBRIEF

0:48–0:52 · 4 min

1. Explain why $V = l \times w \times h$ works using the idea of layers.
2. How did you split a composite figure?
3. When would someone in real life need to know volume?

Close the loop: return to warm-up question 3. Answer: Answers vary. Find how many fit in one layer, then multiply by the number of layers.

5. EXIT TICKET

0:52–1:00 · 8 min

Print the exit ticket PDF (page 2 is the key and mastery guide). Every item requires evidence: Part A asks students to justify each choice, Part B asks for an explanation, and Part C applies the standard to a new situation using Solve-Show-Explain. Sort results into Mastered, Approaching, and Beginning to plan tomorrow's groups.

LESSON RESOURCES

Resource	How it fits the lesson
Warm-up worksheet (PDF)	Optional standalone warm-up (also Part 2 of the lesson worksheet), with a key.
Mini-lesson presenter	Projectable, step-by-step interactive lesson with tools and quick checks (room page).

Resource	How it fits the lesson
Lesson worksheet (PDF + key)	One printable packet students complete during the whole lesson: short fill-ins and quick checks in 13 small parts that match the presenter slides.
The Aquarium Builder Quest (.html)	The quest for Canvas, with differentiated levels, supports, and a turn-in.
Exit ticket (PDF + key)	Evidence-based check with a rubric and a mastery sorting guide.
Illustrative Mathematics (extra)	Free Grade 5 volume unit. https://im.kendallhunt.com/
Khan Academy: 5th Grade Math (extra)	Volume videos and practice. https://www.khanacademy.org/math/cc-fifth-grade-math
Toy Theater: 3-D Shapes (extra)	Free virtual manipulatives. https://toytheater.com/
Open Middle (extra)	Volume puzzles with many solution paths. https://www.openmiddle.com/

ANSWER KEY: THE AQUARIUM BUILDER QUEST

Level 1: Layers (code piece: L)

1. How many cubes are in one layer? -> 20
2. What is the volume of the test tank? -> 60 in^3

Level 2: The Clownfish Tank (code piece: A)

1. What is the volume of the clownfish tank in cm^3 ? -> 15000 cm^3
2. How many liters of water does the tank hold? -> 15 liters

Level 3: Which Tank Is Bigger? (code piece: Y)

1. What is the volume of Tank A? -> 16000 cm^3
2. What is the volume of Tank B? -> 18000 cm^3
3. Which tank should the seahorses get, and how much more space does it have? -> Tank B, $2,000 \text{ cm}^3$ more

Level 4: Same Volume, Different Shape (code piece: E)

1. Which tank dimensions have a volume of 24 ft^3 ? -> Volume is 24 ft^3 : $2 \times 3 \times 4$, $1 \times 4 \times 6$, $2 \times 2 \times 6$ | Volume is not 24 ft^3 : $3 \times 3 \times 3$, $2 \times 5 \times 2$, $4 \times 4 \times 2$
2. If you double only the height of a tank, what happens to its volume? -> It doubles
3. Design a jellyfish tank with a volume of 24 cubic feet that is DIFFERENT from $2 \times 3 \times 4$. -> Any prism with volume 24

Level 5: The Shark Tunnel (code piece: R)

1. What is the total volume of the shark exhibit? -> 320 m^3
2. Why do you ADD the two volumes? -> The exhibit is made of both tanks together

Final code: LAYER