Volume of Rectangular Prisms

Lesson 10-2

Name: _____ Date: _____ Class: _____

Key Vocabulary

Level 1 support

Picture first, then the word, then a plain-language meaning. Say each word out loud.

A box 2 × 1.5 × 1 = 3 ft³ — it holds 3 cubic feet of stuff

Volume

How much space is inside a solid shape.

A tissue box, a fish tank, a brick — all rectangular prisms

Rectangular prism

A solid box shape with six flat rectangle sides.

1 ft³ = a cube that is 1 foot on every edge

Cubic units

The units used to measure space inside, like cubic inches.

A box with dimensions 4 × 3 × 2 means l = 4, w = 3, h = 2

Dimensions

How long, how wide, and how tall a shape is.

Cut a cereal box along its edges, unfold it flat — that is the net

Net

A flat shape that folds up into a solid.

If the base is 6 × 4 = 24 cm² and h = 3, then V = 24 × 3 = 72 cm³

Base area

The area of the bottom of a solid. Volume = base area × height.

Key Ideas & Notes

- Your class is building a time capsule to bury on school grounds.
- The capsule is a rectangular prism that is 2 feet long, 1.5 feet wide, and 1 foot tall.
- You need to figure out how much stuff can fit inside — that means calculating the volume!
- Calculate the volume of each possible time capsule design. Use $V = l \times w \times h$.

Think About It

- What are the three measurements of the time capsule?
- What does volume measure — length, area, or space inside?
- How is volume different from area?

My Notes

Guided Examples

Example 1

What is the volume of a rectangular prism with l = 4 in, w = 3 in, h = 5 in?

Solution: $V = l \times w \times h = 4 \times 3 \times 5 = 60$ cubic inches.

Answer: A. 60 in^3

Example 2

A box has a volume of 36 cm^3. Its length is 6 cm and width is 3 cm. What is the height?

Solution: $V = l \times w \times h \rightarrow 36 = 6 \times 3 \times h \rightarrow 36 = 18h \rightarrow h = 2$ cm.

Answer: A. 2 cm

Example 3

How is volume different from area?

Solution: Volume measures the space inside a 3D shape (cubic units like in^3). Area measures a flat 2D surface (square units like in^2).

Answer: A. Volume measures 3D space (cubic units); area measures 2D surface (square units)

Write About the Math

The Writing Revolution

I can explain my work using the words volume, rectangular prism, dimensions, and base area.

1. Kernel Sentence

subject + verb

Model: Volume is how much space is inside a solid shape.
Volumen es cuánto espacio hay dentro de una figura sólida.

Write a kernel sentence about volume. Use a subject and a verb.
Escribe una oración base sobre volumen. Usa un sujeto y un verbo.

2. Sentence Expansion

because · but · so

Kernel: Volume matters in math
Volumen importa en matemáticas

Expand the kernel three ways. Add a reason, a contrast, and a result.

because *porque*

Volume matters in math because ____.
Volumen importa en matemáticas porque ____.

but *pero*

Volume matters in math, but ____.
Volumen importa en matemáticas, pero ____.

so *entonces*

Volume matters in math, so ____.
Volumen importa en matemáticas, entonces ____.

3. Sentence Types

4 ways to write a math idea

Statement
Afirmación

Tell one true fact about volume.
Di un hecho verdadero sobre volume.

Volume ____.

Question
Pregunta

Ask a question about volume.
Haz una pregunta sobre volume.

How does ____ ?
¿Cómo ____ ?

Exclamation
Exclamación

Show excitement about volume.
Muestra entusiasmo sobre volume.

Wow, ____ !
¡Guau, ____ !

Command
Mandato

Tell a partner what to do with volume.
Dile a un compañero qué hacer con volume.

First, ____ .
Primero, ____ .

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4. Explain Your Reasoning

use a sentence starter

I multiplied ____ by ____ by ____.
Multipliqué ____ por ____ por ____.

The volume is ____.
El volumen es ____.

I would use this to ____.
Usaría esto para ____.

Try It

Solve on your own. Check the answer key when you are done.

1. How is volume different from area?

A. Volume measures 3D space (cubic units); area measures 2D surface (square units)

B. Volume uses square units; area uses cubic units

C. Volume only applies to cubes; area applies to all shapes

D. There is no difference

Show your work:

2. Two boxes: Box A is 10 × 5 × 4 inches. Box B is 8 × 6 × 5 inches. Which has more volume and by how much?

A. Box B by 40 in^3

B. Box A by 40 in^3

C. Box B by 60 in^3

D. They're equal

Show your work:

Stretch Your Thinking

Level 2 enrichment

Challenge task — explain your reasoning in full sentences.

A toy company ships action figures in boxes that are 4 × 3 × 6 inches. A shipping crate is 24 × 12 × 18 inches. How many action figure boxes fit in the crate? Explain your reasoning step by step.

Sentence starter: Each toy box has a volume of ____ in³. The crate has a volume of ____ in³. I can fit ____ boxes because ____. I checked by ____.

Show your work:

Reflect — Exit Ticket

A rectangular prism has l = 7 ft, w = 2 ft, h = 3 ft. What is the volume?

A. 42 ft³

B. 24 ft³

C. 42 ft²

D. 12 ft³

Your answer:

Answer Key & Teacher Guide

1. **Try It 1:** A. Volume measures 3D space (cubic units); area measures 2D surface (square units) — *Volume measures the space inside a 3D shape (cubic units like in^3). Area measures a flat 2D surface (square units like in^2).*
2. **Try It 2:** A. Box B by 40 in^3 — *Box A: $10 \times 5 \times 4 = 200\ in^3$. Box B: $8 \times 6 \times 5 = 240\ in^3$. Box B is bigger by 40 in^3.*
3. **Exit Ticket:** A. 42 ft^3 — *$V = 7 \times 2 \times 3 = 42$ cubic feet. Remember: volume uses cubic units (ft^3).*

Writing (TWR) — what to look for

- **Kernel sentence:** A complete sentence needs a subject and a verb. Example: Volume is how much space is inside a solid shape.
- **Expansion:** *because* gives a reason, *but* shows a contrast or exception, *so* shows a result. Answers vary; each must keep the kernel idea and add the correct kind of detail.
- **Sentence types:** Statement ends with a period, question with "?", exclamation with "!", and a command starts with an action verb (a "bossy" verb).