Name & Surname: _____ Class: _____ Date: _____

Volume With Fractions



Pack cubes, then multiply edges

About 45 minutes Level ★★★☆☆

Volume With Fractions

Volume is the **space** inside a solid, measured in **cubic units**.

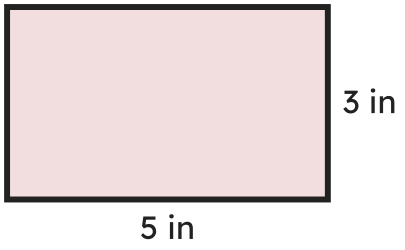
- Pack with **unit cubes**: if edges use halves, pack with $\frac{1}{2}$-in cubes and count them.
- Check by **multiplying**: V = l × w × h gives the same answer as packing.
- Use **base area**: V = b × h, where b = l × w, even with fractions.

Task A

/5

Find the area of each base. You will need base area for V = b × h.

1



Area: _____ **in²**

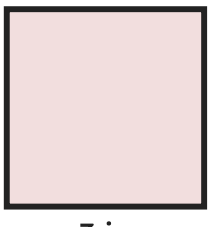
2



Area: _____ **in²**

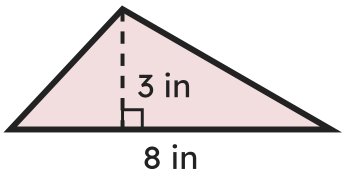
Perimeter: _____ **in**

3



Area: _____ **in²**

4



Area: _____ **in²**

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Multiply Edge Lengths

Pack with $\frac{1}{2}$-in cubes and multiply fractional edges.

Key words

volume: space inside a solid in cubic units

edge: line where two faces meet

cubic units: what you count volume in, like in^3 or ft^3

unit cube: 1 × 1 × 1 block used to fill a larger solid

base area: size of the bottom face, found with l × w

right rectangular prism: box with 6 rectangle faces and square corners

Task B

/12

Practice packing with fraction cubes and multiplying edges.

WARM UP

1. Find the **volume** of a prism with l = 3 in, w = 2 in, h = 4 in.

   Answer: _____

2. Find the **volume** with base area b = 12 in^2 and height h = 3 in.

   Answer: _____

3. A 2-in **edge** is packed with $\frac{1}{2}$-in cubes. How many cubes fit along the edge?

   Answer: _____

4. What is the **volume** of a unit cube with edge $\frac{1}{2}$ in?

   Answer: _____

PRACTICE

5. Find the **volume** with l = $2\frac{1}{2}$ in, w = 2 in, h = 1 in.

   Answer: _____

6. Find the **volume** with l = $\frac{3}{4}$ in, w = 2 in, h = 4 in.

   Answer: _____

7. Find the **volume** with base area b = $3\frac{1}{2}$ in^2 and height h = 2 in.

   Answer: _____

8. Student A says to find **volume** you add l + w + h. Explain how you know she is not correct.

   Answer: _____

PROBLEM SOLVING

9. A storage box is $4\frac{1}{2}$ in × 3 in × 2 in. Find its **volume**.

   Answer: _____

10. A small tank is 5 in × $3\frac{1}{2}$ in × 2 in. Find its **volume**.

    Answer: _____

11. A prism $1\frac{1}{2}$ in × 1 in × $\frac{1}{2}$ in is packed with $\frac{1}{2}$-in cubes. How many small **cubes** fit inside?

    Answer: _____

12. Explain how you know **packing** with $\frac{1}{2}$-in cubes gives the same **volume** as multiplying $1\frac{1}{2} \times 1 \times \frac{1}{2}$.

    Answer: _____

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Solve Real Problems

Use both volume formulas with fractions in real contexts.

Task C

/12

Use V = l × w × h and V = b × h with fractions.

WARM UP

1 Find the **volume** with l = 4 in, w = $1\frac{1}{2}$ in, h = 2 in.

Answer: _____

2 Find the **volume** with base area b = 8 in² and height h = $1\frac{1}{2}$ in.

Answer: _____

3 Find the **volume** with l = $\frac{1}{2}$ in, w = $\frac{2}{3}$ in, h = 3 in.

Answer: _____

4 What is the **volume** of a unit cube with edge $\frac{1}{3}$ in?

Answer: _____

PRACTICE

5 Find the **volume** with l = $3\frac{1}{2}$ in, w = $2\frac{1}{2}$ in, h = 2 in.

Answer: _____

6 Find the **volume** with base area b = $5\frac{1}{4}$ in² and height h = 4 in.

Answer: _____

7 A prism has **volume** 24 in³, l = 4 in, w = 3 in. Find the missing **height**.

Answer: _____

8 Student B says **volume** is measured in square inches. Explain how you know he is not correct.

Answer: _____

PROBLEM SOLVING

9 A shipping box is 6 in × $2\frac{1}{2}$ in × $3\frac{1}{2}$ in. Find its **volume**.

Answer: _____

10 A display case is 10 in × 4 in × $2\frac{1}{2}$ in. Find its **volume**.

Answer: _____

11 A planter box is $3\frac{3}{4}$ ft × 2 ft × $1\frac{1}{2}$ ft. Find its **volume**.

Answer: _____

12 Explain how you know V = b × h works when b = l × w has **fractions**.

Answer: _____

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Fractions and Tables

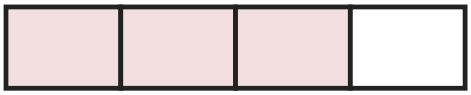
Name fractions and use them to find volume.

Task D

/4

Write the fraction shown or shade the fraction asked for.

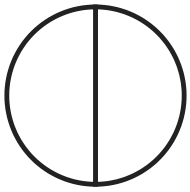
1



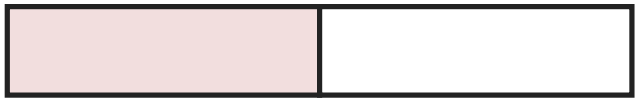
Fraction shaded: $\frac{\square}{\square}$

2

Shade $\frac{1}{2}$



3



$= \frac{1}{2}$



$= \frac{\square}{8}$

4



$\frac{2}{3}$



$\frac{3}{5}$

$\frac{2}{3}$ $\square$ $\frac{3}{5}$ Write <, > or =

Volume With Fractions

Task E

/4

Complete the table by finding the missing volume.

Length	Width	Height	Volume
$2\frac{1}{2}$ in	2 in	2 in	
$\frac{3}{4}$ in	2 in	4 in	
$3\frac{1}{2}$ in	2 in	3 in	
$1\frac{1}{2}$ in	$2\frac{1}{2}$ in	2 in	

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Show Your Method

Convert fractions and show each volume step.

⁒ Task F

/12

Fill in the missing fraction, decimal or percent.

Fraction	Decimal	Percentage
$\frac{1}{2}$		
$\frac{3}{4}$		
$\frac{1}{4}$		
	0.5	
	0.75	
		25%

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Volume With Fractions

Task G

/2

Follow the steps in each example, then try the paired question.

WORKED EXAMPLE

Work out the volume of a box $2\frac{1}{2}$ in × 2 in × 3 in.

1. Write V = l × w × h
2. Change $2\frac{1}{2}$ to $\frac{5}{2}$
3. V = $\frac{5}{2}$ × 2 × 3 = 15, so 15 in³

Answer: 15 in³

YOUR TURN

Work out the volume of a box $3\frac{1}{2}$ in × 2 in × 2 in.

Answer: _____

WORKED EXAMPLE

Work out the volume with base area $4\frac{1}{2}$ in² and height 3 in.

1. Write V = b × h
2. V = $4\frac{1}{2}$ × 3
3. $\frac{9}{2}$ × 3 = $\frac{27}{2}$ = $13\frac{1}{2}$, so $13\frac{1}{2}$ in³

Answer: $13\frac{1}{2}$ in³

YOUR TURN

Work out the volume with base area $6\frac{1}{2}$ in² and height 2 in.

Answer: _____

How did I do?

Circle a face for each line.

I can pack prisms with fraction unit cubes	☹	😐	☺
I can use V = l x w x h and V = b x h	☹	😐	☺
I can solve real problems with fractional edges	☹	😐	☺

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Answer sheet: Volume With Fractions

Task A

1. area = 15 in^2
2. area = 8 in^2, perimeter = 12 in
3. area = 9 in^2
4. area = 12 in^2

Task B

1. 24 in^3
2. 36 in^3
3. 4
4. $\frac{1}{8}$ in^3
5. 5 in^3
6. 6 in^3
7. 7 in^3
8. Adding gives a length, not cubic units. Volume must count cubes with l × w × h.
9. 27 in^3
10. 35 in^3
11. 6
12. Both give $\frac{3}{4}$ in^3. Six $\frac{1}{8}$-in^3 cubes make $\frac{6}{8} = \frac{3}{4}$, same as multiplying.

Task C

1. 12 in^3
2. 12 in^3
3. 3 in^3
4. $\frac{1}{27}$ in^3
5. $17\frac{1}{2}$ in^3
6. 21 in^3
7. h = 2 in
8. Volume counts cubes, so it uses cubic units like in^3, not square units.
9. $52\frac{1}{2}$ in^3
10. 100 in^3
11. $11\frac{1}{4}$ ft^3
12. b is still cubes in one layer. Times h layers gives the total, even with fractions.

Task D

1. $\frac{3}{4}$
2. Shade 1 of the 2 equal parts ($\frac{1}{2}$).
3. $\frac{1}{2} = \frac{4}{8}$ (shade 4 parts)
4. $\frac{2}{3} > \frac{3}{5}$

Task E

$2\frac{1}{2}$ in | 2 in | 2 in | 10 in³

$\frac{3}{4}$ in | 2 in | 4 in | 6 in³

$3\frac{1}{2}$ in | 2 in | 3 in | 21 in³

$1\frac{1}{2}$ in | $2\frac{1}{2}$ in | 2 in | $7\frac{1}{2}$ in³

Task F

1. $\frac{1}{2}$ = 0.5 = 50%
2. $\frac{3}{4}$ = 0.75 = 75%
3. $\frac{1}{4}$ = 0.25 = 25%
4. $\frac{1}{2}$ = 0.5 = 50%
5. $\frac{3}{4}$ = 0.75 = 75%
6. $\frac{1}{4}$ = 0.25 = 25%

Task G

1. 14 in³
2. 13 in³

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