Finding Volume Using Formulas

Finding Volume Using Formulas: Find, Fix, and Work Backward

Name _____ **Date** _____ **Score** _____ / 6

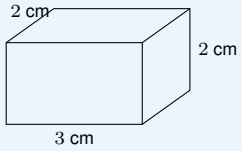
QUICK REVIEW

For a rectangular prism, $V = l \times w \times h = B \times h$, where B is base area. A 5 cm by 3 cm base has $B = 15$ cm^2; at height 4 cm, $V = 15 \times 4 = 60$ cm^3. To find height, divide volume by base area.

Worked example

Find the volume of a rectangular prism measuring 3 cm by 2 cm by 2 cm.

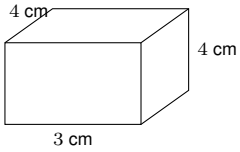
1. One layer or base has $3 \times 2 = 6$ square centimeters.
2. Volume is base area times height: $6 \times 2 = 12$ cubic centimeters.
3. Check the height: $12 \div 6 = 2$ cm.
Answer: 12 cm^3.



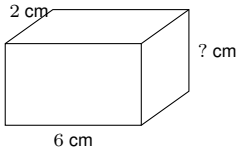
Practice Problems

Show your thinking.

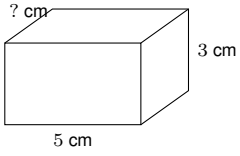
1. A student adds $3 + 4 + 4$ to find this prism's volume. Correct the operation and cubic unit.



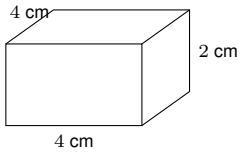
2. A prism has volume 24 cm^3 and base 6 cm by 2 cm. Find its height.



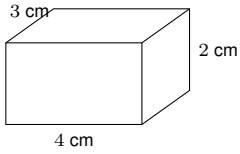
3. A prism has volume 45 cm^3, length 5 cm, and height 3 cm. Find its width.



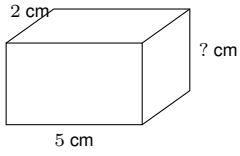
4. A prism measures 4 cm by 4 cm by 2 cm. Cut it horizontally into two equal-height prisms. Find each new height and volume.



5. A volume record gives the number 24 for this 4 cm by 3 cm by 2 cm prism, but labels it square centimeters. Verify the number and repair the unit.



6. Design a prism with volume 30 cm^3 using length 5 cm and width 2 cm. Find the required height.



Answer Key

1. 48 cm^3.
2. 2 cm.
3. 3 cm.
4. Height 1 cm and volume 16 cm^3 each.
5. 24 cm^3, not square centimeters.
6. 3 cm.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. One layer or base has $3 \times 4 = 12$ square centimeters.
2. Volume is base area times height: $12 \times 4 = 48$ cubic centimeters.
3. Check the height: $48 \div 12 = 4$ cm.

Problem 2

1. Use the known base area $6 \times 2 = 12$ cm^2; missing height is $24 \div 12 = 2$ cm.
2. One layer or base has $6 \times 2 = 12$ square centimeters.
3. Volume is base area times height: $12 \times 2 = 24$ cubic centimeters.
4. Check the height: $24 \div 12 = 2$ cm.

Problem 3

1. The known length-height product is $5 \times 3 = 15$ cm^2; width is $45 \div 15 = 3$ cm.
2. One layer or base has $5 \times 3 = 15$ square centimeters.
3. Volume is base area times height: $15 \times 3 = 45$ cubic centimeters.
4. Check the height: $45 \div 15 = 3$ cm.

Problem 4

1. One layer or base has $4 \times 4 = 16$ square centimeters.
2. Volume is base area times height: $16 \times 2 = 32$ cubic centimeters.
3. Check the height: $32 \div 16 = 2$ cm.
4. Each height is $2 \div 2 = 1$ cm; each volume is $16 \times 1 = 16$ cm^3.

Problem 5

1. One layer or base has $4 \times 3 = 12$ square centimeters.
2. Volume is base area times height: $12 \times 2 = 24$ cubic centimeters.
3. Check the height: $24 \div 12 = 2$ cm.
4. All three dimensions contribute a length unit: cm $\times$ cm $\times$ cm $=$ cm^3.

Problem 6

1. Use the known base area $5 \times 2 = 10$ cm^2; missing height is $30 \div 10 = 3$ cm.
2. One layer or base has $5 \times 2 = 10$ square centimeters.
3. Volume is base area times height: $10 \times 3 = 30$ cubic centimeters.
4. Check the height: $30 \div 10 = 3$ cm.

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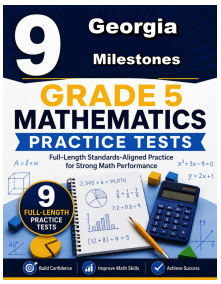

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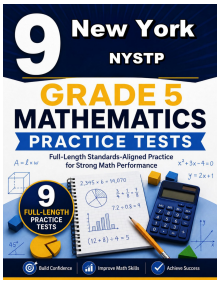

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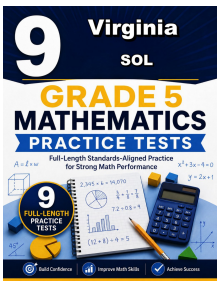

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