

Zero The Math Hero

Standard Mathematical Elements - Lesson 12

Lesson 12 demonstrates how to find the volume for a variety of 3-D figures, such as:

- Prisms
- Cylinders
- Cones
- Pyramids

Lesson 12 also describes how to identify the correct parts of the figures so the students will be able to substitute them into the formulas. The Pythagorean Theorem is also used in the process of finding volumes. Students will also learn to find both exact and approximate answers for cylinders and cones when using the number pi. Also, proofs and the use of deductive reasoning is introduced in this lesson. Two paragraph proofs are shown and explained by using given information and diagrams.

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Lesson 12 – Definitions

volume - the number of cubic units (units^3) needed to completely fill the inside of a 3-D figure

deductive reasoning - the process of thinking logically from given information to reach a conclusion

proof - the process of using deductive logic to show that a conjecture is true

Lesson 12 – Formulas

$V = Bh$ (volume of a prism)

$V = Bh$ or $V = \pi r^2 h$ (volume of a cylinder)

$V = 1/3Bh$ or $V = 1/3\pi r^2 h$ (volume of a cone)

$V = 1/3Bh$ (volume of a pyramid)

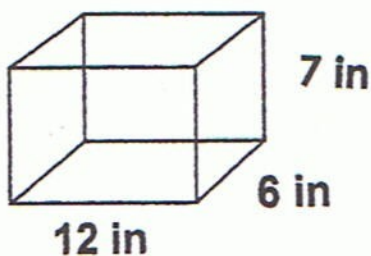
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Lesson 12 - Practice Problems

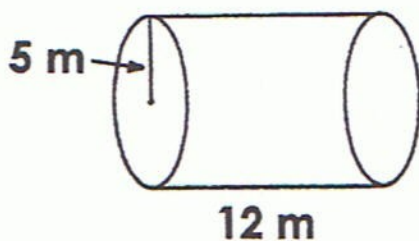
Volume and Proofs

1. Find the volume.



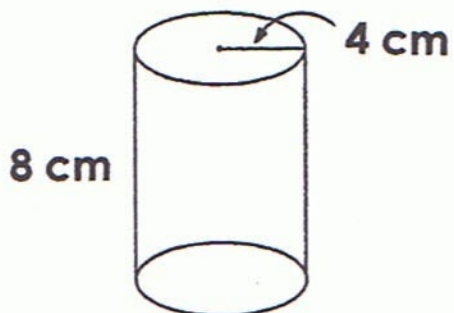
1. $V =$ _____

2. Find the volume in terms of pi.



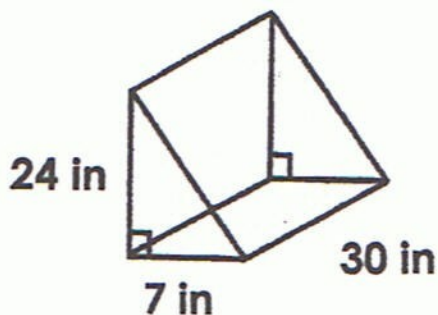
2. $V =$ _____

3. Find the volume to the tenths.



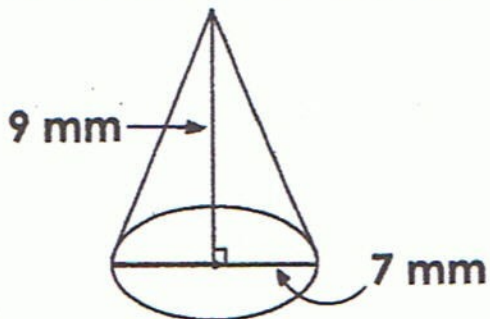
3. $V \approx$ _____

4. Find the volume.



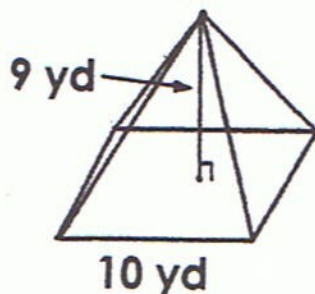
4. $V =$ _____

5. Find the volume in terms of pi.



5. $V =$ _____

6. Find the volume.



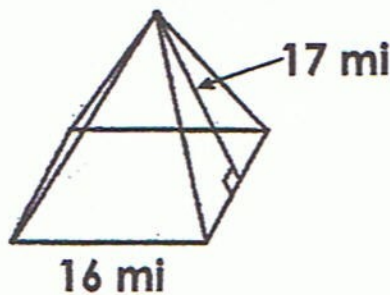
6. $V =$ _____

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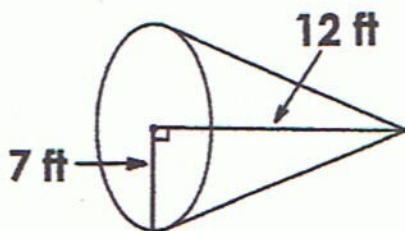
Lesson 12 - Practice Problems - Continued
Volume and Proofs

7. Find the volume.



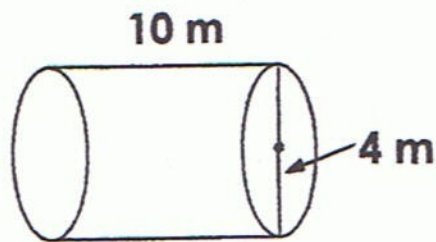
7. $V =$ _____

8. Find the volume in terms of pi.



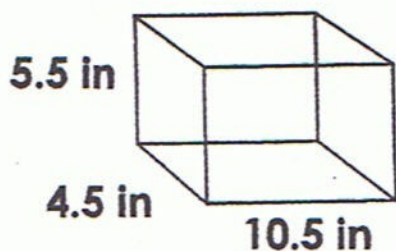
8. $V =$ _____

9. Find the volume to the tenths.



9. $V \approx$ _____

10. Find the volume.

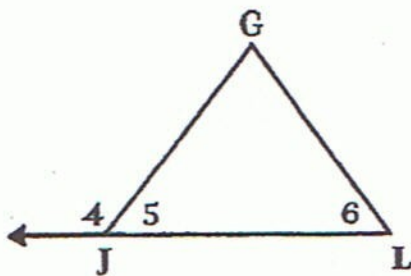


10. $V =$ _____

Write a paragraph proof using the given information and the diagram.

Given: $m\angle 4 + m\angle 6 = 180^\circ$

Prove: $m\angle 5 = m\angle 6$



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Quiz - Terms and Formulas
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Lesson 12 – Terms and Formulas

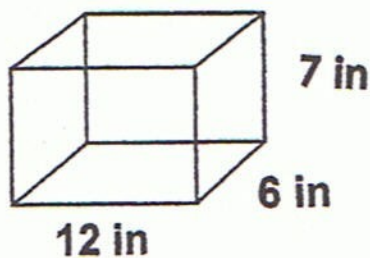
Directions: Fill in each blank with the letter that corresponds to the *best* answer, A-G.

- | | |
|---|---|
| 1. _____ the number of cubic units (units ³) needed to completely fill the inside of a 3-D figure | A. proof |
| 2. _____ the process of using deductive logic to show that a conjecture is true | B. $V = 1/3 Bh$ |
| 3. _____ the process of thinking logically from given information to reach a conclusion | C. $V = 1/3Bh$ <i>or</i>
$V = 1/3\pi r^2h$ |
| 4. _____ volume of a prism | D. volume |
| 5. _____ volume of a cone | E. $V = Bh$ |
| 6. _____ volume of a cylinder | F. $V = Bh$ <i>or</i>
$V = \pi r^2h$ |
| 7. _____ volume of a pyramid | G. deductive reasoning |

Lesson 12 - Practice Problems

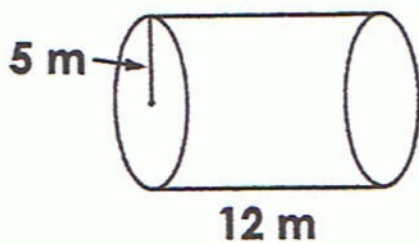
Volume and Proofs

1. Find the volume.



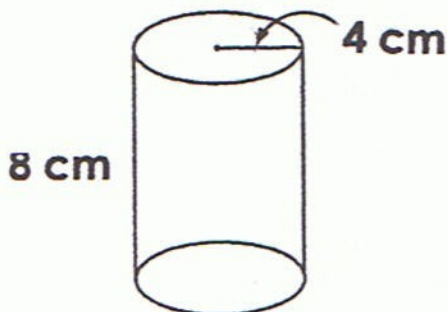
1. $v = 504 \text{ in}^3$

2. Find the volume in terms of pi.



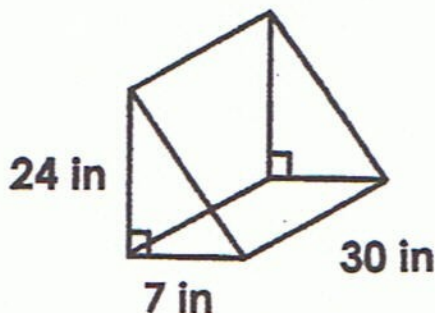
2. $v = 300\pi \text{ m}^3$

3. Find the volume to the tenths.



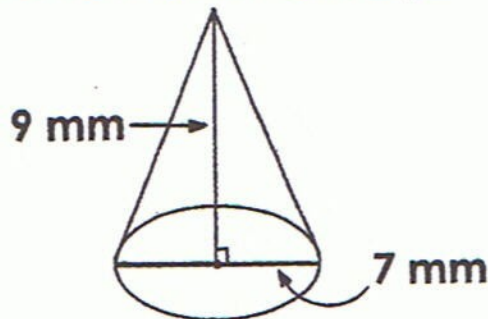
3. $v \approx 401.9 \text{ cm}^3$

4. Find the volume.



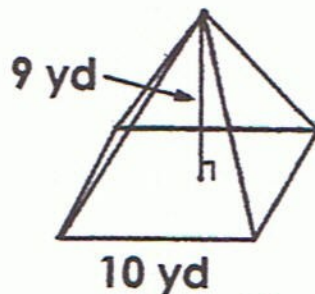
4. $v = 2,520 \text{ in}^3$

5. Find the volume in terms of pi.



5. $v = 36.75\pi \text{ mm}^3$

6. Find the volume.

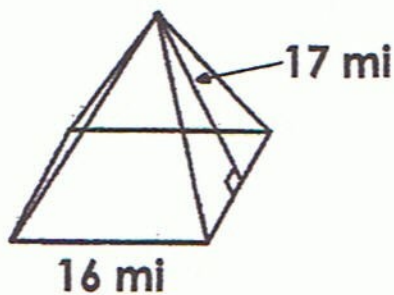


6. $v = 300 \text{ yd}^3$

Lesson 12 - Practice Problems - Continued

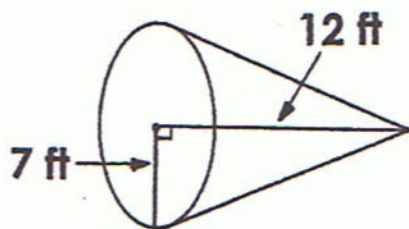
Volume and Proofs

7. Find the volume.



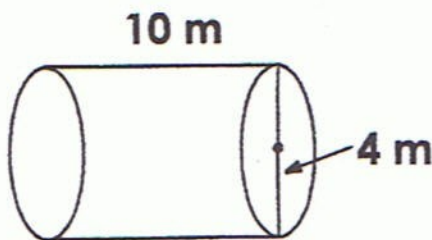
7. $v = \underline{1,280 \text{ mi}^3}$

8. Find the volume in terms of pi.



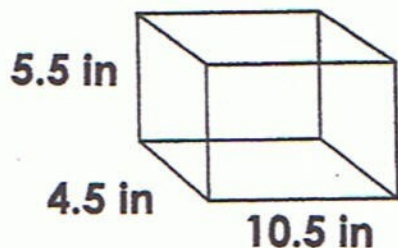
8. $v = \underline{196\pi \text{ ft}^3}$

9. Find the volume to the tenths.



9. $v \approx \underline{125.6 \text{ m}^3}$

10. Find the volume.



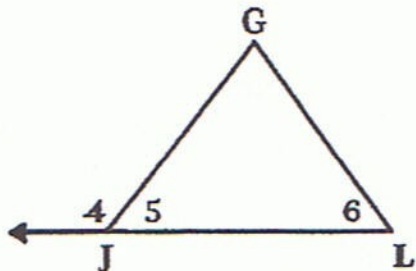
10. $v = \underline{259.875 \text{ in}^3}$

Write a paragraph proof using the given information and the diagram.

Given: $m\angle 4 + m\angle 6 = 180^\circ$

Prove: $m\angle 5 = m\angle 6$

We are given that $m\angle 4 + m\angle 6 = 180^\circ$.
 By the Angle Addition Postulate,
 $m\angle 4 + m\angle 5 = 180^\circ$. From the
 substitution property, $m\angle 4 + m\angle 5 =$
 $m\angle 4 + m\angle 6$. Now, using the subtraction
 property, $m\angle 5 = m\angle 6$.



Name: ANSWER KEY

Date: _____

Quiz - Terms and Formulas
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Lesson 12 – Terms and Formulas

Directions: Fill in each blank with the letter that corresponds to the *best* answer, A-G.

- | | |
|---|--|
| 1. <u>D</u> the number of cubic units (units^3) needed to completely fill the inside of a 3-D figure | A. proof |
| 2. <u>A</u> the process of using deductive logic to show that a conjecture is true | B. $V = 1/3 Bh$ |
| 3. <u>G</u> the process of thinking logically from given information to reach a conclusion | C. $V = 1/3Bh$ or
$V = 1/3\pi r^2h$ |
| 4. <u>E</u> volume of a prism | D. volume |
| 5. <u>C</u> volume of a cone | E. $V = Bh$ |
| 6. <u>F</u> volume of a cylinder | F. $V = Bh$ or
$V = \pi r^2h$ |
| 7. <u>B</u> volume of a pyramid | G. deductive reasoning |