

Volume of Pyramids

Name: _____ Date: _____ Score: _____ / 24

Q Quick Review

A **pyramid** has a flat base and triangular faces that meet at a single point on top. Its volume is $V = \frac{1}{3}Bh$, where B is the **area of the base** and h is the **height** (the straight-up distance from the base to the tip). A pyramid holds exactly *one third* as much as a prism with the same base and height. The trick is always to find the base area B first: for a square base it is side^2 , for a rectangular base it is $\text{length} \times \text{width}$. Volume is in *cubic* units.

◇ **Example:** Find the volume of a pyramid with a square base of side 6 cm and a height of 10 cm.
 ⇒ Start with the base area. The base is a square with side 6, so $B = 6^2 = 36$ square cm. Now use $V = \frac{1}{3}Bh$ with $B = 36$ and $h = 10$: $V = \frac{1}{3} \times 36 \times 10$. Multiply $36 \times 10 = 360$, then take a third: $360 \div 3 = 120$. The volume is 120 cubic centimeters.

Answer: $V = 120 \text{ cm}^3$

PRACTICE

Find the volume of each pyramid.

- | | | | |
|---------------------------------------|-------|--|-------|
| 1. Square base side 3, $h = 5$ | _____ | 11. Rect. base 8×3 , $h = 5$ | _____ |
| 2. Square base side 6, $h = 8$ | _____ | 12. Rect. base 10×6 , $h = 9$ | _____ |
| 3. Square base side 9, $h = 7$ | _____ | 13. Base area 27, $h = 5$ | _____ |
| 4. Square base side 10, $h = 12$ | _____ | 14. Base area 48, $h = 9$ | _____ |
| 5. Square base side 5, $h = 9$ | _____ | 15. Base area 75, $h = 8$ | _____ |
| 6. Square base side 4, $h = 6$ | _____ | 16. Base area 30, $h = 10$ | _____ |
| 7. Square base side 12, $h = 5$ | _____ | 17. Triangular base area 12, $h = 6$ | _____ |
| 8. Square base side 2, $h = 9$ | _____ | 18. Triangular base area 18, $h = 4$ | _____ |
| 9. Rect. base 6×4 , $h = 10$ | _____ | 19. Square base side 7, $h = 6$ | _____ |
| 10. Rect. base 5×9 , $h = 4$ | _____ | 20. Square base side 1, $h = 9$ | _____ |

◆ Word Problems

21. A glass paperweight is a pyramid with a square base of side 6 cm and a height of 8 cm. What is its volume? _____
22. A tent shaped like a pyramid has a rectangular floor 6 ft by 4 ft and a peak height of 10 ft. How much air does the tent hold?

23. A pyramid-shaped sandbox display has a base area of 75 ft^2 and a height of 8 ft. Find its volume. _____
24. A chocolate is molded as a pyramid with a square base of side 3 cm and height 5 cm. A box holds 24 of these chocolates. What total volume of chocolate is in the box? _____



Answer Keys

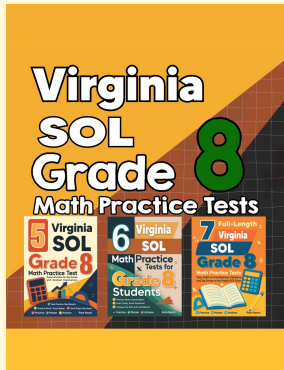
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| 5. <input type="text" value="75"/> | 17. <input type="text" value="24"/> |
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| 7. <input type="text" value="240"/> | 19. <input type="text" value="98"/> |
| 8. <input type="text" value="12"/> | 20. <input type="text" value="3"/> |
| 9. <input type="text" value="80"/> | 21. <input type="text" value="96 cm³"/> |
| 10. <input type="text" value="60"/> | 22. <input type="text" value="80 ft³"/> |
| 11. <input type="text" value="40"/> | 23. <input type="text" value="200 ft³"/> |
| 12. <input type="text" value="180"/> | 24. <input type="text" value="360 cm³"/> |

Step-by-Step Explanations

- | | |
|--|---|
| 1. $B = 9$, so $V = \frac{1}{3}(9)(5) = 15$. | 14. $V = \frac{1}{3}(48)(9) = 144$. |
| 2. $B = 36$, so $V = \frac{1}{3}(36)(8) = 96$. | 15. $V = \frac{1}{3}(75)(8) = 200$. |
| 3. $B = 81$, so $V = \frac{1}{3}(81)(7) = 189$. | 16. $V = \frac{1}{3}(30)(10) = 100$. |
| 4. $B = 100$, so $V = \frac{1}{3}(100)(12) = 400$. | 17. $V = \frac{1}{3}(12)(6) = 24$. |
| 5. $B = 25$, so $V = \frac{1}{3}(25)(9) = 75$. | 18. $V = \frac{1}{3}(18)(4) = 24$. |
| 6. $B = 16$, so $V = \frac{1}{3}(16)(6) = 32$. | 19. $B = 49$, so $V = \frac{1}{3}(49)(6) = 98$. |
| 7. $B = 144$, so $V = \frac{1}{3}(144)(5) = 240$. | 20. $B = 1$, so $V = \frac{1}{3}(1)(9) = 3$. |
| 8. $B = 4$, so $V = \frac{1}{3}(4)(9) = 12$. | 21. The base area is $6^2 = 36 \text{ cm}^2$, so $V = \frac{1}{3}(36)(8) = 96$ cubic centimeters. |
| 9. $B = 24$, so $V = \frac{1}{3}(24)(10) = 80$. | 22. The base area is $6 \times 4 = 24 \text{ ft}^2$, so $V = \frac{1}{3}(24)(10) = 80$ cubic feet. |
| 10. $B = 45$, so $V = \frac{1}{3}(45)(4) = 60$. | 23. With $B = 75$ and $h = 8$, $V = \frac{1}{3}(75)(8) = 200$ cubic feet. |
| 11. $B = 24$, so $V = \frac{1}{3}(24)(5) = 40$. | 24. One chocolate has $V = \frac{1}{3}(3^2)(5) = \frac{1}{3}(9)(5) = 15 \text{ cm}^3$. For 24 of them, $24 \times 15 = 360 \text{ cm}^3$. |
| 12. $B = 60$, so $V = \frac{1}{3}(60)(9) = 180$. | |
| 13. $V = \frac{1}{3}(27)(5) = 45$. | |



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