

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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|---------|-------------------------|
| 1. 15 | 13. 45 |
| 2. 96 | 14. 144 |
| 3. 189 | 15. 200 |
| 4. 400 | 16. 100 |
| 5. 75 | 17. 24 |
| 6. 32 | 18. 24 |
| 7. 240 | 19. 98 |
| 8. 12 | 20. 3 |
| 9. 80 | 21. 96 cm ³ |
| 10. 60 | 22. 80 ft ³ |
| 11. 40 | 23. 200 ft ³ |
| 12. 180 | 24. 360 cm ³ |

Step-by-Step Explanations

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