

# 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  $\text{side}^2$ , 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 $8 \times 3$ , $h = 5$  | _____ |
| 2. Square base side 6, $h = 8$        | _____ | 12. Rect. base $10 \times 6$ , $h = 9$ | _____ |
| 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 $6 \times 4$ , $h = 10$ | _____ | 19. Square base side 7, $h = 6$        | _____ |
| 10. Rect. base $5 \times 9$ , $h = 4$ | _____ | 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  $75 \text{ ft}^2$  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

- |                                      |                                          |
|--------------------------------------|------------------------------------------|
| 1. <input type="text" value="15"/>   | 13. <input type="text" value="45"/>      |
| 2. <input type="text" value="96"/>   | 14. <input type="text" value="144"/>     |
| 3. <input type="text" value="189"/>  | 15. <input type="text" value="200"/>     |
| 4. <input type="text" value="400"/>  | 16. <input type="text" value="100"/>     |
| 5. <input type="text" value="75"/>   | 17. <input type="text" value="24"/>      |
| 6. <input type="text" value="32"/>   | 18. <input type="text" value="24"/>      |
| 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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