

# 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. 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 <sup>3</sup>  |
| 10. 60  | 22. 80 ft <sup>3</sup>  |
| 11. 40  | 23. 200 ft <sup>3</sup> |
| 12. 180 | 24. 360 cm <sup>3</sup> |

### Step-by-Step Explanations

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