

Advanced Geometry

Geometry · Grade 7

Score: _____ / 10

★ Hard · 10 Questions

Solve each problem. Show your work in the space provided. Write your answer on the line.

- Find the volume of a cone with radius 6 cm and height 14 cm ($\pi \approx 3.14$).

Answer: _____

- Find the volume of a sphere with radius 9 cm ($\pi \approx 3.14$).

Answer: _____

3. A cone has the same base radius (5 cm) and height (12 cm) as a cylinder. What is the ratio of their volumes?

Answer: _____

4. A hemisphere (half sphere) has radius 7 cm. Find its volume ($\pi \approx 3.14$).

Answer: _____

5. A sphere fits exactly inside a cube (touching all 6 faces). The sphere has radius 5 cm. Find the volume of the empty space inside the cube. ($\pi \approx 3.14$)

Answer: _____

6. A hollow cylinder has outer radius 8 cm, inner radius 5 cm, and height 15 cm. Find the volume of the material ($\pi \approx 3.14$).

Answer: _____

7. Two cylinders have the same volume. Cylinder A has radius 3 cm and height 16 cm. Cylinder B has height 9 cm. Find the radius of Cylinder B.

Answer: _____

8. A cylinder of radius 3 cm contains 113.04 cm³ of water. Find the height of the water. ($\pi \approx 3.14$)

Answer: _____

9. A cone has volume 100.48 cm^3 and radius 4 cm. Find its height. ($\pi \approx 3.14$)

Answer: _____

10. A cylindrical tank of radius 7 cm has water filled to height 10 cm. Find the volume of water. ($\pi \approx 22/7$)

Answer: _____

Answer Key

Advanced Geometry — Hard

1. **527.52 cm³**

$$V = (1/3)\pi r^2 h = (1/3) \times 3.14 \times 36 \times 14 = (1/3) \times 1,582.56 = 527.52 \text{ cm}^3.$$

2. **3,052.08 cm³**

$$V = (4/3)\pi r^3 = (4/3) \times 3.14 \times 729 \approx 3,052.08 \text{ cm}^3.$$

3. **1:3**

$$\text{Cone: } (1/3)\pi r^2 h. \text{ Cylinder: } \pi r^2 h. \text{ Ratio} = 1:3.$$

4. **$\approx 718.01 \text{ cm}^3$**

$$\text{Full sphere: } (4/3) \times 3.14 \times 343 = 1,436.03. \text{ Hemisphere: } \div 2 \approx 718.01 \text{ cm}^3.$$

5. **$\approx 476.67 \text{ cm}^3$**

$$\text{Cube side}=10. \text{ Cube } V=1,000. \text{ Sphere: } (4/3) \times 3.14 \times 125 \approx 523.33. \text{ Space}=1000-523.33=476.67 \text{ cm}^3.$$

6. **$\approx 1,837 \text{ cm}^3$**

$$\text{Outer: } 3.14 \times 64 \times 15 = 3,014.4. \text{ Inner: } 3.14 \times 25 \times 15 = 1,177.5. \text{ Difference} \approx 1,836.9 \text{ cm}^3.$$

7. **4 cm**

$$V_A = \pi \times 9 \times 16 = 144\pi. V_B = \pi \times r^2 \times 9 = 144\pi. r^2 = 16. r = 4 \text{ cm}.$$

8. **4 cm**

$$V = \pi r^2 h. 113.04 = 3.14 \times 9 \times h = 28.26h. h = 4 \text{ cm}.$$

9. **6 cm**

$$V = (1/3)\pi r^2 h. 100.48 = (1/3) \times 3.14 \times 16 \times h = 16.747h. h \approx 6 \text{ cm}.$$

10. **1,540 cm³**

$$V = \pi r^2 h = (22/7) \times 49 \times 10 = 22 \times 7 \times 10 = 1,540 \text{ cm}^3.$$