

Geometry · Area and Volume Formulas · Quiz

Common Core G-GMD.A.1, G-GMD.A.3 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

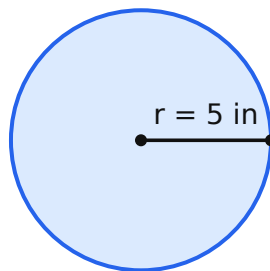
Answer these 10 multiple-choice questions on circle formulas, Cavalieri's principle and volumes of cylinders, pyramids, cones and spheres. Choose one answer for each question, then read the explanation.

GeometryCommon Core: **G-GMD.A.1 · G-GMD.A.3**

Questions

Question 1

What is the circumference of the circle?



A circle with radius 5 in.

- A. 25π in
- B. 5π in
- C. 10π in
- D. 20π in

Question 2

What is the area of a circle with a diameter of 12 cm?

- A. 144π cm²
- B. 12π cm²
- C. 36π cm²
- D. 72π cm²

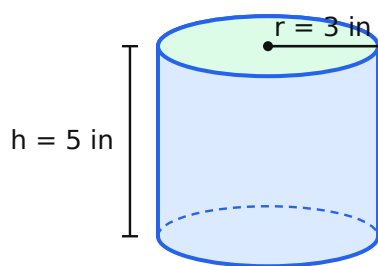
Question 3

Which statement is Cavalieri's principle?

- A. Solids with equal heights and equal cross-sectional areas at every level have equal volumes.
- B. Solids with equal heights always have equal volumes.
- C. Solids with equal surface areas always have equal volumes.
- D. Solids with equal base perimeters have equal volumes.

Question 4

What is the volume of the cylinder?

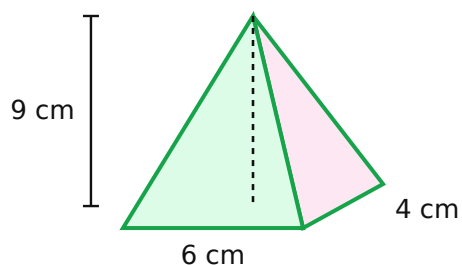


A cylinder, $r = 3 \text{ in}$, $h = 5 \text{ in}$.

- A. $15\pi \text{ in}^3$
- B. $30\pi \text{ in}^3$
- C. $75\pi \text{ in}^3$
- D. $45\pi \text{ in}^3$

Question 5

What is the volume of the rectangular pyramid?



A pyramid with a 6 cm by 4 cm base.

- A. 216 cm^3
- B. 72 cm^3
- C. 108 cm^3
- D. 24 cm^3

Question 6

A cylinder has a volume of $90\pi \text{ cm}^3$. A cone has the same radius and the same height. What is the volume of the cone?

- A. $270\pi \text{ cm}^3$
- B. $45\pi \text{ cm}^3$
- C. $30\pi \text{ cm}^3$
- D. $60\pi \text{ cm}^3$

Question 7

What is the volume of a sphere with a radius of 3 cm?

- A. $36\pi \text{ cm}^3$
- B. $12\pi \text{ cm}^3$
- C. $27\pi \text{ cm}^3$
- D. $108\pi \text{ cm}^3$

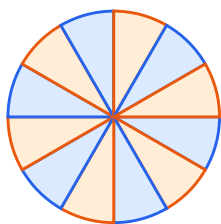
Question 8

The radius of a sphere is doubled. By what factor does its volume increase?

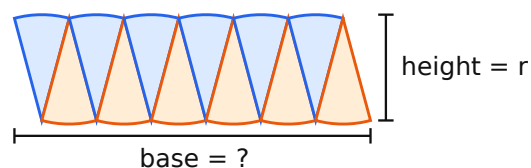
- A. It is multiplied by 2.
- B. It is multiplied by 4.
- C. It is multiplied by 6.
- D. It is multiplied by 8.

Question 9

A circle with radius r is cut into sectors and rearranged as shown. What is the length of the base of the new shape?



Circle cut into 12 sectors



Rearranged sectors.

- A. The whole circumference, $2\pi r$
- B. Half the circumference, πr
- C. The diameter, $2r$
- D. The radius, r

Question 10

A cone has a radius of 6 cm and a volume of $48\pi \text{ cm}^3$. What is its height?

- A. $\frac{4}{3}$ cm
- B. 8 cm
- C. 12 cm
- D. 4 cm

Answer key

1. **C** - $C = 2\pi r = 2\pi(5) = 10\pi$ in. Using πr^2 gives the area 25π , not the circumference.
2. **C** - The radius is 6 cm, so $A = \pi(6)^2 = 36\pi$. Squaring the diameter gives 144π , a common mistake.
3. **A** - Cavalieri's principle needs both equal heights and equal cross-sectional areas at every level, not just one measure.
4. **D** - $V = \pi r^2 h = \pi(9)(5) = 45\pi$ in³. Forgetting to square the radius gives 15π .
5. **B** - $V = (1/3)Bh = (1/3)(24)(9) = 72$ cm³. Leaving out the factor $1/3$ gives 216.
6. **C** - A cone with the same base and height as a cylinder holds one third as much: $90\pi \div 3 = 30\pi$ cm³.
7. **A** - $V = (4/3)\pi(27) = 36\pi$ cm³. Using r^2 instead of r^3 gives 12π .
8. **D** - Volume depends on r^3 , and $2^3 = 8$. A factor of 4 would be the change in surface area.
9. **B** - The sectors alternate up and down, so each edge of the base holds half of the circle's edge: πr .
10. **D** - $48\pi = (1/3)\pi(36)h = 12\pi h$, so $h = 4$ cm. Forgetting to multiply by 3 gives $4/3$.

Remember:

- Standards G-GMD.A.1 and G-GMD.A.3 cover informal arguments for circle and solid formulas, and solving volume problems.
- Circumference $C = 2\pi r$ and area $A = \pi r^2$ both come from the constant $\pi = C/d$.
- Cavalieri's principle: equal heights and equal cross-sectional areas at every level mean equal volumes.
- Cone and pyramid volumes are one third of the matching cylinder or prism: $V = (1/3)Bh$.
- Sphere volume $V = (4/3)\pi r^3$ equals two hemispheres, each a cylinder minus a cone.