Cylinder Surface Area and Volume

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Cylinder volume is $V = \pi r^2 h$; the wall area is $2\pi rh$. A closed cylinder adds two disk areas, an open-top cylinder only one. For $r = 2$ cm and $h = 5$ cm, the wall is 20π cm^2 and the closed area is 28π cm^2.

Worked example

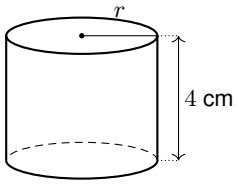
Find the exact volume for $r = 2$ cm and $h = 5$ cm.

1. Base area: $\pi(2)^2 = 4\pi$ cm^2.
2. Multiply by height: $(4\pi)(5) = 20\pi$ cm^3.
3. Check: $20\pi/(4\pi) = 5$ cm.
Answer: 20π cm^3.

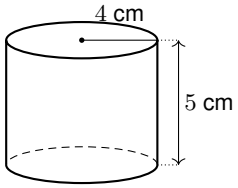
Practice Problems

Show your thinking.

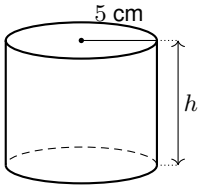
1. A cylinder has diameter 6 cm and height 4 cm. A student uses the diameter as the radius. Correct the exact volume.



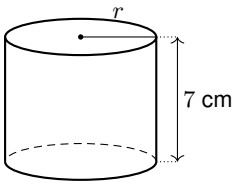
2. A closed cylinder has radius 4 cm and height 5 cm. A student counts only $2\pi rh$. Find the missing area and corrected total.



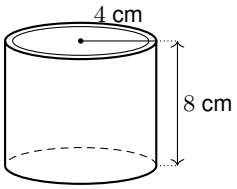
3. A rectangular label of area 60π cm^2 covers the curved wall of a radius-5 cm cylinder from base to top. It wraps once around without overlap. Find the cylinder height.



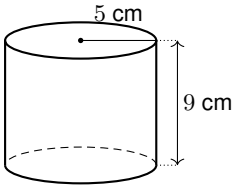
4. A cylinder has height 7 cm and volume 63π cm^3. Recover its radius.



5. A student includes two disks for an open-top cylinder of radius 4 cm and height 8 cm. Correct the area.



6. A student says doubling the radius from 5 cm to 10 cm doubles volume when height stays 9 cm. Calculate the true factor.



Answer Key

1. 36π cm^3.
2. Missing ends: 32π cm^2; total 72π cm^2.
3. 6 cm.
4. 3 cm.
5. 80π cm^2.
6. 225π and 900π cm^3; factor 4.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Halve the diameter: $r = 6/2 = 3$ cm.
2. Base area: $\pi(3)^2 = 9\pi$ cm^2.
3. Multiply by height: $(9\pi)(4) = 36\pi$ cm^3.

Problem 2

1. Two circular ends: $2\pi(4)^2 = 32\pi$ cm^2.
2. Curved wall: $2\pi(4)(5) = 40\pi$ cm^2.
3. Total: $(32 + 40)\pi = 72\pi$ cm^2.

Problem 3

1. Unrolled width is the circumference: $2\pi(5) = 10\pi$ cm.
2. The label spans the full height h, so its area gives $(10\pi)h = 60\pi$.
3. Divide by the width: $h = 60\pi/(10\pi) = 6$ cm.

Problem 4

1. Using $V = \pi r^2 h$ and the given height, $7\pi r^2 = 63\pi$.
2. Divide by 7π: $r^2 = 63/7 = 9$ cm^2.
3. Take the positive root: $r = \sqrt{9} = 3$ cm.

Problem 5

1. One bottom disk: $\pi(4)^2 = 16\pi$ cm^2.
2. Wall area: $2\pi(4)(8) = 64\pi$ cm^2.
3. Add only the bottom: $(16 + 64)\pi = 80\pi$ cm^2.

Problem 6

1. Original volume: $\pi(5)^2(9) = 225\pi$ cm^3.
2. New volume: $\pi(10)^2(9) = 900\pi$ cm^3.
3. Volume factor: $900\pi/(225\pi) = 4$.

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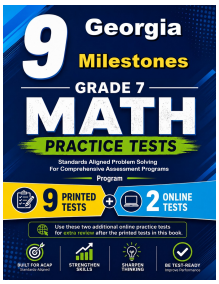

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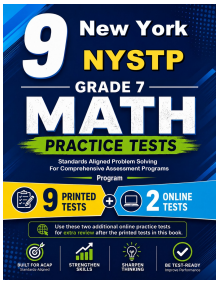

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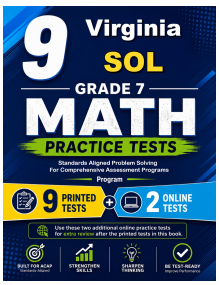

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