Cylinder Surface Area and Volume

Explore ideas and representations

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

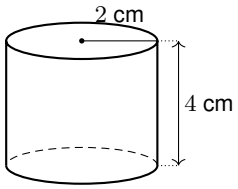
Find the exact volume for $r = 2$ cm and $h = 5$ cm.

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.

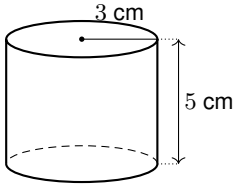
Practice Problems

Show your thinking.

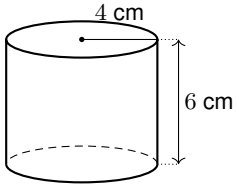
1. Find the exact volume of a cylinder of radius 2 cm and height 4 cm.



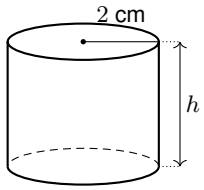
2. Find the exact surface area of a closed cylinder with radius 3 cm and height 5 cm.



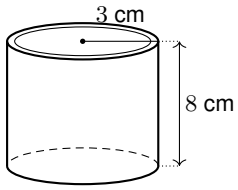
3. Unroll the wall of a cylinder of radius 4 cm and height 6 cm. Give the resulting rectangle dimensions and area.



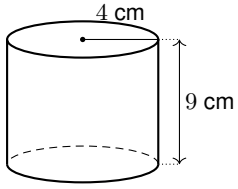
4. A cylinder has volume 28π cm^3 and radius 2 cm. Find its height.



5. Find exact material area for an open-top cylinder of radius 3 cm and height 8 cm.



6. Compare exact volumes for cylinders of height 9 cm and radii 4 cm and 8 cm. Find the volume factor.



Answer Key

1. 16π cm^3.
2. 48π cm^2.
3. 8π cm by 6 cm; 48π cm^2.
4. 7 cm.
5. 57π cm^2.
6. 144π and 576π cm^3; factor 4.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Base area: $\pi(2)^2 = 4\pi$ cm^2.
2. Multiply by height: $(4\pi)(4) = 16\pi$ cm^3.
3. Check: dividing 16π cm^3 by 4π cm^2 gives 4 cm.

Problem 2

1. Two circular ends: $2\pi(3)^2 = 18\pi$ cm^2.
2. Curved wall: $2\pi(3)(5) = 30\pi$ cm^2.
3. Total: $(18 + 30)\pi = 48\pi$ cm^2.

Problem 3

1. Unrolled width is the circumference: $2\pi(4) = 8\pi$ cm.
2. Height stays 6 cm.
3. Area is width times height: $8\pi(6) = 48\pi$ cm^2.

Problem 4

1. The given radius gives base area $\pi(2)^2 = 4\pi$ cm^2.
2. Divide volume by base area: $h = 28\pi/(4\pi) = 7$ cm.
3. Check: $(4\pi)(7) = 28\pi$ cm^3.

Problem 5

1. One bottom disk: $\pi(3)^2 = 9\pi$ cm^2.
2. Wall area: $2\pi(3)(8) = 48\pi$ cm^2.
3. Add only the bottom: $(9 + 48)\pi = 57\pi$ cm^2.

Problem 6

1. Original volume: $\pi(4)^2(9) = 144\pi$ cm^3.
2. New volume: $\pi(8)^2(9) = 576\pi$ cm^3.
3. Volume factor: $576\pi/(144\pi) = 4$.

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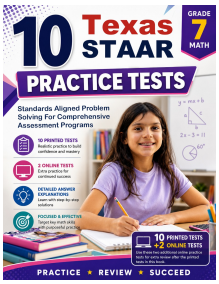

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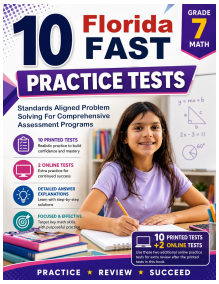

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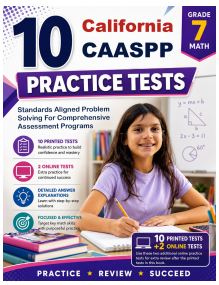

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