

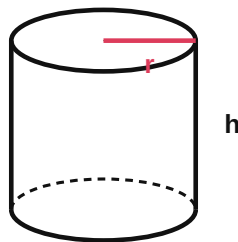
Boost Free Lessons - Year 10 Maths

Lesson 17: Surface Area of Cylinders

Name: _____ Grade: _____ Date: _____

Worked Example 1

Find the surface area of a closed cylinder with radius 5 cm and height 12 cm. Use $\pi \approx 3.14$.



1. A closed cylinder is made of two circular ends and one curved surface.
2. The two circles: $2\pi r^2 = 2 \times 3.14 \times 25 = 157$.
3. The curved surface unrolls into a rectangle: $2\pi rh = 2 \times 3.14 \times 5 \times 12 = 376.8$.
4. Add the two parts together: $157 + 376.8$.

$SA \approx 533.8 \text{ cm}^2$

Worked Example 2

Find the curved surface area only of a cylinder with diameter 8 m and height 10 m.

1. The formula uses the radius, so halve the diameter first: $r = 4 \text{ m}$.
2. Curved surface area $= 2\pi rh$.
3. $= 2 \times 3.14 \times 4 \times 10$.
4. This is the area of the label that would wrap around the outside.

$\approx 251.2 \text{ m}^2$

Remember: For a closed cylinder, $SA = 2\pi r^2 + 2\pi rh$. An open cylinder with no lid has only one circle, and a pipe open at both ends has none. Always halve the diameter to get the radius first.



Question 1: Find the total surface area of each closed cylinder. Use $\pi \approx 3.14$ and round to 1 decimal place.

1. $r = 2 \text{ cm}$, $h = 5 \text{ cm}$

2. $r = 3 \text{ cm}$, $h = 10 \text{ cm}$

3. $r = 7 \text{ cm}$, $h = 4 \text{ cm}$

4. $r = 1 \text{ cm}$, $h = 8 \text{ cm}$

5. $r = 10 \text{ cm}$, $h = 20 \text{ cm}$

6. $r = 6 \text{ cm}$, $h = 6 \text{ cm}$

7. $r = 4 \text{ cm}$, $h = 15 \text{ cm}$

8. $r = 2.5 \text{ cm}$, $h = 8 \text{ cm}$



Question 2: Answer the following. Use $\pi \approx 3.14$.

1. Find the curved surface area only, with $r = 5$ cm and $h = 9$ cm.
2. Find the curved surface area only, with $d = 12$ cm and $h = 7$ cm.
3. A can has $r = 4$ cm and $h = 11$ cm. Find its total surface area.
4. An open cylinder with no lid has $r = 3$ cm and $h = 8$ cm. Find its surface area.
5. A cylinder has a curved surface area of 251.2 cm^2 and $r = 4$ cm. Find its height.
6. Find the total surface area of a cylinder with $d = 10$ m and $h = 3$ m.



Question 3: Answer the following questions. Use $\pi \approx 3.14$.

1. A closed water tank has radius 1.5 m and height 4 m. Find the surface area to be painted.
2. A label wraps around the curved surface of a can with $r = 3.5$ cm and $h = 12$ cm. Find its area.
3. A pipe open at both ends has $r = 20$ cm and length 200 cm. Find its curved surface area.
4. A closed cylinder has $r = 6$ cm and $h = 6$ cm. If paint costs \$0.02 per cm^2 , find the cost of painting it.
5. Explain why the curved surface of a cylinder unrolls into a rectangle, and state its dimensions.





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Answers: Surface Area of Cylinders**Question 1**

- | | |
|--------------------------|----------------------------|
| 1. 87.9 cm ² | 5. 1 884.0 cm ² |
| 2. 244.9 cm ² | 6. 452.2 cm ² |
| 3. 483.6 cm ² | 7. 477.3 cm ² |
| 4. 56.5 cm ² | 8. 164.9 cm ² |

Question 2

- | | |
|--------------------------|--------------------------|
| 1. 282.6 cm ² | 4. 179.0 cm ² |
| 2. 263.8 cm ² | 5. $h = 10$ cm |
| 3. 376.8 cm ² | 6. 251.2 m ² |

Question 3

1. 51.8 m²
2. 263.8 cm²
3. 25 120 cm²
4. \$9.04
5. Cutting straight down the side and flattening it gives a rectangle of width $2\pi r$ (the circumference) and height h .

