

Cylinder Nets and Surface Area

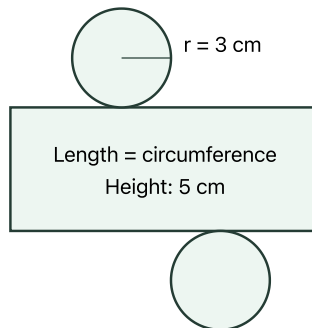
Compare your reasoning, not just the final result. Equivalent correct methods are welcome.

Public practice with published answers. This is not a full-topic readiness assessment.

1. A closed cylinder has radius 3 cm and height 5 cm. Draw its net and label the rectangle dimensions and the two circles. No area calculation is required.

Worked solution 1: Rectangle 6π cm by 5 cm; two circles of radius 3 cm.

1. The rectangle wraps once around a circle: $2\pi \times 3 = 6\pi$ cm.
2. Its other dimension is the cylinder height, 5 cm.
3. Attach two equal circular ends, each with radius 3 cm.



2 circular ends + one curved side · not to scale

Answer: closed cylinder net

2. A paper label covers only the curved side of a cylinder with radius 4 cm and height 9 cm. Find the label area exactly and using $\pi \approx 3.14$.

Worked solution 2: $72\pi \text{ cm}^2$, approximately 226.08 cm^2 .

1. The label is a rectangle with wrapping length $2\pi \times 4 = 8\pi \text{ cm}$.
2. Area = $8\pi \times 9 = 72\pi \text{ cm}^2$.
3. $72 \times 3.14 = 226.08 \text{ cm}^2$. No circular ends are included.

$$r = 4 \text{ cm}$$

Length = circumference
Height: 9 cm

0 circular ends + one curved side · not to scale

Answer: label rectangle without end circles

3. A closed cylinder has diameter 10 cm and height 12 cm. Find total surface area exactly and using 3.14.

Worked solution 3: $170\pi \text{ cm}^2$, approximately 533.8 cm^2 .

1. Radius = $10 \div 2 = 5 \text{ cm}$.
2. Curved area = $2\pi \times 5 \times 12 = 120\pi \text{ cm}^2$.
3. Two ends = $2\pi \times 5^2 = 50\pi \text{ cm}^2$.
4. Total = $170\pi \text{ cm}^2 \approx 533.8 \text{ cm}^2$.

$$r = 5 \text{ cm}$$

Length = circumference
Height: 12 cm

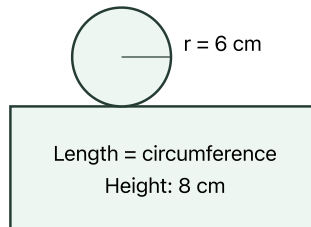
2 circular ends + one curved side · not to scale

Answer: dimensions of the closed net

4. A cylindrical container is open at the top and has radius 6 cm and height 8 cm. Sketch a net showing only its surfaces and find their total area in terms of π .

Worked solution 4: $132\pi \text{ cm}^2$: a rectangle and one circular base.

1. Curved area = $2\pi \times 6 \times 8 = 96\pi \text{ cm}^2$.
2. There is only one circular base: $\pi \times 6^2 = 36\pi \text{ cm}^2$.
3. Total = $96\pi + 36\pi = 132\pi \text{ cm}^2$. An open top contributes no surface.



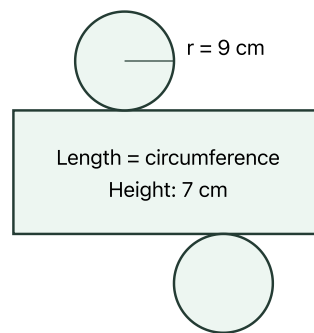
1 circular ends + one curved side · not to scale

Answer: open container has one circular base

5. The rectangle in a closed cylinder net is 18π cm long and 7 cm wide. Find the cylinder radius and total surface area in terms of π .

Worked solution 5: Radius 9 cm; total surface area 288π cm².

1. The wrapping length gives $2\pi r = 18\pi$, so $r = 9$ cm.
2. The cylinder height is 7 cm. Curved area = $18\pi \times 7 = 126\pi$ cm².
3. Two ends = $2\pi \times 9^2 = 162\pi$ cm².
4. Total = $126\pi + 162\pi = 288\pi$ cm².



2 circular ends + one curved side · not to scale

Answer: recovered cylinder net

6. A cardboard sleeve covers the curved side of a cylinder of radius 5 cm and height 11 cm. It needs a 2 cm overlap along the wrapping direction, with no overlap added to the height. Find the rectangular cardboard area using $\pi \approx 3.14$.

Worked solution 6: 367.4 cm².

1. The wrapping length without overlap is $2\pi \times 5 = 10\pi$ cm.
2. Add the 2 cm overlap: rectangle length = $10\pi + 2$ cm.
3. Area = $(10\pi + 2) \times 11 = 110\pi + 22$ cm².
4. Using 3.14 gives $345.4 + 22 = 367.4$ cm². No end circles are needed.

Add 2 cm to the rectangle length

$$r = 5 \text{ cm}$$

Length = circumference + 2 cm
Height: 11 cm

0 circular ends + one curved side · not to scale

Answer: sleeve with wrapping overlap