Get out your homework and have it ready to check.

Classwork - Surface Area of Cylinders

Name each net and find the surface area of the following nets. SHOW WORK AND LABEL.

1)

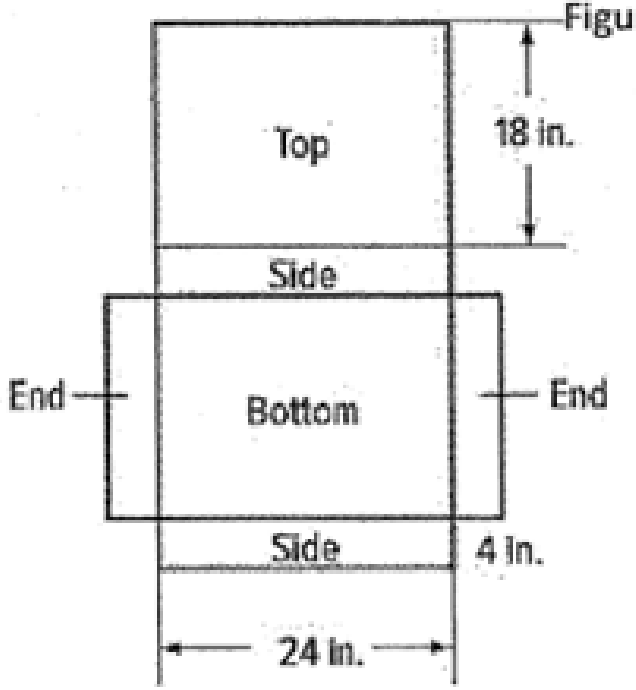


Figure Name→ Rectangular Prism

Top & Bottom $A = 24 \cdot 18 = 432 in^2 (2) = 864 in^2$

Sides $A = 24 \cdot 4 = 96 in^2 (2) = 192 in^2$

Ends $A = 4 \cdot 18 = 72 in^2 (2) = 144 in^2$

$864 + 192 + 144$

Surface Area = $1200 in^2$

2)

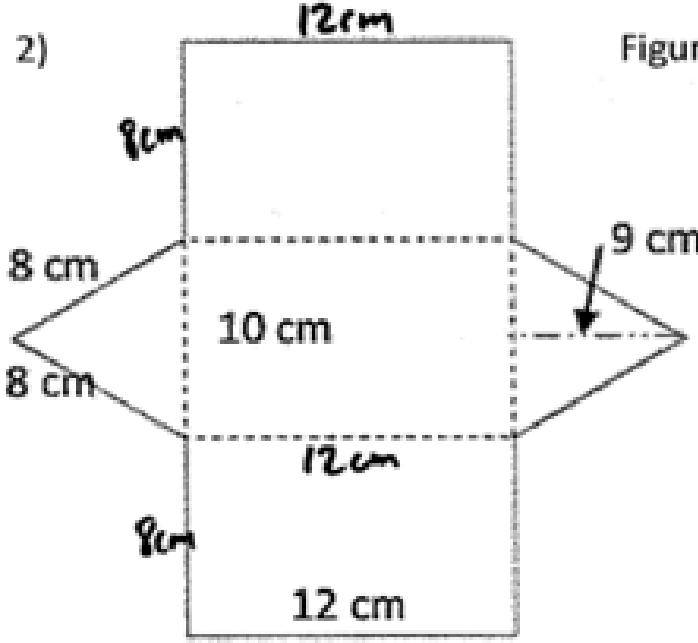


Figure Name→ Triangular Prism

Triangles $A = \frac{1}{2}(9)(10) = 45\,cm^2(2) = \underline{90\,cm^2}$

Side □s $A = 12(8) = 96\,cm^2(2) = \underline{192\,cm^2}$

Bottom □ $A = 10(12) = \underline{120\,cm^2}$

$90+192+120$

Surface Area = $\underline{402\,cm^2}$

3)

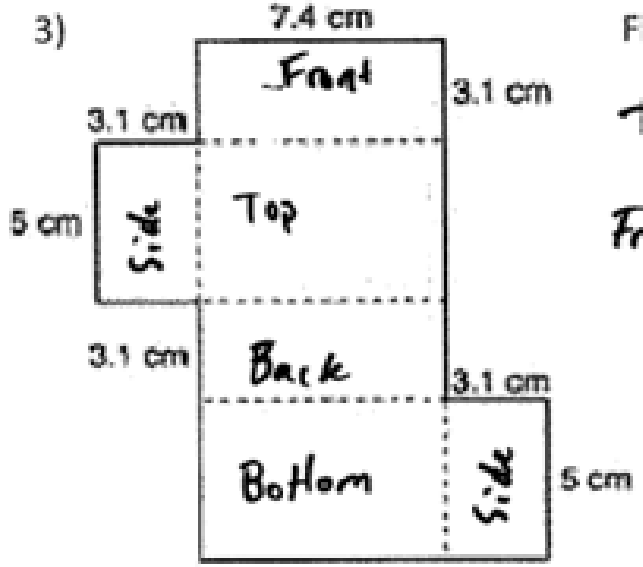


Figure Name→ Rectangular Prism

Top & Bottom $A = 5(7.4) = 37\,cm^2(2) = \underline{74\,cm^2}$

Front & Back $A = 7.4(3.1) = 22.94\,cm^2(2) = \underline{45.88\,cm^2}$

Sides $A = 5(3.1) = 15.5\,cm^2(2) = \underline{31\,cm^2}$

$74+45.88+31$

Surface Area = $\underline{150.88\,cm^2}$

4) HINT → You have to use the Pythagorean Theorem to the find the height of the triangles.

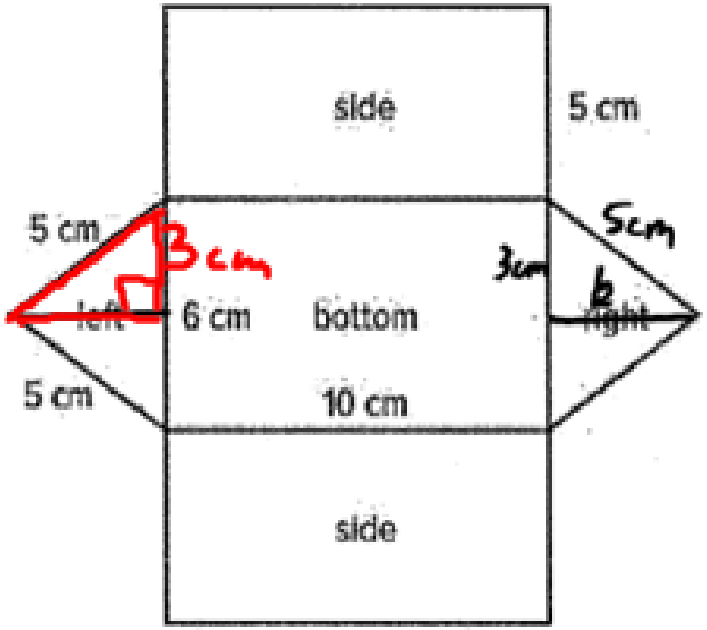


Figure Name → Triangular Prism

Triangles $A = \frac{1}{2}(6)(4) = 12\,cm^2(2) = 24\,cm^2$

Sides $A = 5(10) = 50\,cm^2(2) = 100\,cm^2$

Bottom □ $A: 6 \cdot 10 = 60\,cm^2$

$24 + 100 + 60$

$3^2 + b^2 = 5^2$

$9 + b^2 = 25$

$-9 \quad -9$

$\sqrt{b^2} = \sqrt{16}$

$b = 4\,cm$

Surface Area = $184\,cm^2$

5)

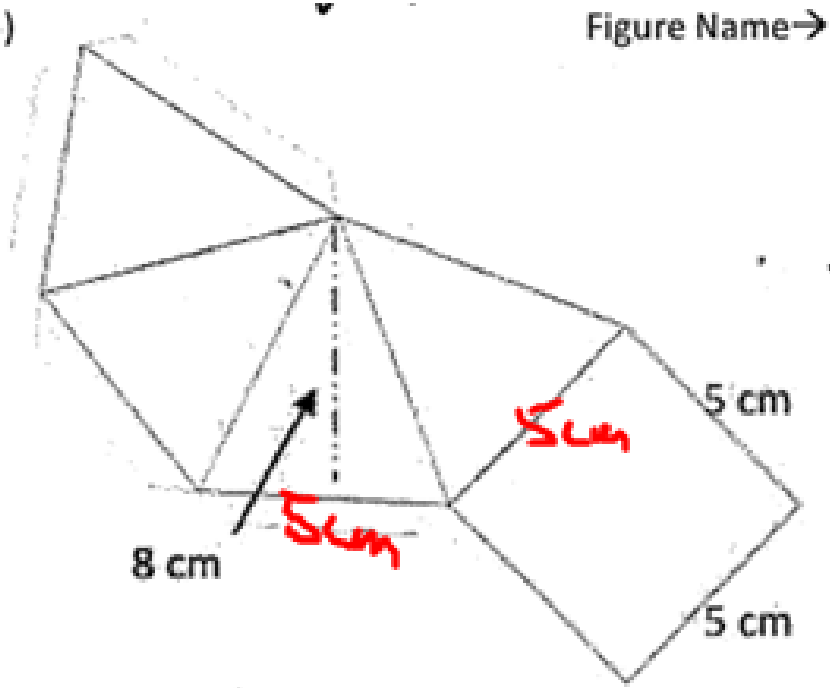


Figure Name→ Square Pyramid

Square Base $A = 5(5) = 25\,cm^2$

Triangles $A = \frac{1}{2}(5)(8) = 20\,cm^2$

$20\,cm^2(4) = 80\,cm^2$

$25 + 80$

Surface Area = $105\,cm^2$

Real-World Link

Bakery The Shiny Bright bakery is making a cake for Maria's quinceañera. The cake will be in the shape of a cylinder with a height of 4 inches and a diameter of 14 inches.

1. What are the shapes that make up the net of the cake? Sketch the net in the space provided.

2. How is the length of the rectangle related to the circles that form the top and bottom of the cake?

3. Find the area of each part of the cake. Round to the nearest whole number.

   Top: ☐ in^2 Bottom: ☐ in^2 Side: ☐ in^2

4. Add the values from Exercise 3. What is the total surface area of the cake? ☐ in^2

Surface Area of a Cylinder

Lateral Area

Words The lateral area *L.A.* of a cylinder with height h and radius r is the circumference of the base times the height.

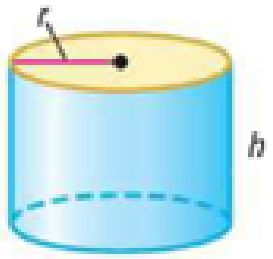
Symbols $L.A. = 2\pi rh$

Total Surface Area

Words The surface area *S.A.* of a cylinder with height h and radius r is the lateral area plus the area of the two circular bases.

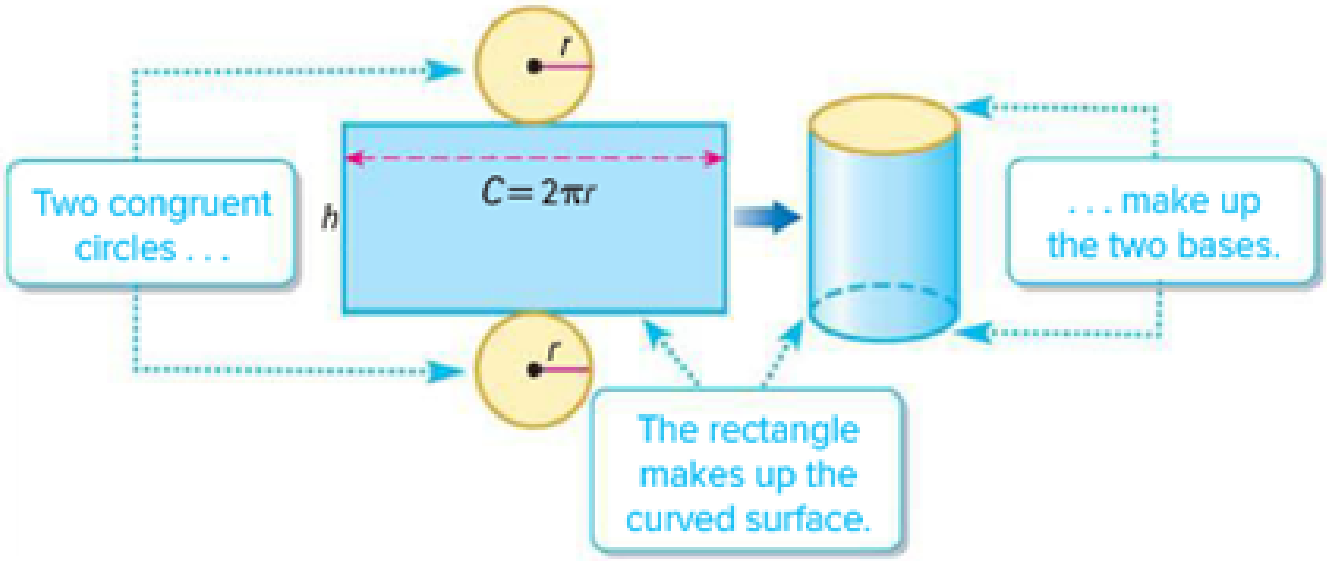
Symbols $S.A. = L.A. + 2\pi r^2$ or $S.A. = 2\pi rh + 2\pi r^2$

Model



area of base $= \pi r^2$

You can find the surface area of a cylinder using a net.



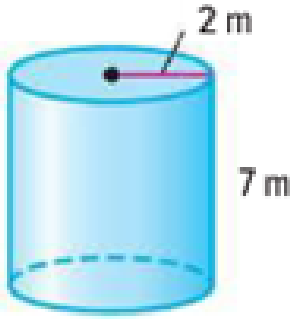
In the diagram above, the length of the rectangle is the same as the circumference of the circle, $2\pi r$. Also, the width of the rectangle is the same as the height of the cylinder.

The **lateral area** of a three-dimensional figure is the surface area of the figure, excluding the area of the base(s). So, the lateral area of a cylinder is the area of curved surface.

The **total surface area** of a three-dimensional figure is the sum of the areas of all its surfaces.

Example

1. **Find the surface area of the cylinder. Round to the nearest tenth.**



$S.A. = 2\pi rh + 2\pi r^2$ Surface area of a cylinder

$S.A. = 2\pi(2)(7) + 2\pi(2)^2$ Replace r with 2 and h with 7.

$S.A. \approx 113.1$ Simplify.

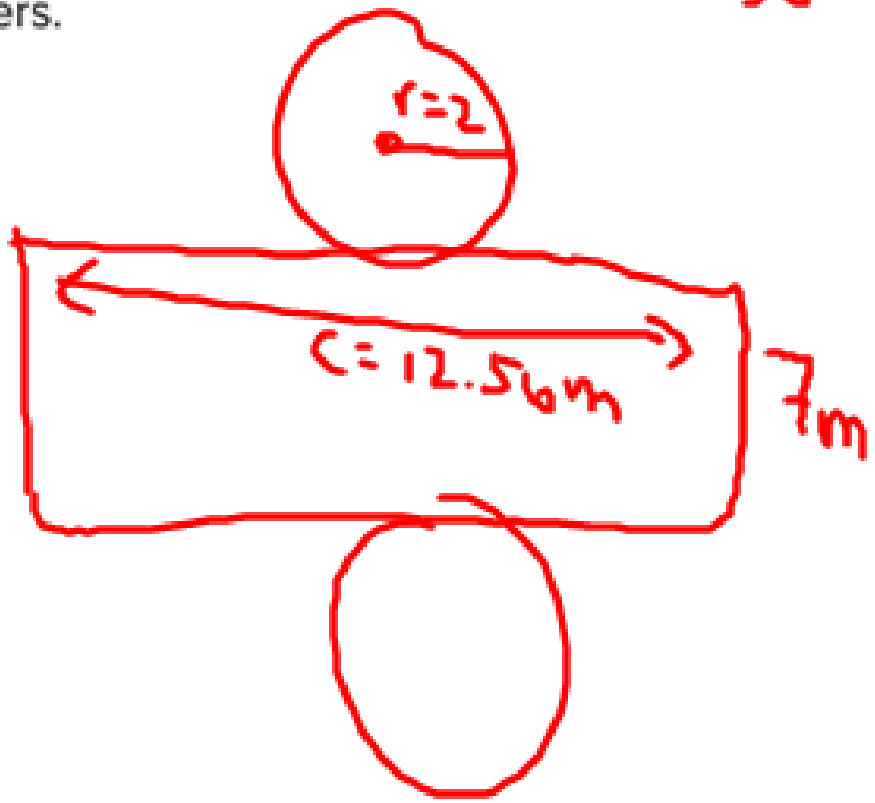
The surface area is about 113.1 square meters.

$SA = 87.92 + 12.56 + 12.56$

$C = 2 \cdot 3.14 \cdot 2 = 12.56$

$L.A. = 12.56(7) = 87.92 m^2$

$A \text{ of } O = 3.14 \cdot 2^2 = 12.56 m^2$

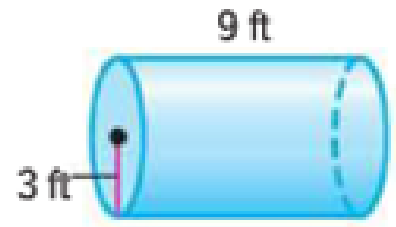


Got it? Do these problems to find out.

$C = 2\pi r$ $C = \pi d$

Find the surface area of each cylinder. Round to the nearest tenth.

a.



b.

$C = 3.14 \cdot 14 = 43.96$

$LA = 43.96(10) = 439.6 cm^2$

circum

$LA = 2 \cdot 3.14 \cdot 3 = 18.84 ft$

$LA = 18.84 \cdot 9 = 169.56 ft^2$

$A \text{ of } O = 3.14(7)^2 = 153.86 cm^2$

$A \text{ of } O = 3.14 \cdot 3^2 = 28.26 ft^2$

$SA = 439.6 + 153.86 + 153.86$

$SA = 747.3 cm^2$

$SA = 169.56 + 28.26 + 28.26 = 226.1 ft^2$

Example

2. **A circular fence that is 2 feet high is to be built around the outside of a carousel. The distance from the center of the carousel to the edge of the fence will be 35 feet. What is the area of the fencing material that is needed to make the fence around the carousel?**

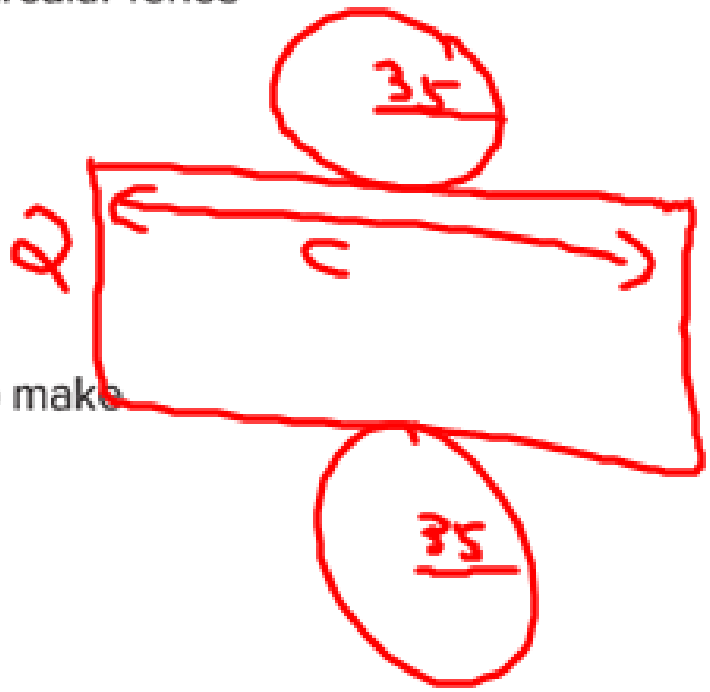
You need to find the lateral area. The radius of the circular fence is 35 feet. The height is 2 feet.

$L.A. = 2\pi rh$ Lateral area of a cylinder

$L.A. = 2\pi(35)(2)$ Replace r with 35 and h with 2.

$L.A. \approx 439.8$ Simplify.

So, about 439.8 square feet of material is needed to make the fence.



Got it? Do these problems to find out.

c. Find the area of the label of a can of tuna with a radius of 5.1 centimeters and a height of 2.9 centimeters. Round to the nearest tenth.

LA

d. Find the total surface area of a cylindrical candle with a diameter of 4 inches and a height of 2.5 inches. Round to the nearest tenth.

c) 5.1

C = 32 cm

LA = 92.8 cm^2

2.9

$C = 2 \cdot 3.14 \cdot 5.1 = 32\,cm$

$LA = 32 \cdot 2.9 = 92.8\,cm^2$

d) SA = 56.5 in^2