

Geometry

9.2: Surface Area of Prisms and Cylinders

Name: _____

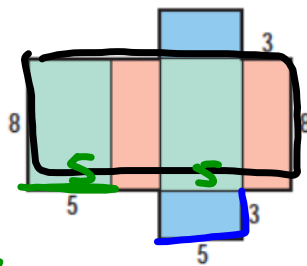
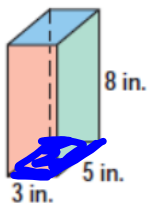
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Students will be able to find the surface area of prisms and cylinders.

☆ **Prism:** polyhedron with 2 bases that are $\cong$ and $\parallel$.

☆ **Surface area:** SA = sum of areas of all faces.

Example 1: Find the surface area of the rectangular prism.



Sides (green + orange)
 bh
 $(16)(8) = 128 \text{ in}^2$

Top and Bottom (Blue)

$$2 \cdot (5)(3)$$

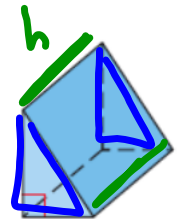
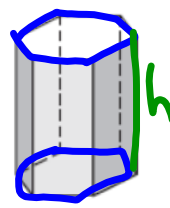
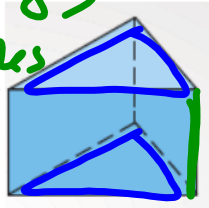
$$2 \cdot 15 = 30 \text{ in}^2$$

$$SA = 30 + 128$$

$$SA = 158 \text{ in}^2$$

☆Lateral Faces: (green + orange)
always rectangles

☆Height of a prism:
distance between
bases



If we look back at Example 1, we can find a shortcut for surface area.

Surface area = area of the bases + area of the lateral faces

$$SA = a \text{ of } B + (\text{perimeter of base})(\text{height of prism})$$

Surface Area of a Prism:

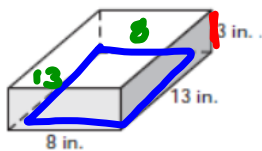
$$SA = 2(a \text{ of } B) + P \cdot h$$

$$SA = 2(\text{area of Base}) + (\text{Perimeter of Base})(\text{height of prism})$$



Example 2: Find a) the height b) the area of a base and c) the perimeter of a base.

1.

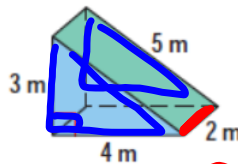


a) $h = 3 \text{ in}$

b) $8 \cdot 13 = 104 \text{ in}^2$

c) $P = 13 + 13 + 8 + 8 = 42 \text{ in}$

2.

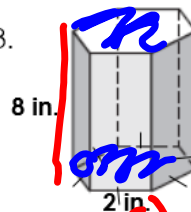


a) $h = 2 \text{ m}$

b) $\frac{3 \cdot 4}{2} = 6 \text{ m}^2$

c) $P = 3 + 4 + 5 = 12 \text{ m}$

3.



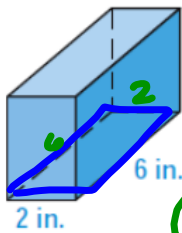
b) $B = 7 \text{ in}^2$

a) $h = 8 \text{ in}$

c) $P = 6 \cdot 2 = 12 \text{ in}$

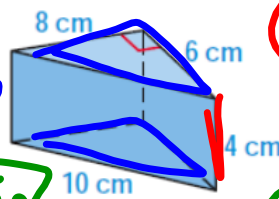
Try: Find a) the height b) the area of a base and c) the perimeter of a base

1.



a) $h = 3 \text{ in}$
 b) $A = 2 \cdot 6 = 12 \text{ in}^2$
 c) $P = 6 + 6 + 2 + 2 = 16 \text{ in}$

2.

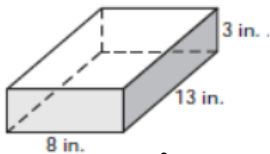


a) $4 \text{ cm} = h$
 b) $A = \frac{8 \cdot 6}{2} = 24 \text{ cm}^2$
 c) $P = 8 + 6 + 10 = 24 \text{ cm}$



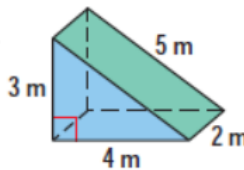
Example 3: Find the surface area of the figure.

1.



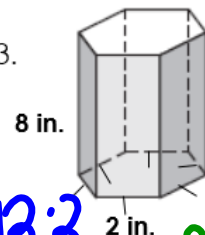
$SA = 2(\text{area of } B) + P \cdot h$
 $SA = 2(104) + 42 \cdot 3$
 $SA = 208 + 126$
 $SA = 334 \text{ in}^2$

2.



$SA = 2(6) + 12 \cdot 2$
 $SA = 12 + 24$
 $SA = 36 \text{ m}^2$

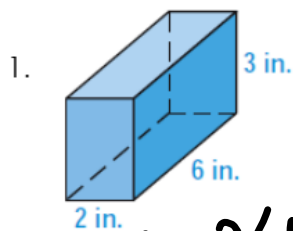
3.



$B = 7 \text{ in}^2$

$SA = 2(7) + 12 \cdot 8$
 $SA = 14 + 96$
 $SA = 110 \text{ in}^2$

Try: Find the surface area of the figure.

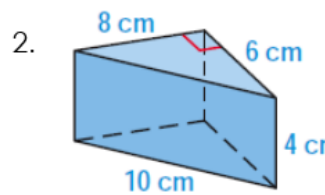


$$SA = 2(12) + 16 \cdot 3$$

$$SA = 24 + 48$$

Surface Area of a Cylinder

$$SA = 72 \text{ in}^2$$

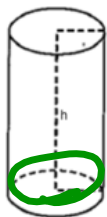


$$SA = 2(24) + 21 \cdot 4$$

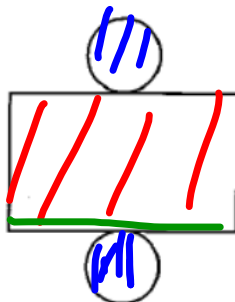
$$SA = 48 + 84$$

$$SA = 132 \text{ cm}^2$$

Rectangle
 $C \cdot h$



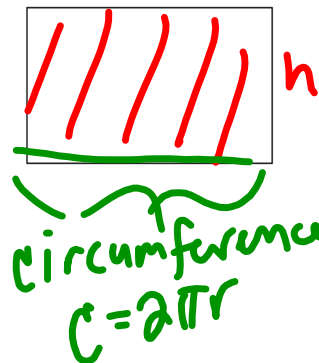
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=



+



Surface area = area of bases + lateral area

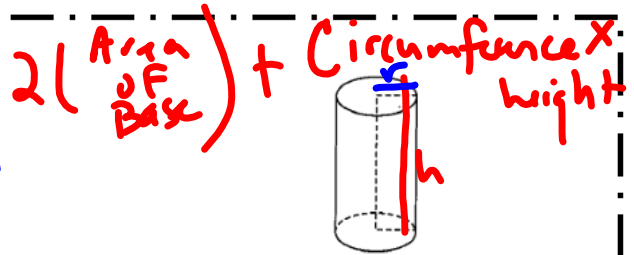
$$SA = 2B + C \cdot h$$

$$SA = 2(\pi r^2) + (2\pi r)h$$

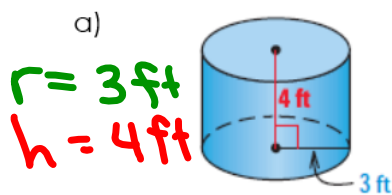
Surface Area of a Cylinder:

$$SA = 2B + Ch$$

$$SA = 2\pi r^2 + 2\pi rh$$



Example 4: Find the surface area of each cylinder using the formula. Round your answer to the nearest whole number.



$$r = 3 \text{ ft}$$

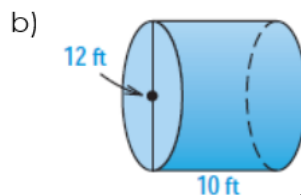
$$h = 4 \text{ ft}$$

$$SA = 2\pi(3)^2 + 2\pi(3)(4)$$

$$SA = 18\pi + 24\pi$$

$$SA = 42\pi$$

$$SA \approx 131.9 \approx \boxed{132 \text{ ft}^2}$$



$$r = 6 \text{ ft}$$

$$h = 10 \text{ ft}$$

$$SA = 2\pi(6)^2 + 2\pi(6)(10)$$

$$SA = 72\pi + 120\pi$$

$$SA = 192\pi$$

$$SA \approx \boxed{603 \text{ ft}^2}$$