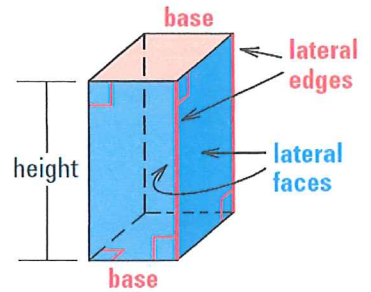


Basic Surface Area and Volume of Prisms and Cylinders- Notes

A **prism** is a polyhedron with two congruent faces, called **bases**, that lie in parallel planes. The other faces, called **lateral faces**, are parallelograms formed by connecting the corresponding vertices of the bases. The segments connecting these vertices are *lateral edges*.

The *altitude* or *height* of a prism is the perpendicular distance between its bases. In a **right prism**, each lateral edge is perpendicular to both bases. Prisms that have lateral edges that are not perpendicular to the bases are **oblique prisms**. The length of the oblique lateral edges is the *slant height* of the prism.



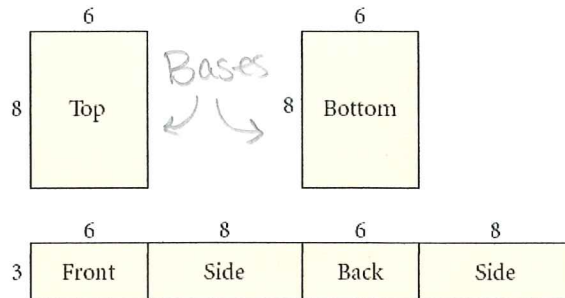
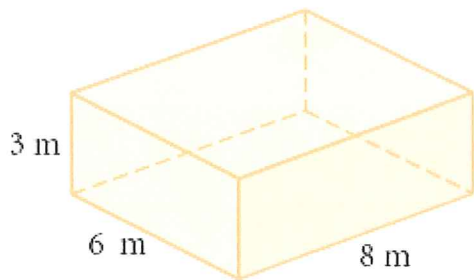
Right rectangular prism

Prisms:

Surface Area:	Lateral Area:	Volume:
Add up all areas of faces!	Area of all the faces except the bases!	$V = B \cdot h$ ↑ ↑ area of base height — connects the 2 bases

Example 1:

Find the volume, lateral area and surface area of the prism.



$$\begin{aligned}
 SA: & 2(3 \times 6) = 36 \\
 & 2(3 \times 8) = 48 \\
 & + 2(6 \times 8) = 96
 \end{aligned}$$

$$SA = 180 \text{ m}^2$$

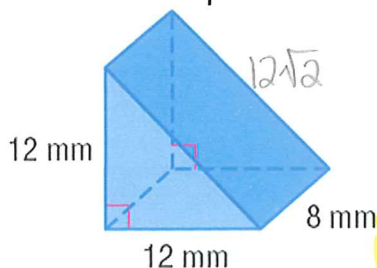
$$\begin{aligned}
 LA: & 2(3 \times 6) \\
 & + 2(8 \times 3)
 \end{aligned}$$

$$LA = 84 \text{ m}^2$$

$$\begin{aligned}
 V &= B \cdot h \\
 &= (6 \times 8)(3)
 \end{aligned}$$

$$V = 144 \text{ m}^3$$

Practice Example: Find the volume, lateral area and surface area of the prism.



$$\begin{aligned}
 SA &= 2\left(\frac{1}{2}\right)(12)(12) \\
 & 2(12 \times 8) \\
 & + 1(8 \times 12\sqrt{2})
 \end{aligned}$$

$$SA \approx 471.8 \text{ mm}^2$$

$$\begin{aligned}
 LA &: 2(12 \times 8) \\
 & + 1(8 \times 12\sqrt{2})
 \end{aligned}$$

$$LA \approx 327.8 \text{ mm}^2$$

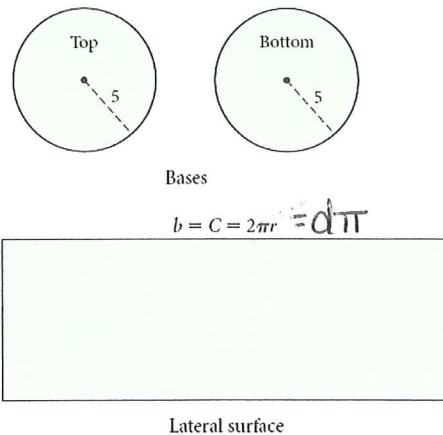
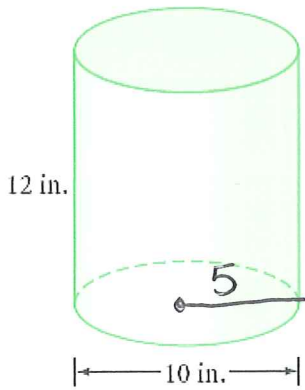
$$\begin{aligned}
 V &= B \cdot h \\
 V &= \frac{1}{2}(12)^2 \cdot 8
 \end{aligned}$$

$$V = 576 \text{ mm}^3$$

Cylinders:

<p><u>Surface Area:</u></p> <p>= 2 Circles + rectangle</p> $= 2\pi r^2 + d\pi h$ $= 2\pi r^2 + 2\pi r h$ <p style="text-align: center;"> \swarrow \uparrow B h </p>	<p><u>Lateral Area:</u></p> <p>LA = Rectangle</p> $= 2\pi r \cdot h$	<p><u>Volume:</u></p> $V = B \cdot h$ <p style="text-align: center;"> \nwarrow $\pi r^2 \cdot h$ \uparrow \uparrow Area of base height connecting the bases </p>
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Example 2:
Find the volume, lateral area and surface area of the prism.



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

$$= 2\pi 5^2 + 2\pi 5 \cdot 12$$

$$= 50\pi + 120\pi$$

$$= 170\pi$$

$$SA \approx 534.1 \text{ in}^2$$

$$LA = 2\pi r h$$

$$= 2\pi 5 \cdot 12$$

$$= 120\pi$$

$$LA \approx 376.99$$

$$LA \approx 377.0 \text{ in}^2$$

$$V = B \cdot h$$

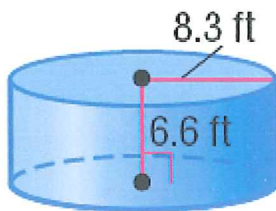
$$V = \pi r^2 \cdot h$$

$$V = \pi 5^2 \cdot 12$$

$$V = 300\pi$$

$$V \approx 942.5 \text{ in}^3$$

Practice Example: Find the volume, lateral area and surface area of the solid.



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

$$= 2\pi (8.3)^2 + 2\pi (8.3)(6.6)$$

$$= 137.78\pi + 109.56\pi$$

$$= 247.34\pi$$

$$SA \approx 777.0 \text{ ft}^2$$

$$LA = 2\pi r h$$

$$= 2\pi (8.3)(6.6)$$

$$= 116.16\pi$$

$$LA \approx 364.2 \text{ ft}^2$$

$$V = B \cdot h$$

$$V = \pi r^2 h$$

$$V = \pi (8.3)^2 (6.6)$$

$$V = 454.674\pi$$

$$V \approx 1428.4 \text{ ft}^3$$