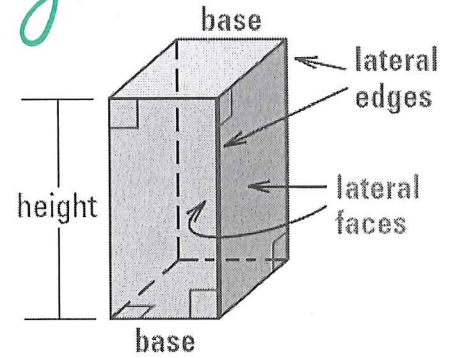# Basic Surface Area and Volume of Prisms - Notes

Key

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 (diagram labeled: base, lateral edges, height, lateral faces, base)

Surface Area:	Lateral Area:	Volume:
Add up all of the faces and bases	Add up all of the faces but NOT bases	$V = BH$ B = AREA of BASE and H= Height connecting two bases.

1. Name the figure, then find the volume and surface area of the prism.

(figure: rectangular prism with dimensions 10, 15, 15 m, 11 m, 10 m)
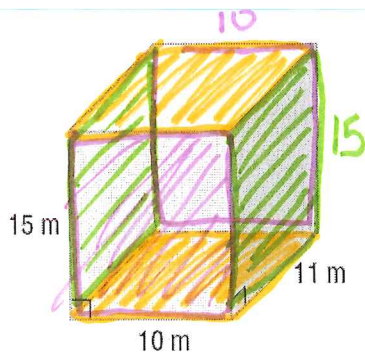
• Rectangular prism.

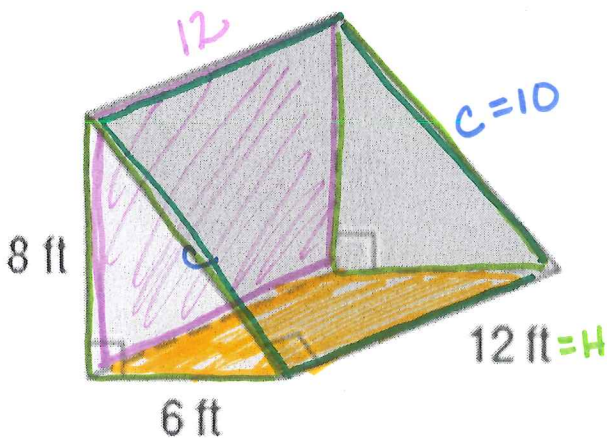$V = $ area of Base $\times$ height

$V = 10 \times 11 \cdot 15$

$\boxed{V = 1650 m^3}$

Surface Area

$2(10 \times 11)$
$+ 2(11 \times 15)$
$+ 2(15 \times 10)$

$\boxed{SA = 850 m^2}$

2. Name the figure, then find the volume, lateral area and surface area of the prism. Hint: find the missing edge 1st.

(figure: triangular prism with dimensions 12, C=10, 8 ft, 12 ft=H, 6 ft)

Name: triangular prism

$V = $ area of base $\times$ height

area of Base

$A_B = \frac{1}{2} 8 \cdot 6$ $H = 12$

$V = \frac{1}{2} 8 \cdot 6 \times 12$

$\boxed{V = 288 ft^3}$

Surface Area

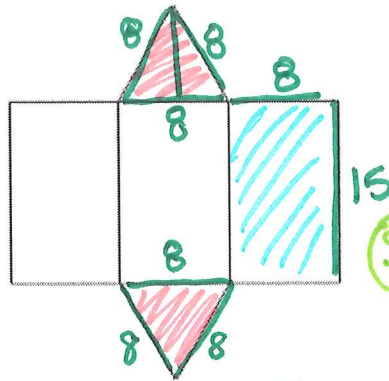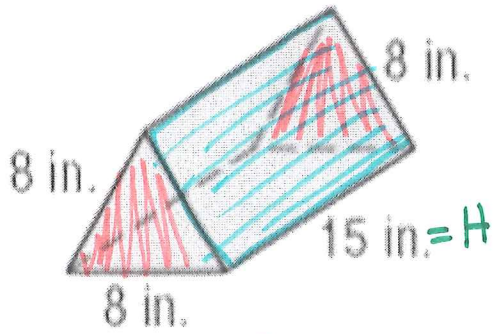$2(\frac{1}{2} 8 \cdot 6) + 10 \times 12$
$6 \cdot 12$
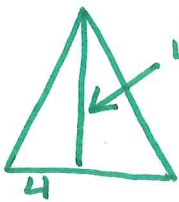$8 \cdot 12$

$\boxed{SA = 336 ft^2}$
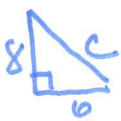
$8^2 + 6^2 = c^2$
$C = 10$

3. Name the figure, then find the volume and surface area of the prism.

ID: Triangular Prism

surface area

$$2(\tfrac{1}{2}8 \cdot 4\sqrt{3}) = 32\sqrt{3}$$
$$+ 3(15 \times 8) = 360$$

SA = $360 + 32\sqrt{3}$ in²

$S \approx 415.426$ in²

8 in.
8 in.
15 in.=H
8 in.

Area of Base

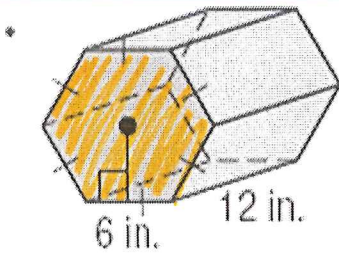$4\sqrt{3}$

$\tfrac{1}{2} 8 \cdot 4\sqrt{3}$

4

$$V = \text{area of base} \times H$$
$$V = \tfrac{1}{2} 8 \cdot 4\sqrt{3} \cdot 15$$
$$V = 240\sqrt{3} \text{ in}^3$$
$$\approx 415.692 \text{ in}^3$$

4. Name the figure, then find the volume and surface area of the prism. 6 in = side length.

ID: Hexagonal prism

$$V = \text{area of base} \times \text{height}$$

Area of base

$3\sqrt{3}$ $A_B = (\tfrac{1}{2} 6 \cdot 3\sqrt{3})$

$H = 12$

6 in.   12 in.

$$V = 6\tfrac{1}{2} 6 \cdot 3\sqrt{3} \cdot 12$$

$V = 648\sqrt{3}$ in³

≈ 1122.369 in³

$$SA = 2(6\tfrac{1}{2} 6 \cdot 3\sqrt{3}) \to 108\sqrt{3}$$
$$+ 6(6 \times 12) \to 432$$

Not like terms = $432 + 108\sqrt{3}$ in²

$SA \approx 619.061$ in²