12.2/12.4 Formulas for Prisms and Cylinders:

P = Perimeter of the base

B = Area of the Base

h= height of the prism
distance from base to base

Polyhedron: three dimensional figure whose surfaces are polygons
Face: polygon sides
Prism: polyhedron with exactly two congruent, parallel faces
Bases: the parallel sides
Lateral faces: the other sides
Height (or altitude) of prism: perpendicular distance between bases

Rectangular Prism:

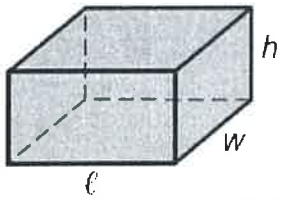
Lateral Area: Ph
no base

Surface area: Ph + 2B
include bases
Total

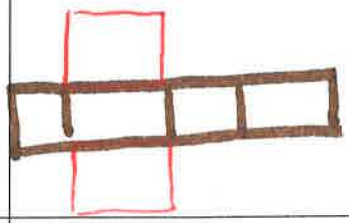
Volume: lwh → Bh

P
B
h

Diagram:



Net:



Cube:

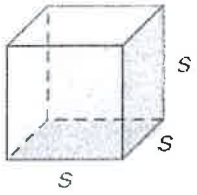
Lateral Area: $4s^2$

Surface Area: $6s^2$

Volume: S^3

S

Diagram:



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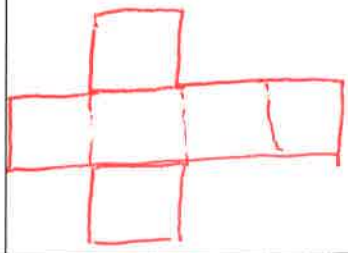


Right Prisms:

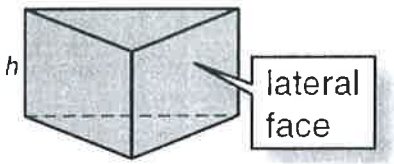
Lateral Area: Ph

Surface area: Ph + 2B

Volume: Bh

P
B
h

Diagram:



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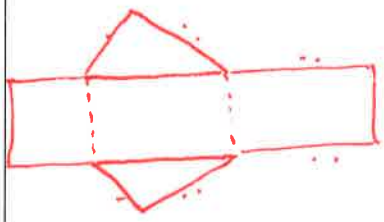


Cylinders: prism with two circle bases

Lateral area: $2\pi rh$

Surface area: $2\pi rh + 2\pi r^2$

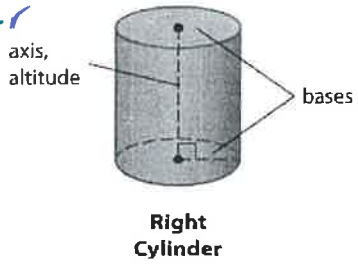
Volume: $\pi r^2 h$

$B = \pi r^2$

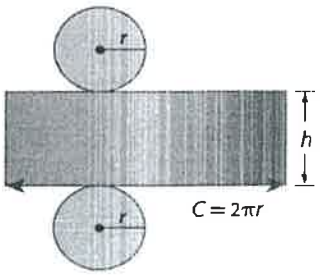
$P = C = 2\pi r$

r
h

Diagram:



Net:

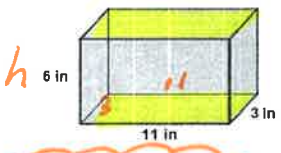


Change in dimensions:

All dimensions	Surface area	Volume
a	a^2	a^3

Examples(1-5): Name the shape, draw the net, and then find the Lateral Area, Surface area, and volume

Example 1: Rectangular Prism



See previous page for net

$LA = Ph = 28(6) = 168\ in^2$

$P = 11+3+11+3 = 28$

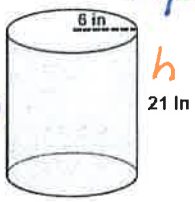
$B = lw = 11(3) = 33$

$h = 6$

$SA = Ph + 2B = 168 + 2(33) = 234\ in^2$

$V = Bh = 33(6) = 198\ in^3$

Example 2: Cylinder See previous page for net.



$LA = 2\pi rh = 2\pi 6(21) = 252\pi\ in^2$

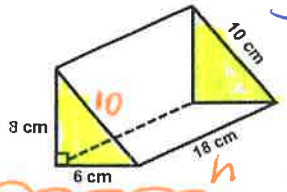
$r = 6$

$h = 21$

$Total\ S.A = 2\pi rh + 2\pi r^2 = 252\pi + 2\pi 6^2 = 252\pi + 72\pi = 324\pi\ in^2$

$V = \pi r^2 h = \pi 6^2(21) = 756\pi\ in^3$

Example 3: Triangular Prism see previous page for net.



$LA = Ph = 24(18) = 432\ cm^2$

$P = 6+8+10 = 24$

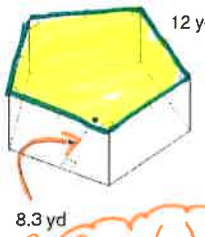
$B_\Delta = \frac{1}{2}(6)(8) = 24$

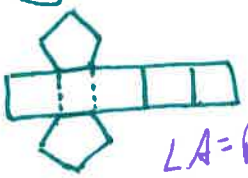
$h = 18$

$SA = Ph + 2B = 432 + 2(24) = 480\ cm^2$

$V = Bh = 24(18) = 432\ cm^3$

Example 4: Pentagonal Prism





$LA = Ph = 60(8) = 480\ yd^2$

$P = 5(12) = 60$

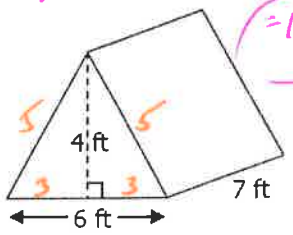
$B = \frac{1}{2}aP = \frac{1}{2}(8.3)(60) = 249\ yd^2$

$h = 8$

$SA = Ph + 2B = 480 + 2(249) = 978\ yd^2$

$V = Bh = 249(8) = 1992\ yd^3$

5. Long Tall Tent Company makes tents in the shape of triangular prisms. Tent model 7T) has a length of 7 feet, width of 6 feet, and a height of 4 feet. You Buy It store has just ordered 40 tents to sell in their camping stores. How much material will Long Tall Tent Company need to complete this order?



$P = 5+6+5 = 16$

$B = \frac{1}{2}(6)(4) = 12$

$h = 7$

→ total surface area

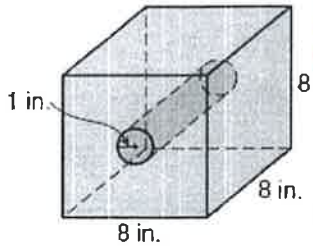
$= Ph + 2B$

$= 16(7) + 2(12) = 136\ ft^2$

$\times 40$ tents

$5440\ ft^2$ → 40 tents

6. Find the Volume of the composite figure



inside cube outside the cylinder

$B_{cube} = 8 \cdot 8 = 64$

$h = 8$

$V_{prism} = Bh \rightarrow 64(8) = 512$

$V_{cylinder} = \pi r^2 h \rightarrow \pi 1^2(8) = 8\pi$

cylinder $r = 1$, $h = 8$

exact $512 - 8\pi$

estimate $512 - 8(3.14) = 486.88$

7. Describe the effect of change on the surface area and volume of the figure above

Dimensions are doubled

all dimensions	Area a^2	Volume a^3
2	$2^2 \Rightarrow 4$	$2^3 \Rightarrow 8$

Dimensions are multiplied by 1/3

all dimensions	Area a^2	Volume a^3
$\frac{1}{3}$	$\left(\frac{1}{3}\right)^2 \rightarrow \frac{1}{9}$	$\left(\frac{1}{3}\right)^3 = \frac{1}{27}$