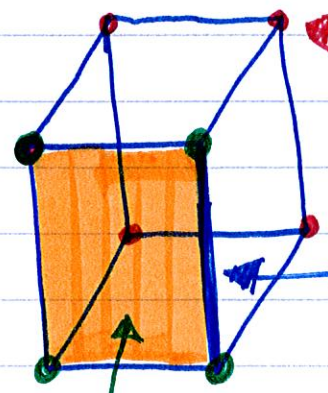
Lesson 12-1

4/25/12 3-Dimensional Figures (p664-669)

Plane: a flat surface that never-ends

Solid: 3-D figure formed by intersecting planes

Polyhedron: a solid with flat surfaces that are polygons



Vertex: where 3 or more planes intersect

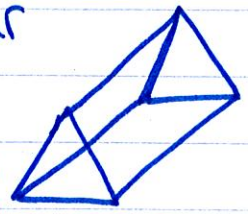
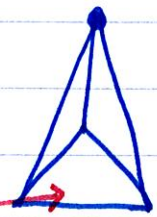
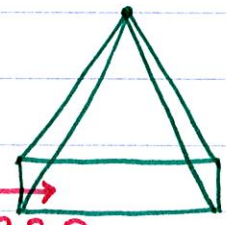
Edge: where 2 planes intersect

Face: flat surface

Prism: a polyhedron with
* 2 parallel & congruent faces ← known as bases
* and rectangular sides

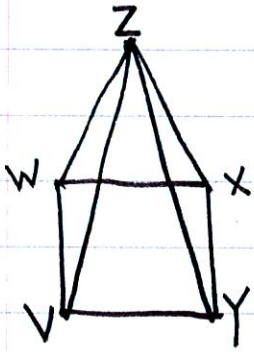
Pyramid: a polyhedron with
* only 1 base
* and triangular sides

Prism	vs.	Pyramid

Triangular Prism  2 triangle bases	Triangular Pyramid  1 triangle base
Rectangular Prism  2 rectangle bases	Rectangular Pyramid  1 rectangle base

Identify the figure.

ex: Name the faces, bases, edges, & vertices



- Rectangular Pyramid
- Base: WXVY
- Faces: ZXY, VYZ, VWZ, WXZ, VWXY ... Don't forget the base
- Edges: $\overline{XY}$, $\overline{ZX}$, $\overline{ZW}$, $\overline{ZY}$, $\overline{ZV}$, $\overline{YV}$, $\overline{VW}$, $\overline{WX}$
- Vertices: X, Y, V, W, Z

Lesson 12-2

5/6/13 Volume of Prisms (p 671-676)

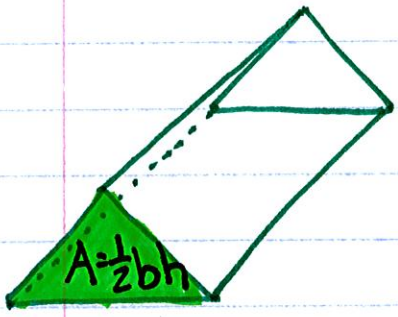
Volume: the measure of a space occupied by a 3D figure

V

measured in **CUBIC** units

in^3

The volume of a prism:
the area of one of the bases (B)
multiplied by
the height (h)
the distance between the 2 bases



$$V = Bh$$

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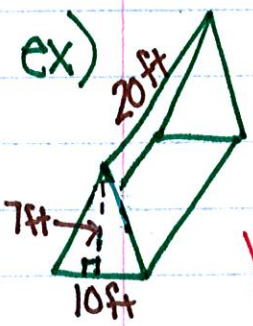
ex)



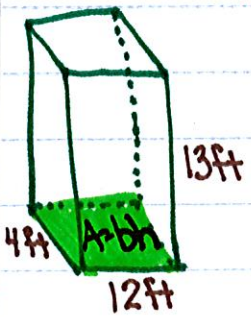
$V = Bh$

$V = \left(\frac{1}{2}bh\right)h$

$V = \left(\frac{1}{2} \times 10 \times 7\right)20$

$V = 700\ ft^3$

ex)



$V = Bh$

$V = (bh)h$

$V = 4 \cdot 12 \cdot 13$

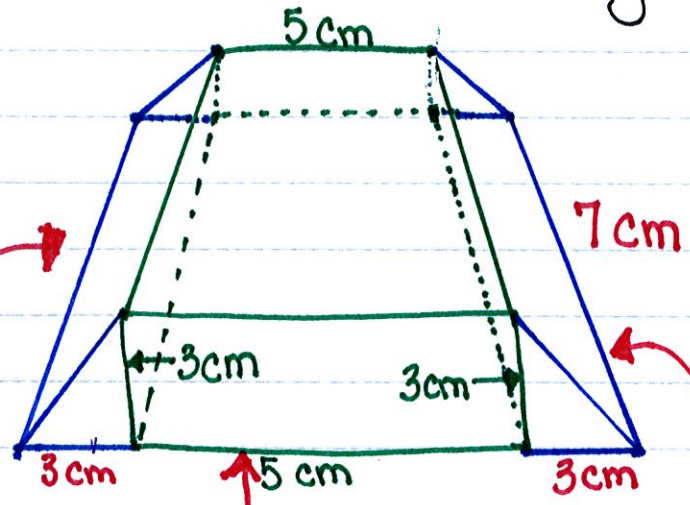
$V = 624\ ft^3$

Lesson 12-2

5/7/13 Volume of a Composite Figure (p671-676)

Find the volume of the figure.

ex)



$V = Bh + Bh + Bh$

$V = (bh)h + (\frac{1}{2}bh)h + (\frac{1}{2}bh)h$

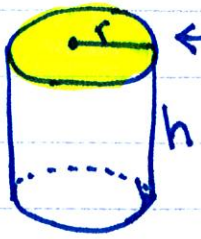
$V = 5 \cdot 3 \cdot 7 + \frac{1}{2} 3 \cdot 3 \cdot 7 + \frac{1}{2} \cdot 3 \cdot 3 \cdot 7$

$V = 105 + 31.5 + 31.5$

$V = 168 \text{ cm}^3$

Lesson 12-3

5/8/13 Volume of Cylinders (p677-681)



← The bases are circles

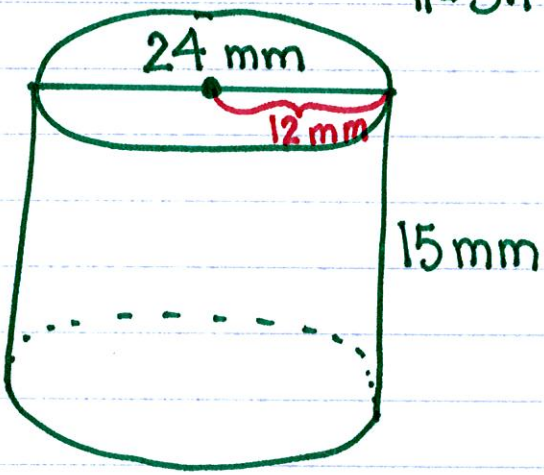
$V = Bh$

$V = \pi r^2 h$

Find the volume. Round to the nearest tenth.

$\pi = 3.14$

ex)



$V = Bh$

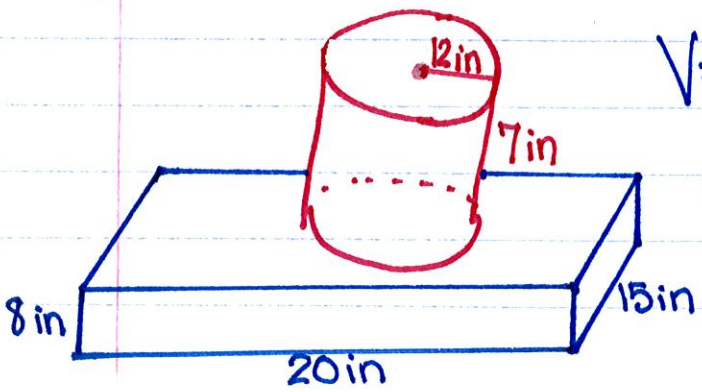
$V = \pi r^2 h$

$V = 3.14 \times 12^2 \times 15$

$V = 6,782.4 \text{ mm}^3$

Find the volume. Round to the nearest tenth.

ex) $\pi = 3.14$



$V = Bh + Bh$

$V = bh\,h + \pi r^2 h$

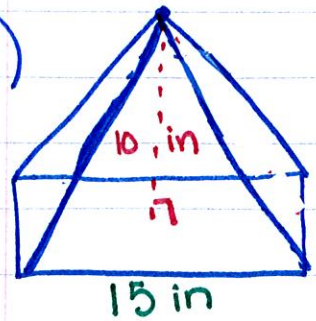
$V = 20 \cdot 8 \cdot 15 + 3.14 \times 12^2 \cdot 7$

$V = 5,565.1 \text{ in}^3$

Lesson 12-4

5/3/12 Volume of Pyramids, Cones, & Spheres (p683-688)

ex)



$V = \frac{1}{3}Bh$ ∴ Rectangular or Triangular Pyramid

$V = \frac{1}{3}(bh)h$

$V = \frac{1}{3}(15 \times 4)10$

$V = 200.0 \text{ in}^3$

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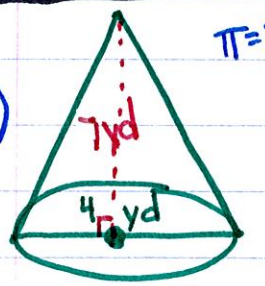
ex)



$\pi = 3.14$

$V = \frac{1}{3}Bh$

$V = \frac{1}{3}(\pi r^2)h$

$V = \frac{1}{3}(3.14 \times 2^2)7$

$V = 29.3 \text{ yd}^3$

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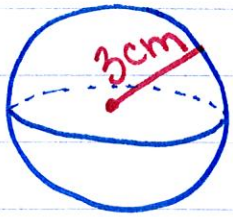
ex)



$V = \frac{4}{3}\pi r^3$ ← Note the Cubed!

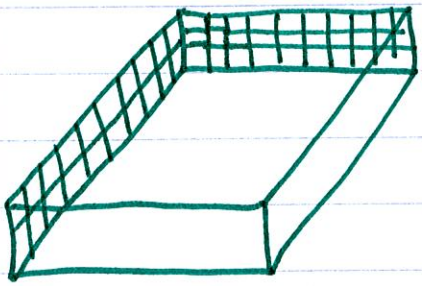
$V = \frac{4}{3} \times 3.14 \times 3^3$

$V = 113.0 \text{ cm}^3$

Lesson 12-5

Surface Area of Prisms (p691-695)

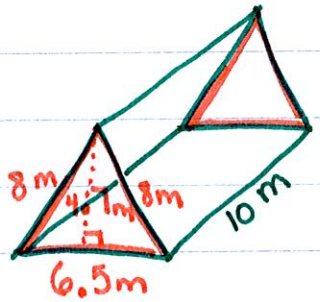
Surface Area: the number of square units needed to cover the surface of a 3D figure



$SA = L + 2B$

Surface area (SA) of a prism is the lateral area (L) plus the sum of the area of both bases

Lateral Area: the sum (in square units) of the lateral faces



← The lateral area in this triangular prism is the three rectangles.

- $L = Ph$

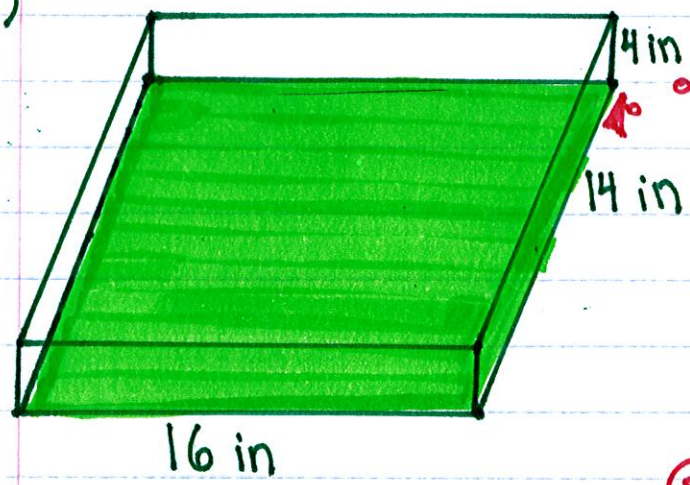
Lateral area (L) of a prism is the perimeter (P) of the base times the height (h) between the two bases.

8+8+6.5

- $L = 22.5 \times 10$
- $L = 225\ m^2$

- $SA = L + 2(\frac{1}{2}bh)$
- $SA = 225 + 2(\frac{1}{2} \times 6.5 \times 4.7)$
- $SA = 255.55\ m^2$

ex)



I picked this as the base

$SA = L + 2B$

$L = Ph$
$L = 60 \times 4$
$L = 240 \text{ in}^2$

$SA = L + 2bh$
$SA = 240 + 2 \times 16 \times 14$
$SA = 688 \text{ in}^2$

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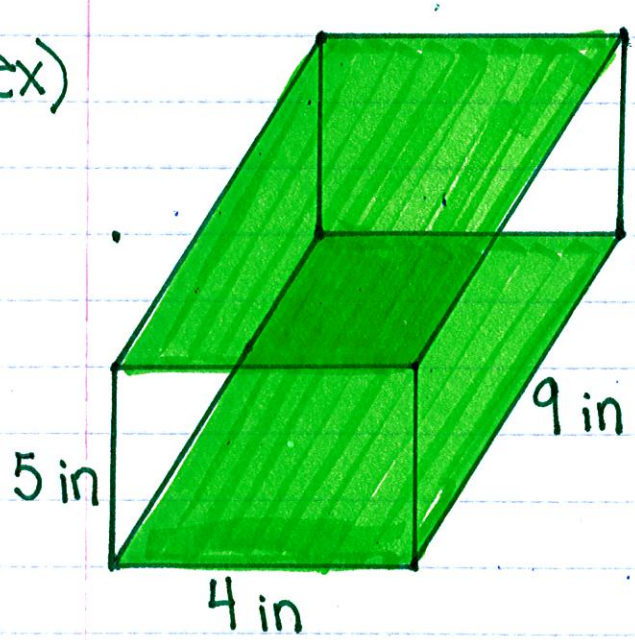
ex)



$L = Ph$
$L = 26 \cdot 5$
$L = 130 \text{ in}^2$

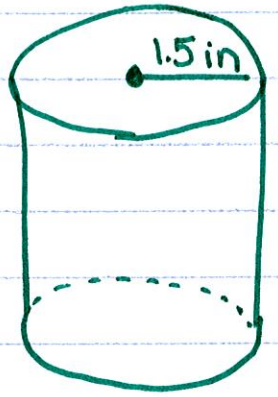
$SA = L + 2bh$
$SA = 130 + 2 \cdot 9 \cdot 4$
$SA = 202 \text{ in}^2$

Lesson 12-6

5/9/12 Surface Area of Cylinders (p691-701)

ex) $\pi = 3.14$

* Round to the nearest tenth.



6.5 in

This is still Circumference (which is $C = 2\pi r$) times the height.

$L = 2\pi r h$

$L = 2 \times 3.14 \times 1.5 \times 6.5$

$L = 61.2 \text{ in}^2$

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

$SA = 61.2 + 2 \times 3.14 \times 1.5^2$

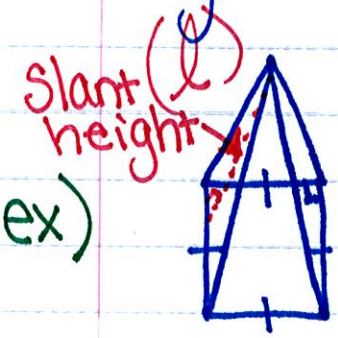
$SA = 75.3 \text{ in}^2$

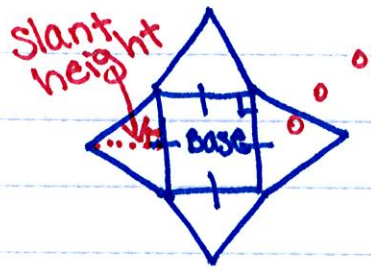
Lesson 12-7

Surface Area of Pyramids (p702-706)

Regular Pyramid: a pyramid that has a regular polygon as its base

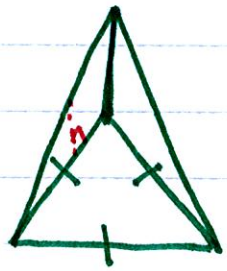
ex)

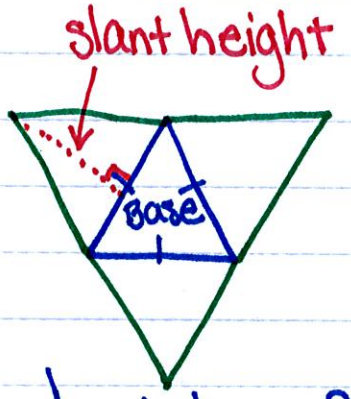




The triangles are the lateral faces

ex)





Slant Height: height of the lateral side

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ex) Square Pyramid

$L = \frac{1}{2}P\ell$

$L = \frac{1}{2} \times 40 \times 12$

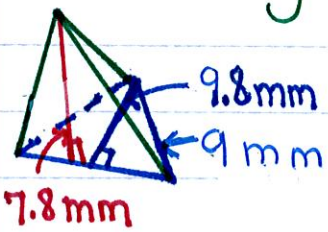
$L = 240 \text{ in}^2$

$SA = L + bh$

$SA = 240 + 10 \cdot 10$

$SA = 340 \text{ in}^2$

ex) Triangular Pyramid



$L = \frac{1}{2}P\ell$

$L = \frac{1}{2} \times 27 \times 7.8$

$L = 105.3 \text{ mm}^2$

$SA = L + \frac{1}{2}bh$

$SA = 105.3 + \frac{1}{2} \times 9 \times 9.8$

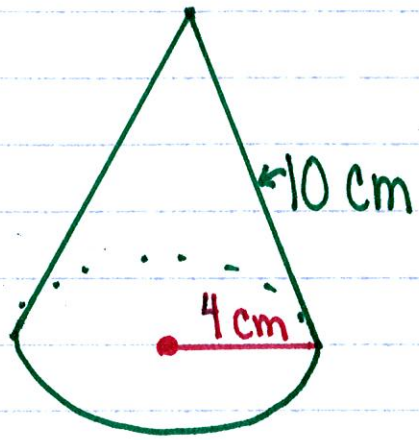
$SA = 149.4 \text{ mm}^2$

Lesson 12-7

Surface Area of Cones (p702-707)

Find the surface area. Round to the nearest tenth.

ex) $\pi = 3.14$



This is the same as $\frac{1}{2}$ the circumference because $C = 2\pi r$ and $\frac{1}{2}(2\pi r) = \pi r$ ☺

$L = \pi r \ell$

$L = 3.14 \times 4 \times 10$

$L = 125.6 \text{ cm}^2$

$SA = L + \pi r^2$

$SA = 125.6 + 3.14 \times 4^2$

$SA = 175.8 \text{ cm}^2$