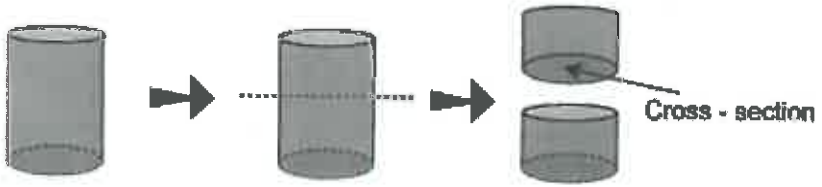
Geometry R – Mr. Bo
Unit 11 – Day 1 Notes

Name notes.
Date

Volumes of 3D Solids

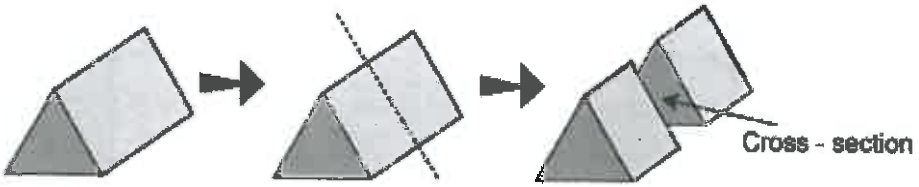
Cross Sections of 3D Solids:

Cylinder



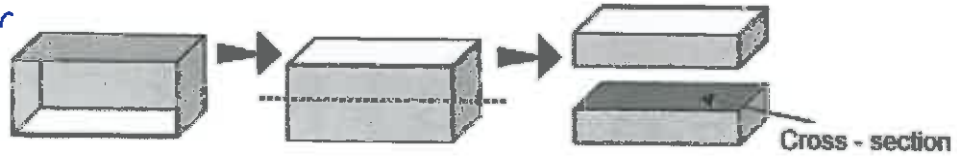
cross-sections are circles

triangular prism



cross-sections are triangles.

rectangular prism



rectangular cross sections.

1. Name the shape of each 2D cross section.

triangular prism.

triangle cross-sections

Sphere

Circle cross-section

hexagonal prism

Hexagon cross-section

square based pyramid

Square Pyramid

Square cross-sections

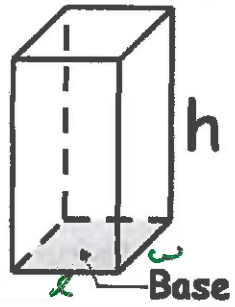
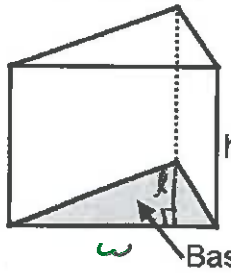
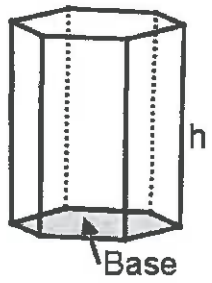
* Cross-sections // to the base of a 3D solid takes the shape of the base.

3D Solids with Polygonal Cross Sections:

Prisms – (3D Solid with 2 parallel Bases & Remaining Sides Rectangular)

Base Area

$$V = B \cdot h$$ ← dist. between the // bases.

(Rectangular)	(Triangular)	(Hexagonal)
		
Base Area = $\ell \cdot w$	Base area = $\frac{1}{2} \ell \cdot w$	

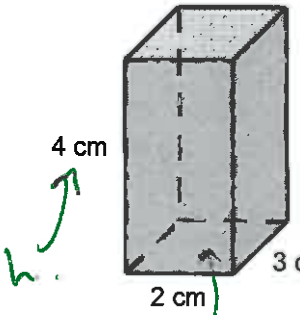
→ Base area: Regular Hexagon.

6 equilateral Δ's.

each Δ = $\frac{1}{2} \ell \cdot w$.

2. Find the volumes of each 3D Solid.

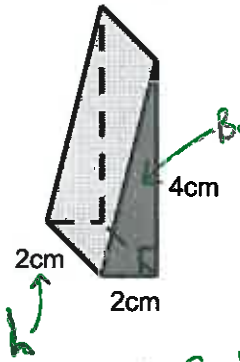
a. Rectangular Prism.



Base Area = (2)(3) = 6 cm²

V = B · h
= (6)(4)
= 24 cm³

b. triangular prism

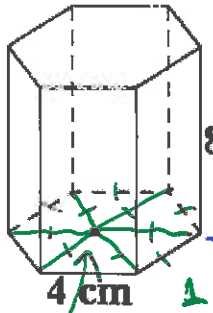


Base Area = $\frac{1}{2}(4)(2)$
= 4 cm²

V = B · h
= (4)(2)
= 8 cm³

Hexagonal Prism.

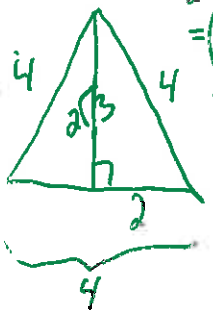
c. (Regular hexagon Base)



6 = Δ's

1 Δ.

Base Area = $\frac{1}{2}(4)(2\sqrt{3})(6)$
= $(4\sqrt{3}\ \text{cm}^2)(6)$
= $24\sqrt{3}\ \text{cm}^2$



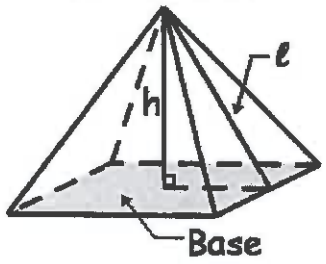
V = B · h
$(24\sqrt{3})(8)$
$= 192\sqrt{3}\ \text{cm}^3$
$\approx 332.6\ \text{cm}^3$

Pyramids – (3D Solid with 1 Base & Remaining sides Triangular)

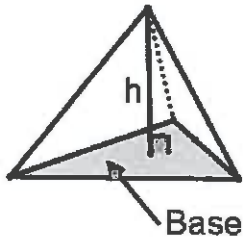
Base Area

$$V = \frac{1}{3} \cdot B \cdot h$$ ← height (⊥ to the base)

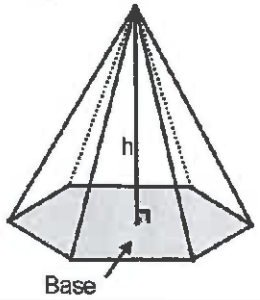
(Rectangular)



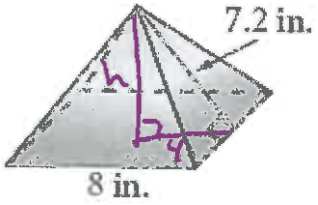
(Triangular)



(Hexagonal)



3. Find the Volume of the Solid. (square base pyramid)



Base Area = (8)(8)
= 64 in²

$4^2 + h^2 = 7.2^2$

$16 + h^2 = 51.84$

$h^2 = 35.84$

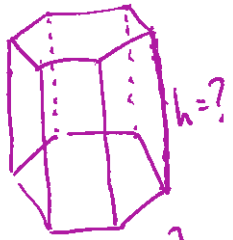
$h = \sqrt{35.84}$ in.

$V = \frac{1}{3} B \cdot h$

$= \frac{1}{3}(64)(\sqrt{35.84})$

≈ 127.7 in³

4. The volume of a regular hexagonal pyramid is 400 ft³. If the area of the base of the pyramid is 100 ft², what is the measure of its height?



$V = 400$ ft³

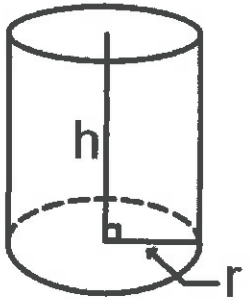
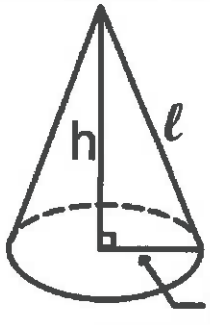
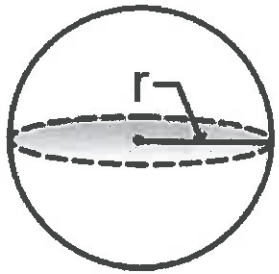
Base Area = 100 ft²

$V = B \cdot h$

$400 = 100 \cdot h$

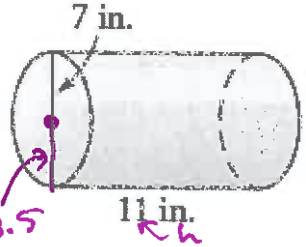
$h = 4$ ft

3D Solids with Circular Cross Sections:

Right Cylinder	Right Cone	Sphere
		
$V = \pi r^2 \cdot h$	$V = \frac{1}{3} \cdot \pi r^2 h$	$V = \frac{4}{3}\pi r^3$

5. Find the volumes of each 3D solid *(in terms of π and rounded to the nearest tenth)*

a.

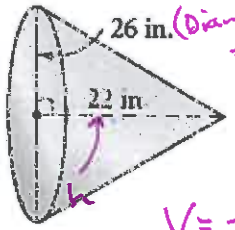


$V = \pi(3.5)^2(11)$

$= 134.75\pi \text{ in}^3$

$\approx 423.3 \text{ in}^3$

b.



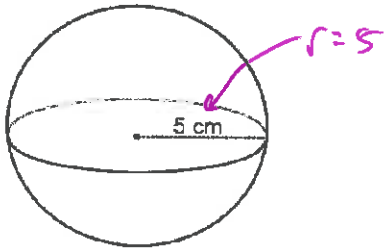
$\Rightarrow r = 13$ in.

$V = \frac{1}{3}\pi(13)^2(22)$

$= \frac{3718}{3}\pi \text{ in}^3$

$\approx 3{,}893.5 \text{ in}^3$

c.



$V = \frac{4}{3}\pi(5)^3$

$= \frac{500}{3}\pi \text{ cm}^3$

$\approx 523.6 \text{ cm}^3$