Cavalieri's Principle

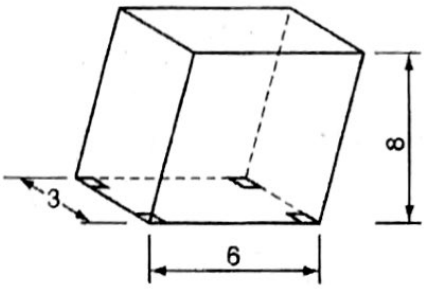
Consider This

Cavalieri's Principle states that the same formula, $V = Bh$, can be used to find the volume of a prism, whether it is a right prism or an oblique prism. The principle can be extended to right and oblique cylinders.

Cavalieri's Principle: If two prisms (solids) having the same height lie between parallel planes and have all cross sections equal distances from the bases with congruent areas, the solids have the same volume.

Find each volume. Use 3.14 for π. Round answers to the nearest cubic unit.

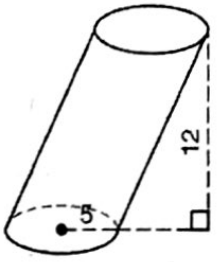
1



$V = 3 \cdot 6 \cdot 8$

$= 144$

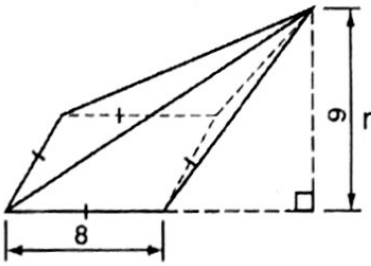
2



$V = \pi(5)^2(12)$

$= 300\pi$

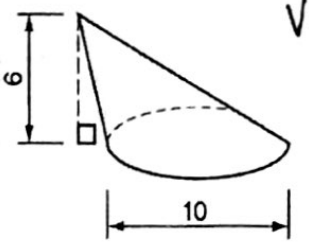
3



$V = \frac{1}{3}(8 \cdot 8)(9)$

$= 192$

4

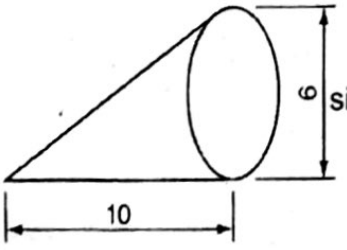


$V = \frac{1}{3}\pi(5)^2(6)$

$= 50\pi$

≈ 157.1

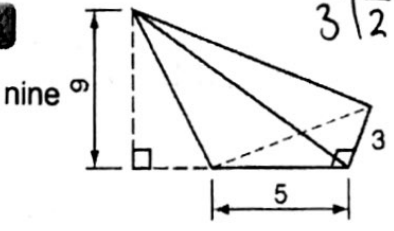
5



$\frac{1}{3}(\pi(3)^2)(10)$

30π

6



$\frac{1}{3}\left(\frac{1}{2} \cdot 3 \cdot 5\right)(9)$

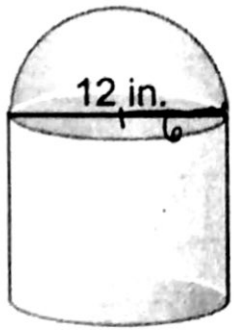
225

Name: _____ Date: _____

Volume of Composite Solids

Find the volume of each of the following composite functions.

1.



Top: Hemisphere $V = \frac{4}{3}\pi(6)^3 = \frac{288\pi}{2} = 144\pi$ (sphere → Hemisphere)

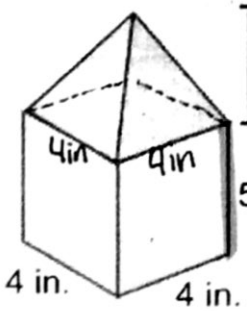
Bottom: cylinder $V = (\pi(6)^2)(13) = 468\pi$

$144\pi + 468\pi$

$612\pi \text{ in}^3$

1922.65 in^3

2.

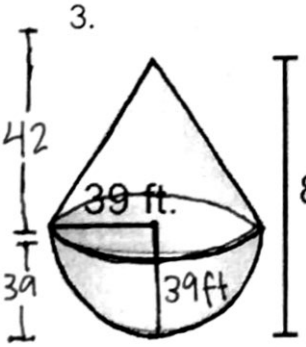


Top: Pyramid w/ Rectangle Base $V = \frac{1}{3}Bh = \frac{1}{3}(4\cdot4)(6) = \frac{1}{3}(l\cdot w)h = 32 \text{ in}^3$

Bottom: Rectangular prism $V = Bh$, $V = (l\cdot w)h$, $(4\cdot4)5$, $V = 80 \text{ in}^3$

$V = 112 \text{ in}^3$

3.



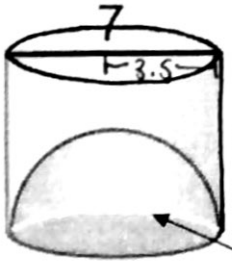
Top: cone $V = \frac{1}{3}(\pi r^2)h = \frac{1}{3}(\pi(39)^2)(42) = 21294\pi$

Bottom: Hemisphere $V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(39)^3 = 79092\pi \rightarrow 39546\pi$ (2 ← hemisphere)

$60840\pi \text{ ft}^3$

$\approx 191,134.5$

4.



Cylinder: $V = (\pi(3.5)^2)(5.5) = 67.38\pi = 211.7$

Hemisphere $V = \frac{4}{3}\pi(3.5)^3 = \frac{57.16\pi}{2} = 28.58\pi \rightarrow 89.8$

$211.7 - 89.8 \approx 121.86$