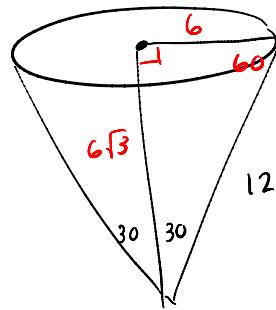


Section 12.5

p. 586: 8-11, 14, 16, 17-20

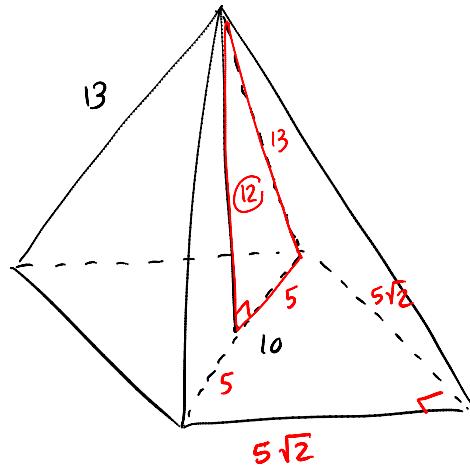
- #8 Find the volume of the cone with a 60° vertex angle and a slant height of 12.

$$\begin{aligned} V &= \frac{A_{\text{Base}} \cdot h}{3} \\ &= \frac{\pi(6)^2 \cdot 6\sqrt{3}}{3} \\ &= \boxed{72\pi\sqrt{3} \text{ u}^3} \approx 391.8 \end{aligned}$$



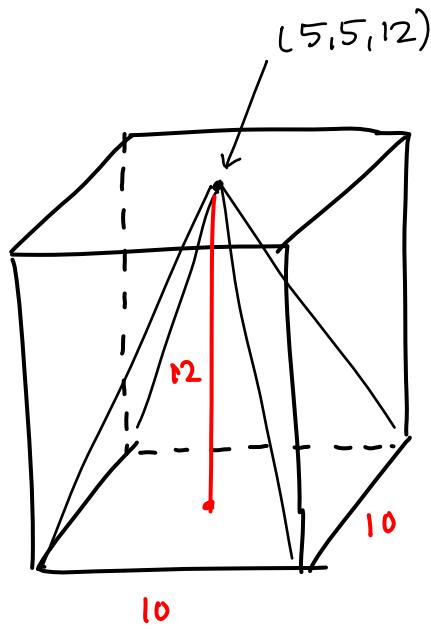
- #9 A pyramid has a square base with a diagonal of 10. Each lateral edge measures 13. Find volume.

$$\begin{aligned} V &= \frac{A_{\text{Base}} \cdot h}{3} \\ &= \frac{(5\sqrt{2})^2 \cdot 12}{3} \\ &= \frac{25 \cdot 2 \cdot 12}{3} \\ &= \boxed{200 \text{ u}^3} \end{aligned}$$



$$\begin{aligned} \frac{x\sqrt{2}}{\sqrt{2}} &= \frac{10}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \\ x &= \frac{10\sqrt{2}}{2} \\ x &= 5\sqrt{2} \end{aligned}$$

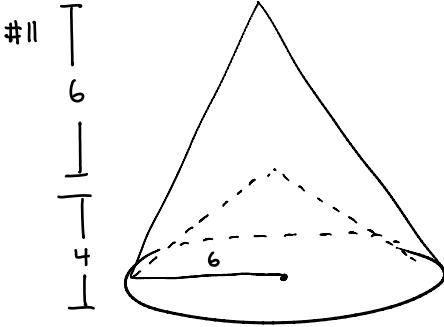
#10



a. Find the coordinates of C $(0, 10, 0)$

b. Find the volume of the pyramid

$$V = \frac{A_{\text{Base}} \cdot h}{3} = \frac{100 \cdot 12}{3} = \boxed{400}$$

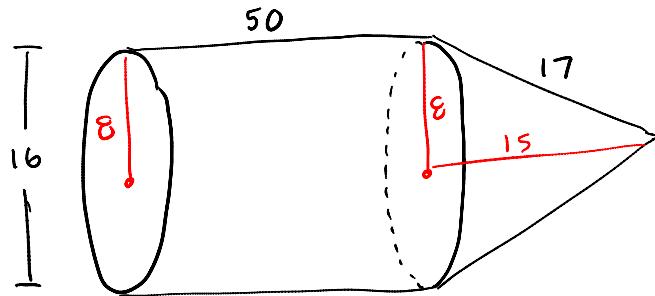


$$\begin{aligned}
 V_{\text{big}} &= \frac{A_{\text{base}} \cdot h}{3} \\
 &= \frac{\pi(6)^2 \cdot 10}{3} \\
 &= \frac{36\pi}{3} \\
 &= 120\pi
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{small}} &= \frac{A_{\text{base}} \cdot h}{3} \\
 &= \frac{36\pi \cdot 4}{3} \\
 &= 48\pi
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{total}} &= 120\pi - 48\pi \\
 &= \boxed{72\pi u^3}
 \end{aligned}$$

- #12 A ROCKET has the dimensions shown. If 60% of the space in the rocket is needed for fuel, what is the volume of the portion of the rocket that is available for nonfuel items



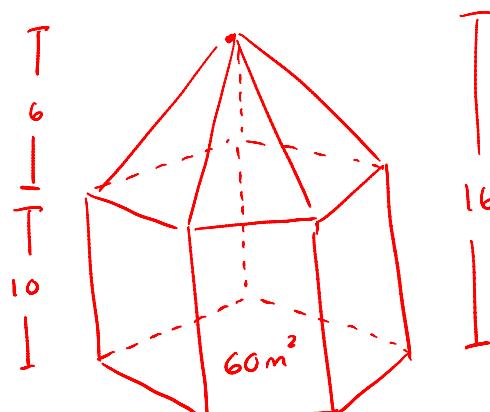
$$\begin{aligned}
 V_{\text{cyl}} &= A_{\text{base}} \cdot h \\
 &= \pi(8)^2 \cdot 50 \\
 &= 64\pi \cdot 50 \\
 &= 3200\pi
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{cone}} &= \frac{A_{\text{base}} \cdot h}{3} \\
 &= \frac{64\pi \cdot 15}{3} \\
 &= 320\pi
 \end{aligned}$$

$$\begin{aligned}
 V_{\text{total}} &= 3200\pi + 320\pi \\
 &= 3520\pi
 \end{aligned}$$

$$.4(3520\pi) \approx \boxed{4423u^3}$$

- #13 A gazebo has a pentagonal base with an area of $60 m^2$. The total height of the peak is 16m. The height of the pyramidal roof is 6m. Find the gazebo's total volume.



$$\begin{aligned}
 V_{\text{hex prism}} &= A_{\text{base}} \cdot h \\
 &= 60 \cdot 10 \\
 &= 600
 \end{aligned}
 \quad
 \begin{aligned}
 V_{\text{pyr}} &= \frac{A_{\text{base}} \cdot h}{3} \\
 &= \frac{60 \cdot 6}{3} \\
 &= 120
 \end{aligned}$$

$$V_{\text{total}} = 600 + 120 = \boxed{720 m^3}$$

#14 Use the diagram to find

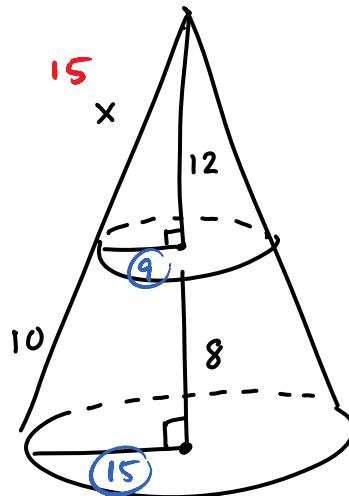
a. x

$$\frac{x}{x+10} = \frac{12}{20}$$

$$20x = 12x + 120$$

$$8x = 120$$

$$\boxed{x=15}$$



b. radii of circles

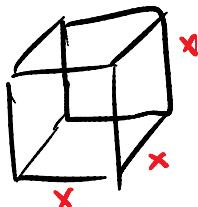
9 and 15

c. volume of smaller cone: $\frac{81\pi \cdot 12}{3} = 324\pi$

d. volume of larger cone: $\frac{225\pi \cdot 20}{3} = 1500\pi$

e. volume of frustum: $1500\pi - 324\pi = 1176\pi \approx \boxed{3694.5}$

#16 Find the volume of a cube whose total surface area is 150 sq in



$$6(x \cdot x) = 150$$

$$6x^2 = 150$$

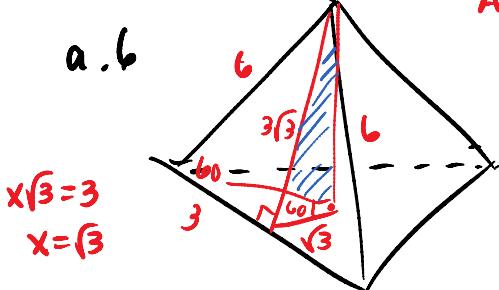
$$x^2 = 25$$

$$x = 5$$

$$V = 5 \cdot 5 \cdot 5 \\ = \boxed{125 \text{ in}^3}$$

#17 Regular tetrahedron
Find the volume if each edge measures

$$A_{\text{base}} = \frac{6^2 \sqrt{3}}{4} = 9\sqrt{3}$$

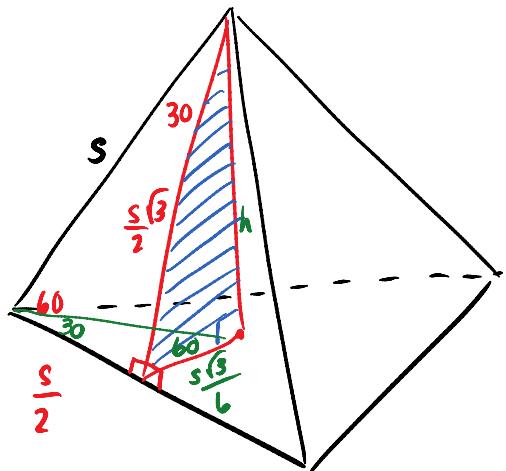


$$x\sqrt{3} = 3 \\ x = \sqrt{3}$$

$$(3\sqrt{3})^2 + h^2 = (3\sqrt{3})^2 \\ 3 + h^2 = 27 \\ h^2 = 24 \\ h = 2\sqrt{6}$$

$$V = \frac{9\sqrt{3} \cdot 2\sqrt{6}}{3} \\ = 6\sqrt{18} \\ = 6\sqrt{9 \cdot 2} \\ = \boxed{18\sqrt{2}}$$

b.



$$\frac{x\sqrt{3}}{\sqrt{3}} = \frac{s}{2}\sqrt{3}$$

$$x = \frac{s}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$x = \frac{s\sqrt{3}}{6}$$

$$\left(\frac{s\sqrt{3}}{6}\right)^2 + h^2 = \left(\frac{s\sqrt{3}}{2}\right)^2$$

$$\frac{3s^2}{36} + h^2 = \frac{3s^2}{4}$$

$$\sqrt{h^2} = \sqrt{\frac{2}{3}}$$

$$h = \frac{\sqrt{2} \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} = \frac{\sqrt{6}}{3}$$

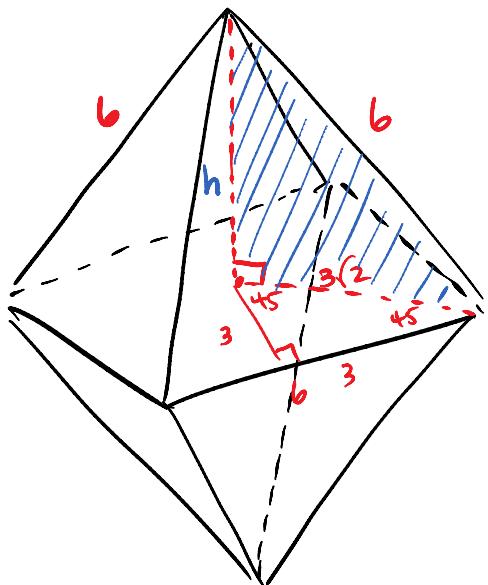
$$A_{\text{Base}} = \frac{s^2\sqrt{3}}{4}$$

$$\text{VOL}_{\text{pyr}} = \frac{\frac{s^2\sqrt{3} \cdot \sqrt{6}}{4} \cdot \frac{1}{3}}{3} = \frac{s^2\sqrt{18}}{12} \cdot \frac{1}{3}$$

$$= \frac{3s^2\sqrt{2}}{36}$$

$$= \boxed{\frac{s^2\sqrt{2}}{12}}$$

#18 A regular octahedron (eight equilateral faces) has an edge of 6. Find the octahedron's volume



$$(3\sqrt{2})^2 + h^2 = 6^2$$

$$18 + h^2 = 36$$

$$h^2 = 18$$

$$h = 3\sqrt{2}$$

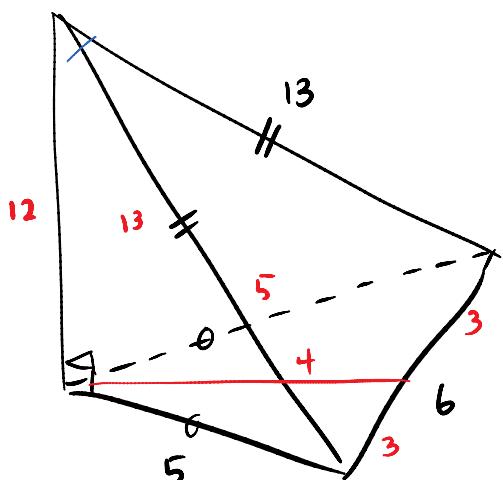
$$\text{VOL}_{\text{pyr}} = \frac{36 \cdot 3\sqrt{2}}{3}$$

$$= 36\sqrt{2}$$

$$\text{VOL}_{\text{oct}} = 2(36\sqrt{2})$$

$$= \boxed{72\sqrt{2}}$$

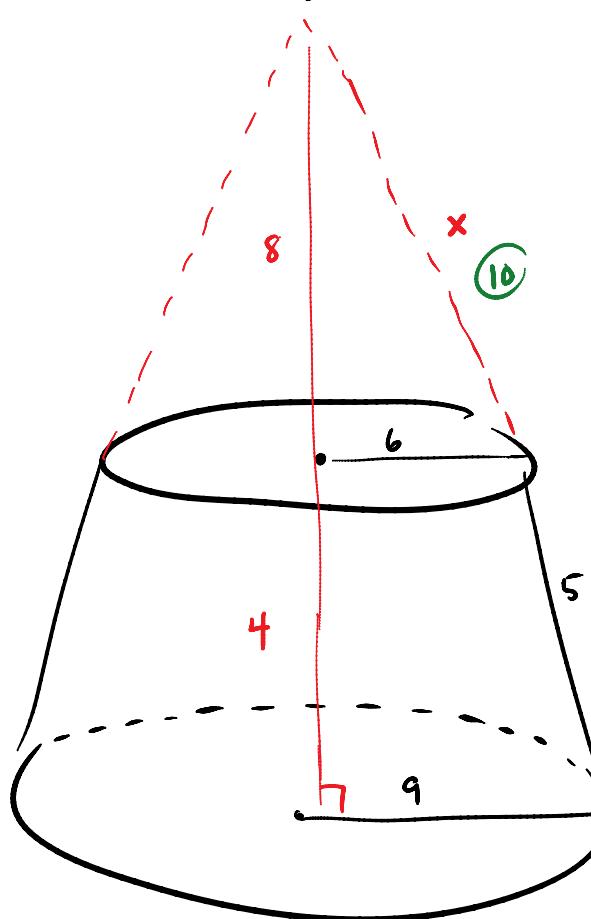
#19 Find the volume of the pyramid shown.



$$A_{\text{Base}} = \frac{6 \cdot 8}{2} = 12$$

$$\begin{aligned} V_{\text{OL}} &= \frac{A_{\text{Base}} \cdot h}{3} \\ &= \frac{12 \cdot 12}{3} \\ &= 48 u^3 \end{aligned}$$

#20



$$\begin{aligned} \frac{6}{9} &= \frac{x}{(x+5)} \\ 6x + 30 &= 9x \\ 30 &= 3x \\ 10 &= x \end{aligned}$$

$$V_{\text{OL small}} = \frac{36\pi \cdot 8}{3} = 96\pi$$

$$V_{\text{OL large}} = \frac{81\pi \cdot 12}{3} = 324\pi$$

$$V_{\text{OL frus}} = 324\pi - 96\pi = 228\pi$$