

Date:

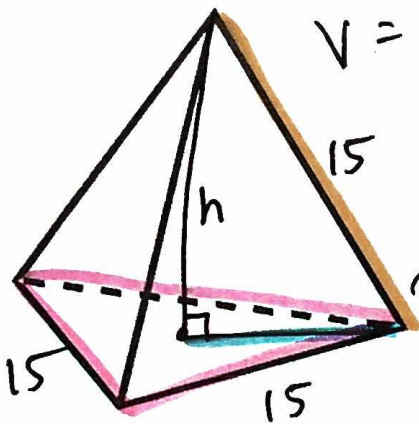
Period:

SA and Volume of Tetrahedrons and Octahedrons

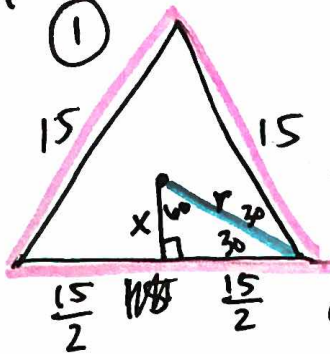
Tetrahedron: a solid created by

4 $\cong$ equilateral Δ s

$$\frac{s^2\sqrt{3}}{4}$$



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



$$LL = SL\sqrt{3}$$

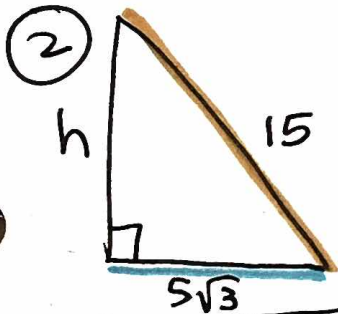
$$\frac{15}{2} = x\sqrt{3}$$

$$\frac{15}{2\sqrt{3}} = x$$

$$\frac{5\sqrt{3}}{2} = x$$

$$\frac{5\sqrt{3}}{2} = x \rightarrow r = 5\sqrt{3}$$

Find the volume of a tetrahedron with side length 15.



$$h^2 + (5\sqrt{3})^2 = 15^2$$

$$h^2 + 75 = 225$$

$$h^2 = 150$$

$$h = 5\sqrt{6}$$

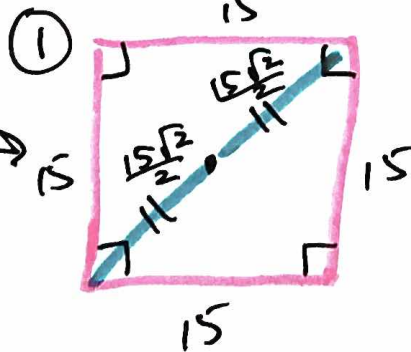
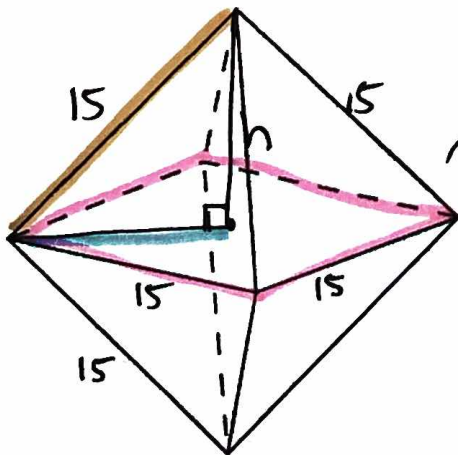
$$(3) V = \frac{1}{3} \left(\frac{15^2\sqrt{3}}{4} \right) (5\sqrt{6})$$

$$= \frac{375}{4} \sqrt{18}$$

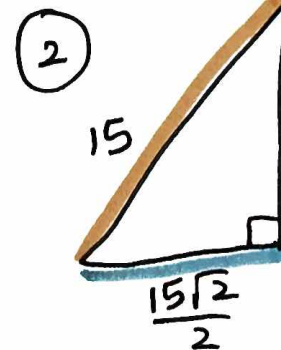
$$= \frac{375 \cdot 3\sqrt{2}}{4}$$

$$= \frac{1125\sqrt{2}}{4}$$

Octahedron: a solid created by

8 $\cong$ equilateral Δ s

*45-45-90 rules



$$h^2 + \left(\frac{15\sqrt{2}}{2} \right)^2 = 15^2$$

$$h^2 + \frac{225}{2} = 225$$

$$h^2 = \frac{225}{2}$$

$$h = \frac{15\sqrt{2}}{2}$$

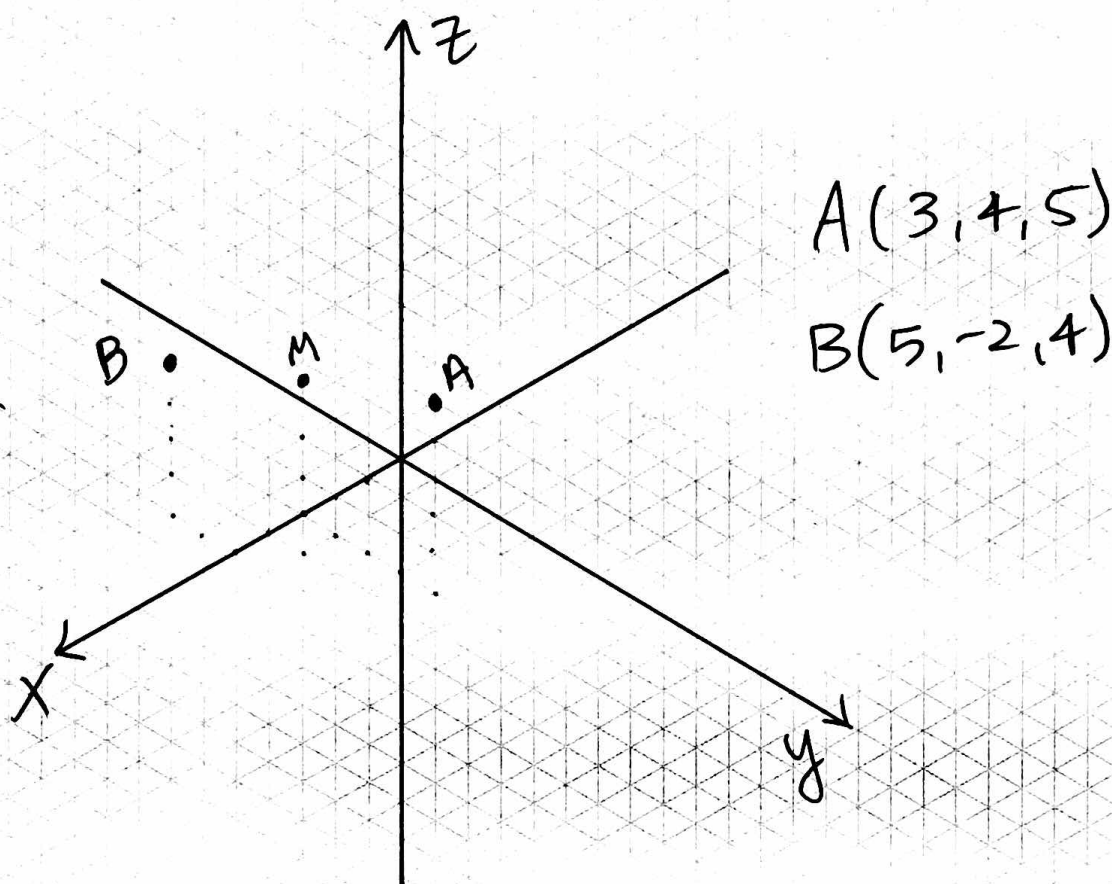
*45-45-90

Find the volume of an octahedron with side length 15.

$$(3) V = 2 \left(\frac{1}{3} Bh \right)$$

$$= 2 \left(\frac{1}{3} 15^2 \cdot \frac{15\sqrt{2}}{2} \right) = \frac{1125\sqrt{2}}{2}$$

(x, y, z)



dist. formula $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

$$\begin{aligned} AB &= \sqrt{(3 - 5)^2 + (4 - (-2))^2 + (5 - 4)^2} \\ &= \sqrt{(-2)^2 + 6^2 + 1^2} \\ &= \sqrt{4 + 36 + 1} \\ &= \sqrt{41} \end{aligned}$$

mdpt. formula $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$

$$\text{mdpt } \overline{AB} \left(\frac{3+5}{2}, \frac{4+(-2)}{2}, \frac{5+4}{2} \right) = (4, 1, 4.5)^M$$