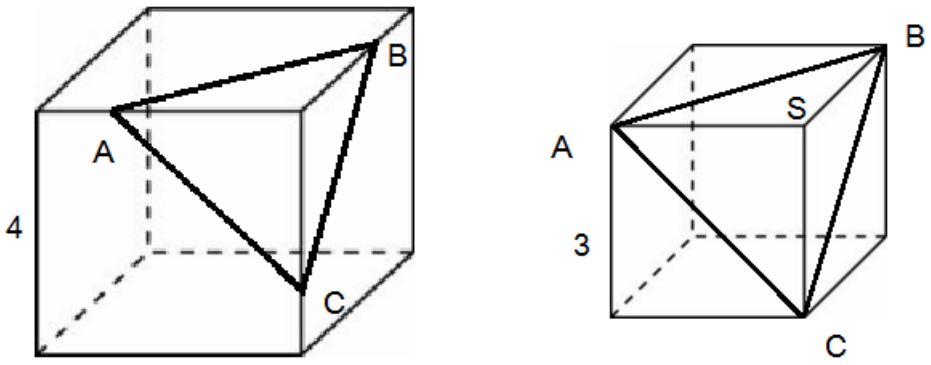
Answer on Question #57601 – Math – Geometry

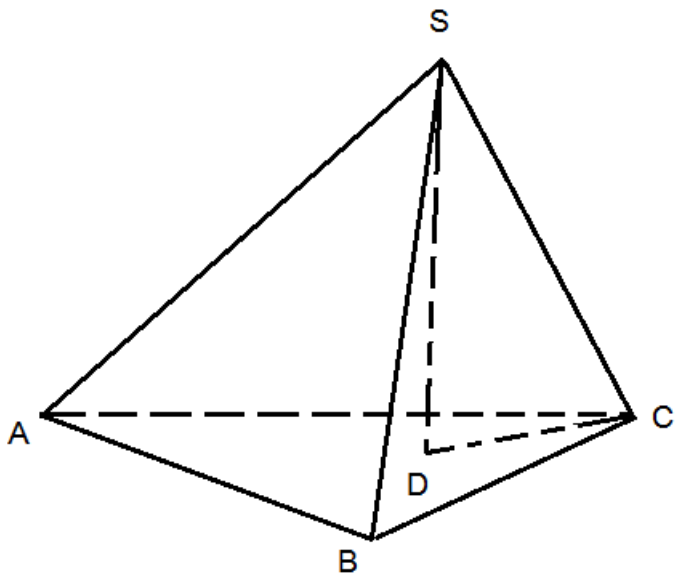
Question

*A solid object consists of a 4*4*4 cube with a 3*3*3 cube sticking out. Three corners of the 3*3*3 cube lie on the edges of the 4*4*4 cube. The same distance along each edge. What is the combined volume of this object?*

Solution



The combined volume of this object is V (4*4*4 cube) + V (3*3*3 cube) – 2*V (SABC).
V (4*4*4 cube) = 64
V (3*3*3 cube) = 27



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

SC = SB = 3 (as edges of the 3*3*3 cube)
∠CSB=90°
CB=$3\sqrt{2}$
Find the same way AC=DC=AB=$3\sqrt{2}$

ABC is equilateral triangle.

$$A = \frac{a^2\sqrt{3}}{4} = \frac{\left(3\sqrt{2}\right)^2\sqrt{3}}{4} = \frac{9\sqrt{3}}{2}$$

CD is the radius of the circle circumscribed about the triangle:

$$R = \frac{a\sqrt{3}}{3} = \frac{3\sqrt{2}\sqrt{3}}{3} = \sqrt{6}$$

SDC is right triangle:

$$SC^2 = SD^2 + DC^2$$

SD=h

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

$$V\ (SABC) = \frac{9\sqrt{3}}{6}\sqrt{3} = 4.5$$

V (4*4*4 cube) + V (3*3*3 cube) – 2*V (SABC)=64+27-2*4.5=64+18=82.

Answer: 82.