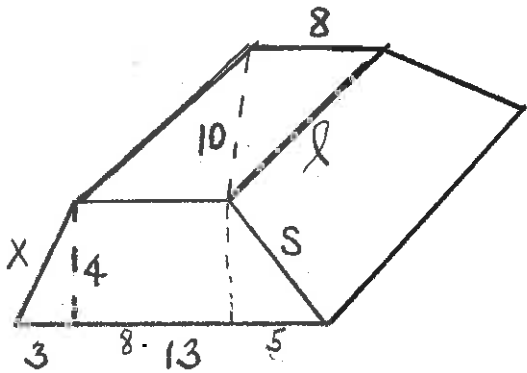


All necessary work must be shown for credit. You may NOT use computers, notes or texts. All of your team members must help. PLEASE have 3 team members. Each team member's printed name must be on the left and the written name must be on the right. Your signature means you only worked with team members on this problem. Your turn in work should be NEAT and look professional. This will be part of your score.

- | | |
|----------|----------|
| 1. _____ | 1. _____ |
| 2. _____ | 2. _____ |
| 3. _____ | 3. _____ |
| 4. _____ | 4. _____ |

All of the team members above are to work on the following problems together. You write up should be in nice easy to read format.

Sally brought the following box into class. The teacher had Billy build a can with the same volume. The teacher had Milly build a box with a square base with the same volume. The teacher had Wally build a box with an equilateral triangle base with the same volume. Give the volume to surface area ratio for all these boxes.



$$l^2 + 8^2 = 10^2$$

$$l = 6$$

$$\begin{aligned} V &= 6 \cdot \frac{16+8}{2} \cdot 4 \\ &= 6 \cdot 12 \cdot 4 = 288 \end{aligned}$$

$$\begin{aligned} SA &= 2 \left[\frac{16+8}{2} \cdot 4 \right] + 6 \cdot 8 + 6 \cdot 16 + \\ &6 \cdot x + 6 \cdot S \end{aligned}$$

$$\begin{aligned} &= 96 + 48 + 96 + 6 \cdot 5 + 6 \cdot \sqrt{41} \\ &= 270 + 6\sqrt{41} \approx 308.42 \end{aligned}$$

$$x^2 = 3^2 + 4^2$$

$$x = 5$$

$$S^2 = 4^2 + 5^2 = 41$$

$$S = \sqrt{41}$$

$$\frac{V}{SA} = \frac{288}{270 + 6\sqrt{41}} \approx 0.93$$

$$V = 288$$

a) Can $V = \pi r^2 h = 288 \quad h = 6$

$$6\pi r^2 = 288 \quad r^2 = \frac{288}{6\pi} = \frac{48}{\pi}$$

$$r = \sqrt{\frac{48}{\pi}} = 4\sqrt{\frac{3}{\pi}}$$

$$\begin{aligned} SA &= 2\pi r^2 + 2\pi r h = 2\pi \frac{48}{\pi} + 48\pi \sqrt{\frac{3}{\pi}} \\ &= 96 + 48\sqrt{3\pi} \end{aligned}$$


$$\frac{V}{SA} = \frac{288}{96 + 48\sqrt{3\pi}} = \frac{6}{2 + \sqrt{3\pi}}$$

b) Box $V = x^2 h = 288 \quad h = 6 \quad x^2 = 48$

$$x = \sqrt{48} = 4\sqrt{3}$$

$$SA = 2x^2 + 4xh = 96 + 96\sqrt{3}$$

$$\frac{V}{SA} = \frac{288}{96 + 96\sqrt{3}} = \frac{3}{1 + \sqrt{3}}$$

c)  $V = \frac{\sqrt{3}}{4} s^2 h = \frac{3\sqrt{3}}{2} s^2 = 288$

$$s^2 = \frac{576}{3\sqrt{3}} = \frac{192}{\sqrt{3}} = \frac{3 \cdot 64}{\sqrt{3}} = 64\sqrt{3}$$

$$s = 8\sqrt{\sqrt{3}}$$

$$SA = 2 \frac{\sqrt{3}}{4} s^2 + 3sh = 96 + 144\sqrt{\sqrt{3}}$$

$$\frac{V}{SA} = \frac{288}{96 + 144\sqrt{\sqrt{3}}}$$