1.(a) Let S be length of square side then

$$2S^2 = 4 \qquad S^2 = 2 \qquad S = \sqrt{2} = 2r$$

$$r = \frac{\sqrt{2}}{2} \qquad A = \pi r^2 = \pi \frac{1}{2}$$

$$P = 2\pi r = \pi\sqrt{2}$$

$$\frac{A}{P} = \frac{\frac{1}{2}}{\sqrt{2}} = \frac{1}{2\sqrt{2}}$$

(b) $r = 2 \qquad A = 4\pi \qquad P = 4\pi \qquad \frac{A}{P} = 1$

2 (b) $r = 2 \qquad h = 2$ for all 6 equilateral triangles Let s be length of side of triangle then

$$\left(\frac{S}{2}\right)^2 + 2^2 = S^2 \qquad \frac{3}{4}S^2 = 4 \qquad S^2 = \frac{16}{3}$$

$$S = \frac{4}{\sqrt{3}}$$

$$A_{Hexagon} = 6\left(\frac{1}{2}\, 2\, \frac{4}{\sqrt{3}}\right) = \frac{24}{\sqrt{3}}$$

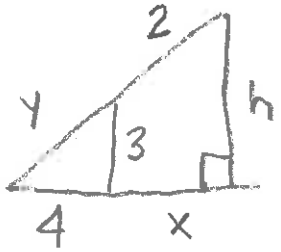
$$P_{Hexagon} = 6\,\frac{4}{\sqrt{3}} = \frac{24}{\sqrt{3}} \qquad \frac{A}{P} = 1$$

3 (a) $12^2 + 5^2 = c^2 \qquad c = 13$

$$A = \frac{1}{2}(12 \cdot 5) + \frac{1}{2}\pi\left(\frac{5}{2}\right)^2 + \frac{1}{2}\pi\left(\frac{13}{2}\right)^2$$

$$P = \pi \cdot \frac{13}{2} + \pi\,\frac{5}{2} + 12$$

4 (b)



$4^2 + 3^2 = y^2 \Rightarrow y = 5$

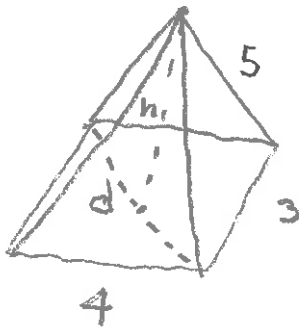
$$\frac{h}{3} = \frac{5+2}{5} \Rightarrow h = \frac{21}{5}$$

$$\frac{x+4}{4} = \frac{h}{3} = \frac{21}{15}$$

$$x+4 = \frac{84}{15}$$

$$x = \frac{84}{15} - 4 = \frac{4}{15}$$

5 (b)



$3^2 + 4^2 = d^2 \qquad d = 5$

$$h^2 + \left(\frac{d}{2}\right)^2 = 5^2$$

$$h^2 + \left(\frac{5}{2}\right)^2 = 5^2$$

$$h^2 = \frac{5^2}{2} \Rightarrow h = \frac{5}{\sqrt{2}}$$

$$V = \frac{1}{3}(3 \cdot 4)\,\frac{5}{\sqrt{2}}$$

$$A = 12 + 2\left(\frac{1}{2}3 \cdot h_1\right) + 2\left(\frac{1}{2}4 \cdot h_2\right)$$

$$h_1^2 + \left(\frac{3}{2}\right)^2 = 5^2 \qquad h_2^2 + \left(\frac{4}{2}\right)^2 = 5^2$$

6. (b) Volume = area of octagon $\cdot \ell$

$$1^2 + \ell^2 = 12^2$$

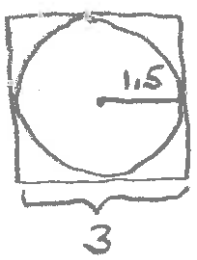
$$\ell^2 = 143 \qquad \ell = \sqrt{143}$$

7. $d^2 = 3^2 + 4^2 \qquad d = 5$

$$r = \frac{5}{2} \qquad 60° = \frac{1}{6}\,360°$$

$$A = \frac{1}{6}\pi r^2 = \frac{1}{6}\pi\left(\frac{5}{2}\right)^2$$

8.



$$V_{CUBE} = 3^3 = 27$$

$$V_{SPHERE} = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(1.5)^3$$

$$V = 27 - \frac{4}{3}\pi(1.5)^3$$