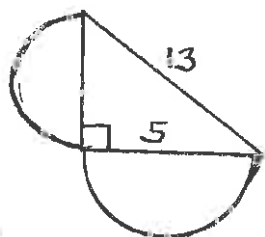


All necessary work must be shown for credit. Your work MUST be NEAT. You may NOT use computers, notes or texts.

I have neither received nor given help on this exam. Don Key
 (Signature) (2 points)

1. Give the areas of the following regions. (6 points each)

(a) Right triangle with two semi-circles.

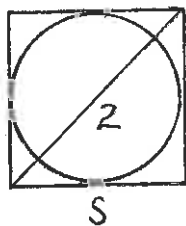


$$5^2 + h^2 = 13^2$$

$$h = 12$$

$$A = \frac{\pi 6^2}{2} + \frac{\pi \left(\frac{5}{2}\right)^2}{2} + \frac{1}{2} 5 \cdot 12$$

(b) Circle inside a square with diagonal 2.



$$2s^2 = 2^2$$

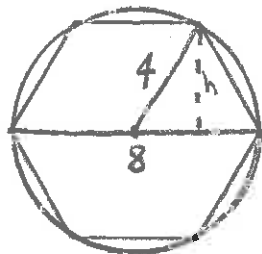
$$s^2 = 2$$

$$s = \sqrt{2}$$

$$r = \frac{\sqrt{2}}{2}$$

$$A = \pi \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{1}{2} \pi$$

(c) Hexagon inside a circle of diameter 8.



$$h^2 + 2^2 = 4^2$$

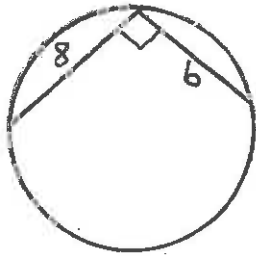
$$h = \sqrt{12}$$

$$A_T = \frac{1}{2} bh = \frac{1}{2} 4\sqrt{12} = 4\sqrt{3}$$

$$A_H = 6 A_T = 24\sqrt{3}$$

2. Give the volumes of the following. (6 points each)

(a) A can of height 3 with the circular base given.



$$d^2 = 6^2 + 8^2$$

$$d = 10$$

$$A = \pi 5^2 = 25\pi$$

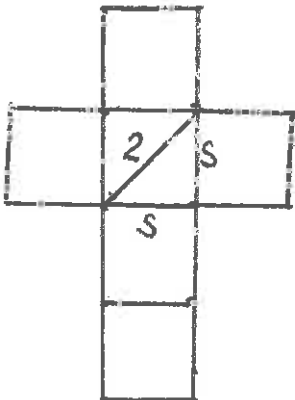
$$V = 3(25\pi) = 75\pi$$

(b) Alex and Sandy roll a spherical snowball of 18 inches around a baseball of radius 2 inches. What is the volume of the snow?

$$\frac{4}{3}\pi 9^3 - \frac{4}{3}\pi 2^3$$

$$\frac{4}{3}\pi (9^3 - 2^3)$$

(c) The following is folded up into a cube.



$$2s^2 = 2^2$$

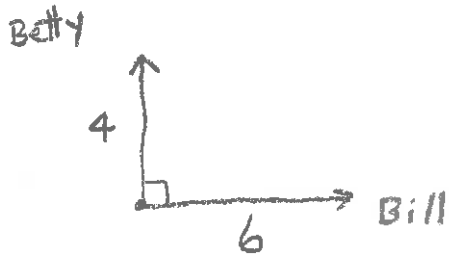
$$s^2 = 2$$

$$s = \sqrt{2}$$

$$V = s^3 = (\sqrt{2})^3$$

3. Answer the following questions. (9 points each)

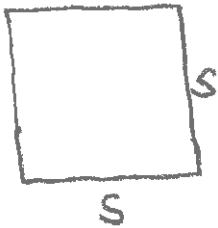
(a) Betty and Bill are standing at the same point. They walk in perpendicular directions to each other. Betty walks at 2 feet per second. Bill walks at 3 feet per second. How far from each other are they after two seconds?



$$d^2 = 6^2 + 4^2 = 52$$

$$d = \sqrt{52} = 2\sqrt{13} \text{ feet}$$

(b) Cary and Kerry build a cube with surface area 24 that a sphere is put in. The sphere touches all six sides of the box. What is the surface area of the sphere?



$$SA = 6s^2 = 24$$

$$s^2 = 4$$

$$s = 2$$

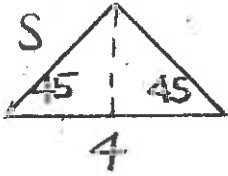
$$r = 1$$

$$V_s = \frac{4}{3} \pi r^3 = \frac{4}{3} \pi$$

$$A_s = 4\pi r^2 = \underline{\underline{4\pi}}$$

4. Give the area to perimeter ratio for the following two figures. (9 points each)

(a) Isosceles triangle.



$$h = 2 \quad 2^2 + 2^2 = S^2$$

$$S^2 = 8$$

$$S = \sqrt{8}$$

$$P = 4 + 2S = 4 + 2\sqrt{8}$$

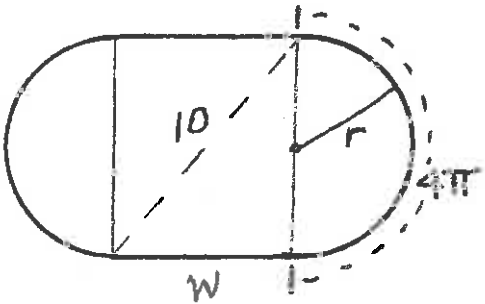
$$A = \frac{1}{2}(4)(2) = 4$$

$$\frac{A}{P} = \frac{4}{4 + 2\sqrt{8}}$$

$$= \frac{2}{2 + \sqrt{8}}$$

$$= \frac{1}{1 + \sqrt{2}}$$

(b) Oval track.



$$\pi r = 4\pi \quad r = 4$$

$$8^2 + W^2 = 10^2$$

$$W = 6$$

$$P = 8\pi + 12$$

$$A = \pi 4^2 + 8 \cdot 6$$

$$\frac{A}{P} = \frac{48 + 16\pi}{12 + 8\pi}$$

$$= \frac{12 + 4\pi}{3 + 2\pi}$$