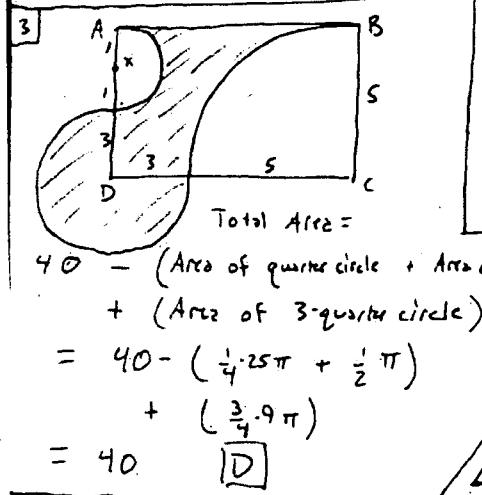
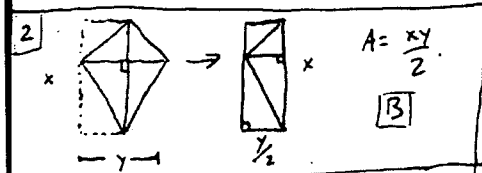


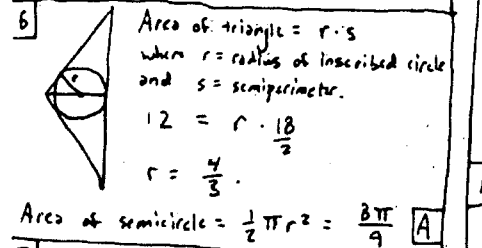
March 2005 Regional Geometry Individual Solutions

1 $(\frac{1-3}{2}, \frac{2-2}{2}, \frac{3-1}{2}) = (-1, 0, 1)$ **B**

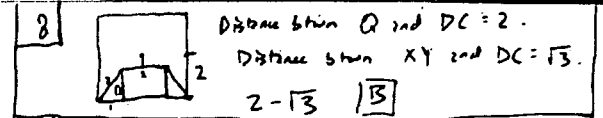


4 I. True by definition
 II. False:
 III. False. see diagram for counterexample.
 IV. False. This example demonstrates an angle total of $90+90+60 = 240$. **A**

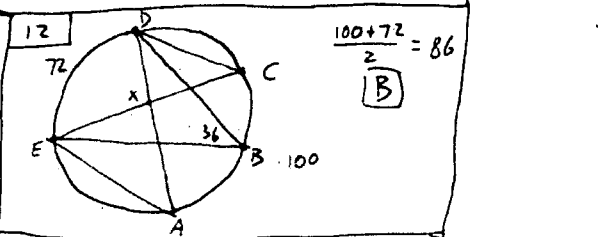
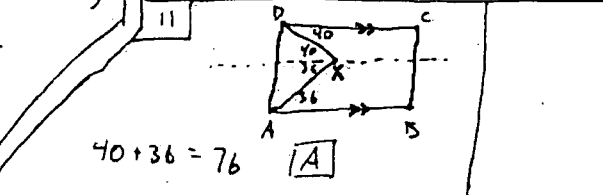
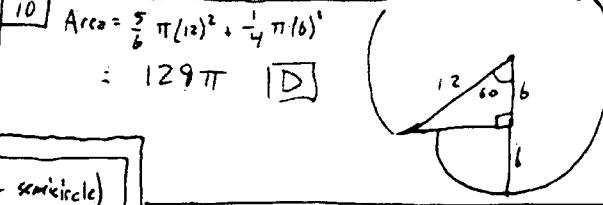
5 Sequence is the triangular numbers.
 1 3 6 10 15 21 28
 $21 + 28 = 49$ **E**



7 Sphere: $\frac{4}{3} \pi r^3 = 4\pi r^2$ $r = 3$
 Circle: $\pi r^2 = 2\pi r$ $r = 2$
 $3 - 2 = 1$. **A**

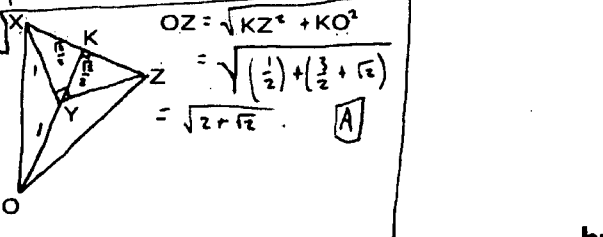
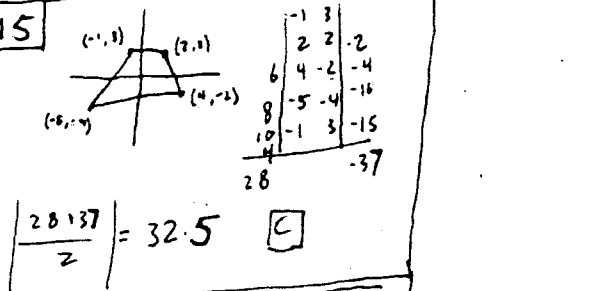


9 $V_{\text{ball}} = V_{\text{twine}}$
 $V_{\text{ball}} = \frac{4}{3} \pi (3)^3$ $V_{\text{twine}} = l \cdot \pi (\frac{1}{16})^2$
 $4 \pi (3)^3 = l \cdot \pi (\frac{1}{16})^2$
 $l = 9216 \text{ in} = 768 \text{ ft.}$ **B**



13 $D = \sqrt{3^2 + 5^2 + 2^2} = \sqrt{38}$ **A**

14 All are valid formulas. **E**



March 2005 Regional Geometry Individual Solutions

17 13 books + 5 solids = 18 [A]

18 r cannot equal l because l is the hypotenuse of a right triangle in which r is a leg. A hypotenuse cannot ever equal a leg in the same right triangle. [D]

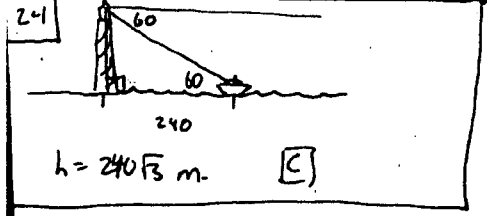
19 Exactly 7 of these small circles will fit if they are packed hexagonally. [C]

20 All of these projections are possible [D]

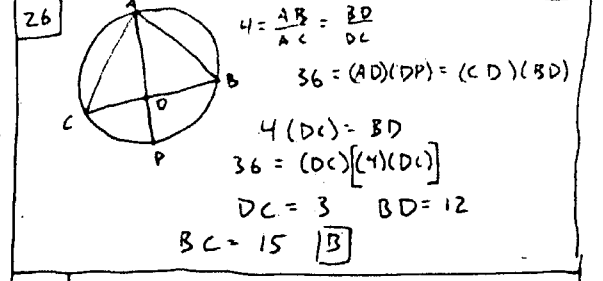
21 This line will be the hypotenuse of a right triangle with one leg as the diagonal of a face of the cube and the other leg as half of one edge. This yields 3. [D]

22 $\frac{7(7-1)}{2} = 21$. [B]

23 The ratio of the volumes of two similar figures is related to the ratio of the surface areas of the two figures as follows:
 $V_Q/V_P = (SA_Q/SA_P)^{3/2}$ [A]
 $V_Q/V_P = (8/25)^{3/2} = (16)(2)^{3/2}/125$.



25 $\Delta h = \frac{\Delta V}{\text{Surface Area}}$
 $\Delta V = 50(V_{\text{ball}}) - 20(V_{\text{cylinder}})$
 $= 50\left(\frac{4}{3}\pi(a\text{m})^3\right) - 20\left(\pi(a\text{m})^2(a\text{m})\right)$
 $= \frac{8\pi}{300} \text{ m}^3$
 $SA = 30\text{m} \cdot 100\text{m} = 3000\text{m}^2$
 $\Delta h = \frac{\pi}{112500} \text{ m} = \frac{\pi}{1125} \text{ cm}$ [A]



27 Angle = 245 or 115. Neither of these are acute. [E]

28 $E = V + F - 2 = 12$ [C]

29 360 total degrees in all exterior angles, so the measure of one of them will be $360/720 = 5$. [A]

30 Orthocenter: yes
 Incenter: No [C]
 Circumcenter: yes
 Centroid: No