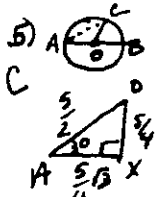
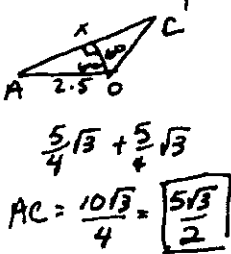


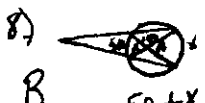
March Regional
2002 Geometry

5)  


$AC = \frac{10\sqrt{3}}{4} = \frac{5\sqrt{3}}{2}$

3) $\frac{360}{36} = 10$

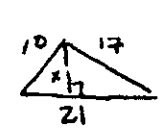
7) $N = 11000_2 = 2^4 + 2^3$
 $N - 1 = 2^4 + (2^3 - 1)$
 $D = 2^4 + (2^2 + 2 + 1) = 10111_2$

8) 
 $\frac{50+x}{2} = 80$
 $50+x = 160$
 $x = 110$

$\frac{110-50}{2} = \frac{60}{2} = 30$

10) $\frac{4(25)}{100}$ 

13) $\frac{x^2 + 4 + x^2 - 2x}{2} = \frac{1}{2}x + 12$
 $2x^2 - 2x + 4 = x + 24$
 $2x^2 - 3x - 20 = 0$
 $(2x+5)(x-4) = 0$
 $2x+5=0 \quad x-4=0$
 $x = -\frac{5}{2} \quad x = 4$
 $\frac{1}{2}(-\frac{5}{2}) + 12 = \frac{1}{2}(4) + 12$
 $-\frac{5}{4} + 12 = 14$
 $10\frac{3}{4}$

1) 
 $\cos X = \frac{17^2 - 21^2 - 10^2}{-2(21)(17)}$

$\Delta = \frac{10+17+21}{2} = \frac{48}{2} = 24$
 $A = \sqrt{24(24-10)(24-17)(24-21)} = 84$
 $A = \frac{1}{2}bh \quad \frac{1}{2}(21)x = 84$
B $x = 8$

4) $5y - 2 + 3y + 6 = 180$
 $8y + 4 = 180$
 $8y = 176$
 $y = 22$

$5(22) - 2 = 110 - 2 = 108 = 9r$
 $12 = r$

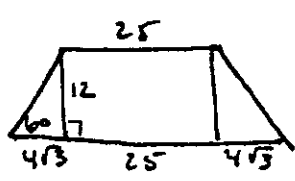
9) $a_1 = 2 \quad n = 52, d = 1$
 $S = \frac{1}{2}(52)[4 + 51]$
 $9 = \frac{1}{2}(52)(55)$

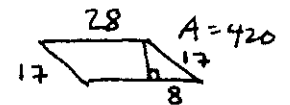
avg. = $\frac{5}{52} = \frac{1}{2} \frac{(52)(55)}{52} = \frac{55}{2} = 27\frac{1}{2}$

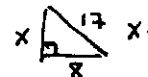
11) $6x - 5 + 9x - 10 = 180$
 $15x - 15 = 180$
 $15x = 195$
 $x = 13$

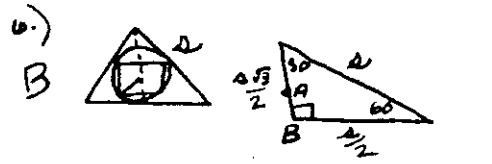
$2(13) + 30 = 26 + 30 = 56$
 $\frac{180}{-56} = 12\frac{4}{7}$

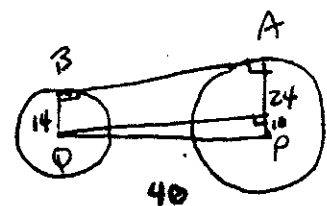
14) $\frac{12(30)}{12+30} = \frac{12(30)}{48}$
 $\frac{12(3)}{4} = 9$

16) 
 $\frac{1}{2}(12)(25+25+8\sqrt{3})$
 $6(50+8\sqrt{3})$
 $300 + 48\sqrt{3}$


2) 
 $A = 420$


 $x = 15$
 $15(x) = 420$
 $x = 28$
 $2(17) + 2(28) = p$
 $34 + 56 = p$
 $p = 90$

6) 
 $AB = \frac{1}{3}(\frac{\Delta\sqrt{3}}{2}) = \frac{\Delta\sqrt{3}}{6} = \text{radius}$
 $\text{radius} = \frac{1}{2} \text{diagonal of square}$
 $\text{Area of square} = \frac{1}{2}d_1 \cdot d_2$
 $d_1 = \frac{2\Delta\sqrt{3}}{6} = \frac{\Delta\sqrt{3}}{3}$
 $A = \frac{1}{2}(\frac{\Delta\sqrt{3}}{3})(\frac{\Delta\sqrt{3}}{3}) = \frac{\Delta^2}{6}$


15) 
 $10\sqrt{15}$


March Regional
2002

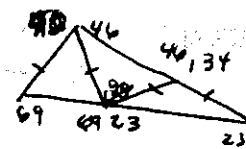
17.) B  $x^2 = 3\left(\frac{16}{3}\right) + \left(\frac{16}{3}\right)^2$
 $\frac{4}{3} = \frac{y}{x}$
 $\frac{4}{3} = \frac{y}{4}$
 $16 = 3y$
 $\frac{16}{3} = y$
 $x^2 = y(3+y)$
 $x^2 = 3y + y^2$

$x^2 = 3\left(\frac{16}{3}\right) + \left(\frac{16}{3}\right)^2$
 $x^2 = \frac{48}{3} + \frac{256}{9}$
 $y^2 = \frac{400}{9} = \left(\frac{20}{3}\right)^2$

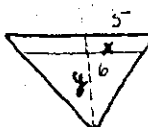
18.) $\frac{6-4}{5+3} = \frac{1}{4}$ $y-6 = \frac{1}{4}(x-5)$
 D $y-6 = \frac{1}{4}(13-5)$
 $y-6 = 2$
 $y = 8$
 (13, 8)

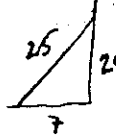
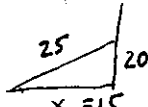
19.) B  $\frac{144 - 36\pi}{2}$
 $72 - 18\pi$

20.) E  $A = 26\pi$
 $\pi r^2 - \frac{1}{5}\pi r^2 = 26\pi$
 $r^2 = \frac{4}{5}r^2 = 20$
 $\frac{4}{5}r^2 = 20$
 $r^2 = 25$
 $r = 5$

21.) D 

22.) A $\begin{matrix} 3 & -1 & 1 & 3 \\ 3 & 1 & -2 & 3 \end{matrix}$
 $\frac{(3+2+3) - (-3+1-6)}{2}$
 $\frac{8 - (-8)}{2} = \frac{16}{2} = 8$

23.) A  $\frac{5}{x} = \frac{6}{4}$
 $5y = 6x$
 $y = \frac{6}{5}x$

24.) B  $\frac{625}{576}$
 $x = 15$
 $625 - 400 = 225$

25. Cross section of the pipe πR^2
 $15\text{ft} - 7\text{ft} = 8\text{ft}$
 $\therefore \text{large pipe} / \text{small pipe}$
 $6^2 / 2 = 36$

$\frac{27}{64}V = \frac{\pi x^2 y}{3} = \frac{\pi x^2 \cdot \frac{6x}{5}}{3}$
 $= \frac{\pi \cdot 6x^3}{15} = \frac{27}{64}(50\pi)$

The carrying capacity of 36 small pipes = 1 large pipe

$\frac{27 \cdot 25}{32} = \frac{2x^3}{5}$
 $x^3 = \frac{\sqrt{27 \cdot 25 \cdot 5}}{32 \cdot 2}$

26.) D $l \cdot h \cdot l \cdot w \cdot h \cdot w$
 $e^2 h^2 w^2$
 the square of the volume

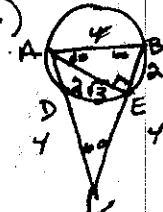
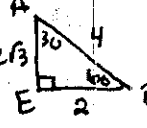
27. $n = \#$ of people present. $P =$ a person
 A P shakes hands with $(n-1)$ persons, this is true for each of the n persons. Since each handshake is between 2 people the total $\#$ of handshakes is $n(n-1)/2 = 28$
 $\therefore n = 8$ or $C(n, 2) = n(n-1)/2 = 28$

$\frac{5 \cdot 3}{4} = \frac{15}{4} = x$
 $y = \frac{6 \cdot \sqrt{15}}{5 \cdot 4} = \frac{9\sqrt{15}}{20}$

28.) Single out any one pt. A. joined to the remaining 11 pts, A yields 11 lines. Since a line is determined by 2 pts, we have for the 12 points $\frac{1}{2} \cdot 12 \cdot 11 = 66$ lines

29.) B $90 - (60^\circ + \frac{1}{4} \cdot 30^\circ) = 22\frac{1}{2}^\circ$

in 15 minutes the hour hand moves through an angle of $\frac{1}{4}$ of $30^\circ = 7\frac{1}{2}^\circ$

30.) C  

Answers for FAMAT March Regional Geometry

1. B
2. D
3. C
4. B
5. C
6. B
7. D
8. B
9. C
10. C
11. C
12. A
13. D
14. C
15. E
16. D
17. B
18. D
19. B
20. E
21. D
22. A
23. A
24. B
25. D
26. D
27. A
28. C
29. B
30. C

TEAM

1.) 144

2.) $5\sqrt{3} = h, r = 5$

3.) $\frac{500}{3}$ or $166\frac{2}{3}$

4.) $\frac{50\sqrt{3}}{3}$

5.) the smallest values are
 $\frac{1, 2, 2 \text{ dimensions}}{\text{space diagonal} = 3}$
 $\text{volume} = 4$

6.) $r = 1$

7.) $V = \frac{52}{3}$ or $17\frac{1}{3}$

8.) $300\sqrt{3}$

9.) 24π

10.) 10

11.) 39

12.) 59

13.) $r = \frac{a}{\sqrt{2}+1} = a(\sqrt{2}-1)$

14.) centroid = (1, 2)

15.) $\frac{431}{2}$ or $215\frac{1}{2}$