

**GEOMETRY REGIONAL MARCH 2000  
INDIVIDUAL ANSWER KEY**

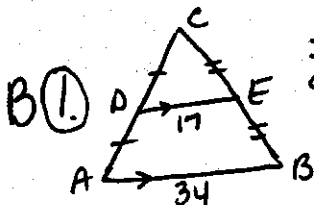
1. B
2. A
3. B
4. A
5. D
6. C
7. A
8. B
9. C
10. A
11. D
12. C
13. B
14. A
15. D
16. B
17. D
18. E
19. A
20. D
21. B
22. A
23. D
24. B
25. D
26. B
27. A
28. A
29. D
30. C

**TEAM SOLUTIONS**

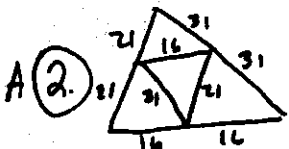
1. 108
2.  $\overline{UA}$
3.  $133^\circ$
4.  $\frac{191\pi}{4}$  ft<sup>2</sup>
5. 105 m
6.  $26\pi$
7. 33.125
8.  $2\sqrt{3}$
9.  $x^2 + y^2 + 6x - 8y + 9 = 0$
10. 990'
11. 145.767
12.  $\angle APJ, \angle BPJ, \angle APG, \angle BPG$   
 $\angle APH, \angle BPH$
13.  $220.5\pi$
14.  $6750\pi$
15. centroid, circumcenter, excenter,  
incenter, orthocenter

# GEOMETRY

## INDIVIDUAL SOLUTIONS REGIONAL MARCH 2000

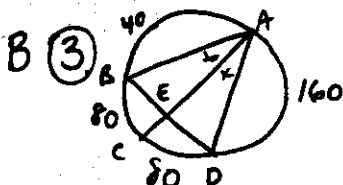


If midpoints of  $\Delta$  are connected, segments are  $\parallel$  and  $\frac{1}{2}$  the third side

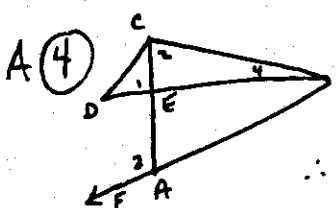


$$2a + b - c$$

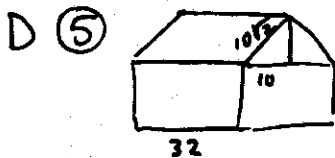
$$2 \cdot 31 + 16 - 21 = 57$$



$$80 + 40 = \frac{120}{2} = 60$$



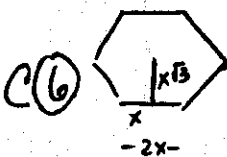
$m\angle 1 > m\angle 2$  and  $m\angle 4$  is exterior  $\angle$ . Vertical  $\angle$ 's then  $\angle 3$  is an exterior  $\angle$ .  $\therefore m\angle 3 > m\angle 4$



2 sides of roof

$$2(32 \cdot 10\sqrt{2}) = (640\sqrt{2})(1.10) = 704\sqrt{2} / 32 \text{ sq ft.}$$

31.1 sheets



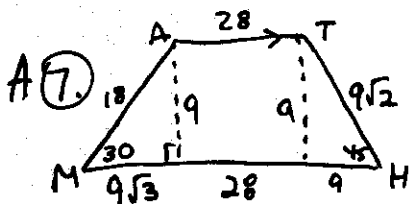
$A = \frac{1}{2} \text{ apothem} \cdot \text{perim}$

$$50\sqrt{3} = \frac{1}{2} \cdot x\sqrt{3} \cdot 6 \cdot 2x$$

$$100\sqrt{3} = 12x^2\sqrt{3}$$

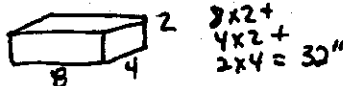
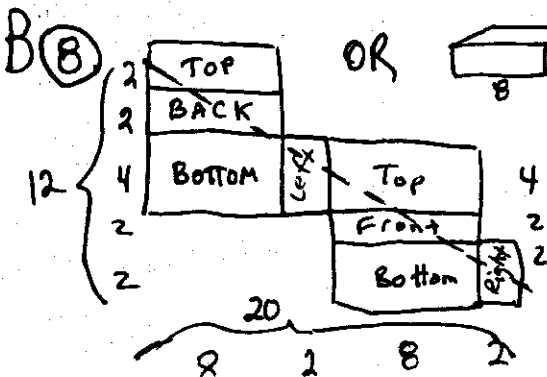
$$\frac{25}{3} = x^2$$

$$x = \frac{5}{\sqrt{3}} \cdot 12 = \frac{60\sqrt{3}}{\sqrt{3}\sqrt{3}}$$



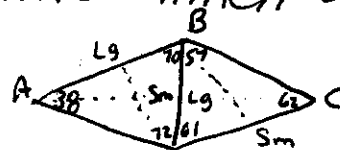
$$9\sqrt{2} + 28 + 18 + 9\sqrt{3} + 28 + 9$$

$$9\sqrt{2} + 9\sqrt{3} + 83$$



$$2 \cdot 8 \cdot 2 + 4 \cdot 2 + 2 \cdot 4 = 30"$$

$$\sqrt{12^2 + 20^2} = \sqrt{544} \approx 23.3"$$



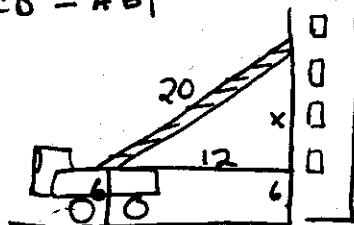
$|CD - AB|$

A (10)

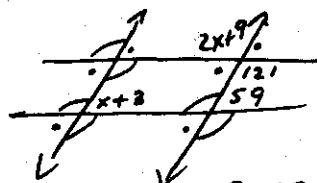
$$20^2 = 12^2 + x^2$$

$$x = 16$$

$$16 + 6 = 22'$$



D (11)



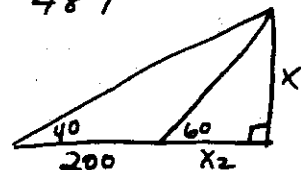
$$2x + 9 + x + 3 = 180$$

$$3x = 168$$

$$x = 56$$

$$3 \cdot 121 - 59 + 2 \cdot 121 - 59 = 487$$

C (12)



$$x = \tan 40 = \frac{x_1}{x_2 + 200}$$

$$\tan 60 = \frac{x_1}{x_2}$$

$$\tan 60 \cdot x_2 = \tan 40(200 + x_2)$$

$$\frac{x_2}{200 + x_2} = .484454$$

$$x_2 = 9689087 + .484454397x$$

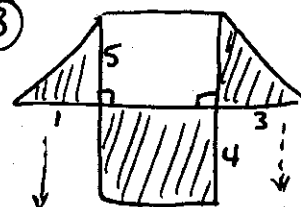
$$.51554603x_2 = 9689087$$

$$x_2 = 1879383496$$

$$\tan 60 = \frac{x_1}{x_2}$$

$$x_1 = 325.5187702$$

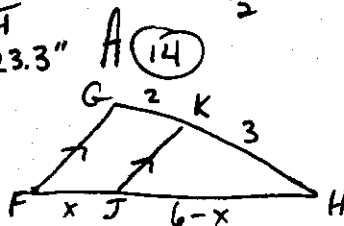
B (13)



$$\frac{1}{2} \cdot 1.5 + 4.5 + \frac{1}{2} \cdot 3.5$$

$$\frac{5}{2} + 20 + \frac{15}{2} = \frac{60}{2} = 30$$

A (14)



$$\frac{2}{3} = \frac{x}{6-x}$$

$$12 - 2x = 3x$$

$$x = \frac{12}{5}$$

$$\frac{12}{5} + 3 - 4.2 = -\frac{13}{5}$$

D (15)   
 $\frac{130-90}{2} = x$   
 $20 = x$

D (20)   
 $\frac{23 \cdot 15}{23+15} = \frac{345}{38}$   
 $A = \frac{1}{2} \cdot 19 \cdot \frac{345}{38}$   
 $= 86.25 \text{ ft}^2$

D (25)   
 $24 \cdot 7 = 168$

B (16)   
 $A = \frac{1}{2} \cdot 5 \cdot 8 \sqrt{2}$   
 $= 20\sqrt{2}$

B (21)   
 Area-segment =  $\frac{m}{360} \cdot \pi r^2 - \text{area } \Delta$   
 $\frac{50}{360} \cdot \pi 9^2 - \frac{1}{2}bh$

B (26)   
 5-12-13 triplet  
 A (27) (-4, 1)  
 $x^2 + 8x + 16 + y^2 + 2y + 1 = 16 + 1$   
 $(x+4)^2 + (y-1)^2 = 17$

D (17)   
 $AX \cdot XB = CX \cdot XD$   
 $(n+2)(2n-1) = (n+4)(n)$   
 $2n^2 - n - 4n - 2 = n^2 + 4n$   
 $n^2 - n - 2 = 0$   
 $(n+1)(n-2) = 0$   
 $n = -1 \quad n = 2$   
 $AX = 4 \quad XB = 3$   
 $CX = 6 \quad XD = 2$   
 $4+3=7 \quad 6+2=8$   
 $7 \cdot 8 = 56$

A (28)   
 $3x = 114 \quad x = 38$   
 $(1.5)(38) = 57$   
 $(67)(5) = 285$

$\sin 65 = \frac{x}{9}$   
 $9 \sin 65 = x$   
 $9 \cdot 0.906309 = x = 8.15677$   
 $\cos 65 = \frac{y}{9}$   
 $9 \cos 65 = y$   
 $9 \cdot 0.422615 = y = 3.80354$   
 $3.80354 \cdot 2 = 7.60708$   
 $\frac{5}{36} \cdot 81\pi - \frac{1}{2}(7.60708)(8.15677)$   
 $\frac{45\pi}{4} - 31.02479 \Rightarrow 35.325 - 31.02479 \approx 4.3$

D (29)   
 $CP = 2 \cdot PE$   
 $CP = 4$   
 $AP = 2 \cdot PD$   
 $AP = 7$   
 $7 + (7+3.5) + 2 + 27.5 = 47.5$

E (18)   
 $6^2 = x(x+9)$   
 $36 = x^2 + 9x$   
 $0 = x^2 + 9x - 36$   
 $0 = (x+12)(x-3)$   
 $x = 3$   
 $6^2 = 4(y+4)$   
 $36 = 4y + 16$   
 $20 = 4y$   
 $5 = y$   
 $x + 2y = 13$   
 $3 + 2 \cdot 5 = 13$

A (22)   
 use 30-60-90  $\Delta$  information  
 $x = \frac{24}{x\sqrt{3}}$   
 $CE = 38 \quad HK = 9.5$   
 $HE = 19 \quad MK = 4.75$

C (30)   
 $\text{Vol } \text{Cyl} + \text{Vol } \text{sm Cyl} + \text{Vol prism}$   
 $B_1 h - B_2 h + l \cdot w \cdot h$   
 $\pi \cdot 20^2 \cdot 10 - \pi \cdot 10^2 \cdot 10 + (10\sqrt{2})(10\sqrt{2})(10)$   
 $4000\pi - 1000\pi + 2000$   
 $3000\pi + 2000$

D (23)   
 $\frac{3}{4} \frac{12}{16} = \frac{x}{9}$   
 $4x = 27$   
 $x = \frac{27}{4}$   
 $\Delta \text{MPH} = \frac{1}{2}bh : \Delta \text{MPK} = \frac{1}{2}bh$   
 $\frac{1}{2} \cdot \frac{27}{4} \cdot x : \frac{1}{2} \cdot 12 \cdot k$   
 $\frac{27}{4} \cdot 12 = \frac{9}{16}$

A (19)   
 $V = l \cdot w \cdot h$   
 $12 \cdot 5 \cdot 1.7 = 102 \text{ cm}^3$

B (24)   
 $\tan 8^\circ = \frac{764}{x}$   
 $x = \frac{5436.14}{1000} = 5.4 \text{ km}$   
 close to 5.5 km