

NOTA denotes None Of These Answers

Note: Figures NOT drawn to scale.

1. A triangle has angle measures of  $3x + 7$ ,  $4x - 3$ , and  $2x + 5$ . Find the sum of the measures of the two largest angles.

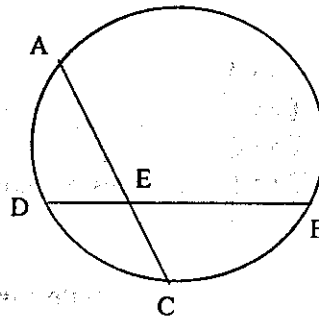
A) 107      B) 116      C) 137      D) 168      E) NOTA

2. Find the measure of an angle (to the nearest degree) such that nine times its complement is equal to two more than three times its supplement.

A) 44  
B) 45  
C) 46  
D) 82  
E) NOTA

3. Given that  $AE = 10$ ,  $DE = 5$ ,  $BE = 6$ ,  $E$  is the intersection of the two chords, and  $E$  is not the center of the circle. Find  $CE$ .

A) 1  
B) 3  
C)  $\frac{25}{3}$   
D) 60  
E) NOTA

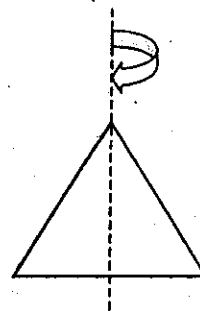


4. The area of a circle is  $36\pi$  and the diameter of the circle also serves as the side of a regular hexagon. Find the area of the hexagon.

A)  $36\sqrt{3}$   
B)  $54\sqrt{3}$   
C)  $216\sqrt{3}$   
D)  $216\pi$   
E) NOTA

5. An equilateral triangle with area  $9\sqrt{3}$  is rotated about the center axis (dotted line) as in the figure below. Find the volume of the resulting solid.

A)  $9\pi\sqrt{3}$   
B)  $18\pi$   
C)  $12\pi\sqrt{3}$   
D)  $36\pi\sqrt{3}$   
E) NOTA



6. A triangle has sides of length 3, 5, and 6. It is similar to a second triangle with shortest side of length 12. Find the ratio of the area of the first triangle to the second.

- A)  $\frac{1}{8}$   
 B)  $\frac{1}{16}$   
 C)  $\frac{1}{32}$   
 D)  $\frac{1}{96}$   
 E) NOTA

7. Cathy is very hungry and wants to maximize the amount of pie she can make. She has a choice of the three pans (all cylindrical) with dimensions described below (all lengths measured in inches): Which pan would allow Cathy to make the most amount of pie (assuming she can only make one)?

|       | Radius | Depth |
|-------|--------|-------|
| Pan A | 6      | 2     |
| Pan B | 8      | 1     |
| Pan C | 7      | 1.5   |

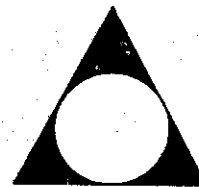
- A) Pan A  
 B) Pan B  
 C) Pan C  
 D) Two largest pans are equal  
 E) NOTA

8. Steve is trying to calculate his test average in his Algebra class. His test scores are 64, 76, 82, 57, 100, and  $x$ . Kim, his teacher, calculated his test average to be 75. Then Steve realized he mistyped his last score ( $x$ ) and obtained the incorrect average of 78. What is the absolute value of the difference between what Steve incorrectly entered in his calculator and his actual test average in Kim's grade book?

- A) 3  
 B) 5  
 C) 18  
 D) Not Enough Information  
 E) NOTA

9. The figure below has a circle of diameter 8 inscribed in the equilateral triangle. Find the area of the shaded region.

- A)  $16\sqrt{3} - 16\pi$   
 B)  $32\sqrt{3} - 16\pi$   
 C)  $40\sqrt{3} - 16\pi$   
 D)  $48\sqrt{3} - 16\pi$   
 E) NOTA

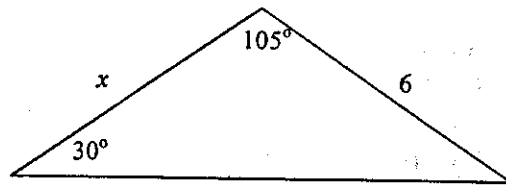


**FAMAT Regional Competition  
Geometry Individual Test**

February

10. Given the figure at right, find  $x$ .

- A)  $2\sqrt{6}$
- B)  $6\sqrt{2}$
- C) 9
- D)  $6\sqrt{3}$
- E) NOTA



11. Two angles,  $A$  and  $B$ , form a linear pair. If the measure of  $\angle A = 75^\circ$ , find the measure of  $\angle B$ .

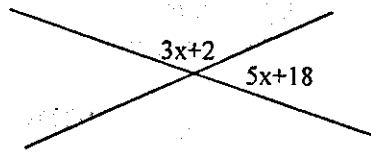
- A)  $15^\circ$
- B)  $75^\circ$
- C)  $105^\circ$
- D)  $285^\circ$
- E) NOTA

12. Find the area of a triangle with vertices  $(6,18)$ ,  $(6,6)$ ,  $(9,6)$ .

- A)  $\frac{9\sqrt{3}}{4}$
- B) 18
- C) 36
- D)  $36\sqrt{3}$
- E) NOTA

13. Find " $x$ " in the figure of intersecting lines below.

- A) 8
- B) 8.75
- C) 20
- D) 28
- E) NOTA



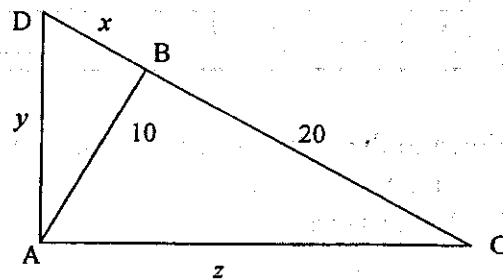
14. A triangle has sides of length 5, 7, and  $x$ . Which of the following could *not* be a value of  $x$ ?

- A) 3
- B) 6
- C) 10
- D) 12
- E) NOTA

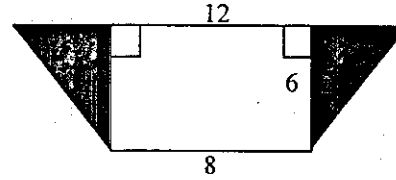
15. Given the figure at right, find  $x - y + z$ .

Assume:  $\overline{AB} \perp \overline{CD}$   
 $\overline{AD} \perp \overline{AC}$

- A)  $5\sqrt{5} - 5$
- B)  $15\sqrt{5} - 5$
- C)  $5 - 5\sqrt{5}$
- D)  $5 - 15\sqrt{5}$
- E) NOTA

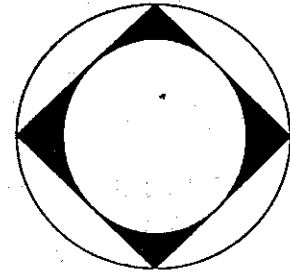


16. The trapezoid below has bases of lengths 8 and 12 with height 6. Find the area of the shaded regions.



- A) 6
- B) 12
- C) 48
- D) 60
- E) NOTA

17. In the figure below the larger circle is circumscribed about the square and the smaller circle is inscribed within the square. If the area of the larger circle is  $144\pi$ , find the area of the shaded region.



- A)  $144 - 36\pi$
- B)  $288 - 72\pi$
- C)  $576 - 144\pi$
- D) Not Enough Information to be Determined
- E) NOTA

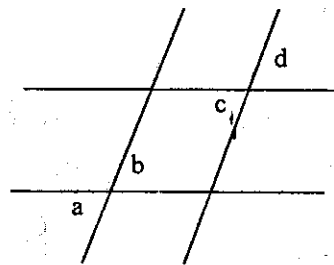
18. Which of the following is the name given to the point where the angle bisectors of a triangle intersect?

- A) Bicenter
- B) Circumcenter
- C) Incenter
- D) Orthocenter
- E) NOTA

**USE THE FOLLOWING PROOF FOR QUESTIONS 19 & 20**

If, in the figure,  $\angle b \cong \angle c$ , prove  $\angle a \cong \angle d$

| PROOF                        |                        |
|------------------------------|------------------------|
| <i>Statements</i>            | <i>Reasons</i>         |
| 1. $\angle a \cong \angle b$ | Vertical Angle Theorem |
| 2. $\angle b \cong \angle c$ | Given                  |
| 3. #19                       | Vertical Angle Theorem |
| 4. $\angle a \cong \angle d$ | #20                    |



19. Which of the following provides the *best* Statement #3 in the above proof?

- A)  $\angle b \cong \angle a$
- B)  $\angle c \cong \angle a$
- C)  $\angle c \cong \angle d$
- D)  $\angle c \cong \angle c$
- E) NOTA

20. Which of the following properties serves as the best reason for statement #4 in the proof?

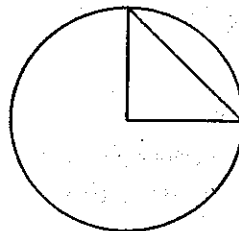
- A) Reflexive      C) Symmetric      E) NOTA  
B) Commutative      D) Transitive

21. Find the area of a regular hexagon that has opposite sides 24 units apart.

- A)  $18\sqrt{3}$   
B)  $188\sqrt{3}$   
C)  $240\sqrt{3}$   
D)  $288\sqrt{3}$   
E) NOTA

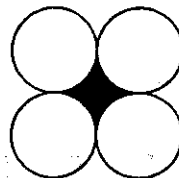
22. The circle has radius of length 6 in the figure below. Find the area of the segment.

- A)  $9\pi - 36$   
B)  $9\pi - 18$   
C)  $9\pi$   
D)  $36\pi - 36$   
E) NOTA



23. Each of the four circles below has diameter 6, and all are externally tangent to each other. Find the area of the shaded region.

- A)  $9 - 3\pi$   
B)  $12 - 3\pi$   
C)  $36 - 9\pi$   
D)  $144 - 36\pi$   
E) NOTA



24. Find the centroid of a triangle with vertices  $(3,5)$ ,  $(7,2)$  and  $(5,2)$ .

- A)  $(2,5)$       B)  $(5,3)$       C)  $\left(\frac{1}{5}, \frac{1}{2}\right)$       D)  $\left(\frac{1}{2}, \frac{1}{5}\right)$       E) NOTA

25. Find the angle between the hands of a clock at 6:23 p.m.

- A)  $42^\circ$   
B)  $53.5^\circ$   
C)  $72.1^\circ$   
D)  $88^\circ$   
E) NOTA

26. A metallic sphere of radius 3 is melted and poured into a previously empty cone of radius 6 and height 4. What percent of the cone will be filled by the melted sphere?

- A) 50 %
- B)  $66.\overline{6}$  %
- C) 75%
- D) 87.5%
- E) NOTA

27. A parallelogram is a rhombus if and only if:

- A) Both pairs of opposite sides are congruent.
- B) Diagonals bisect each other
- C) Diagonals are congruent.
- D) Diagonals bisect opposite angles.
- E) NOTA

28. A pair of vertical angles have measures of  $x^2 + 5x$  and  $3x + 8$ . Find the sum of the two angle measures.

- A) 14
- B) 28
- C) 56
- D) 196
- E) NOTA

29. Which of the following construction methods could prove triangles congruent assuming none have a right angle...

- I. SSS
- II. SAS
- III. SSA
- IV. ASA

- A) I only
- B) III & IV only
- C) I & II
- D) I, II, IV only
- E) NOTA

30. Bob is 6 feet tall and standing a distance away from a building 500 feet high. At that point the angle of elevation from Bob's eye to the top of the building is  $76^\circ$ . Bob then walks backwards until the angle of elevation from his eye to the top of the building is  $23^\circ$ . To the nearest foot, how many feet backwards did Bob walk from the original point?

- A) 1040.62
- B) 1053.26
- C) 1505.32
- D) 1523.60
- E) NOTA

Table of Trig. Values

|                           |
|---------------------------|
| $\sin(76^\circ) = 0.9703$ |
| $\sin(23^\circ) = 0.3907$ |
| $\sin(53^\circ) = 0.7986$ |
| $\cos(76^\circ) = 0.2419$ |
| $\cos(23^\circ) = 0.9205$ |
| $\cos(53^\circ) = 0.6018$ |