GEOMETRY INDIVIDUAL TEST—WANDO HIGH SCHOOL 4TH ANNUAL TOURNAMENT 2009

NOTE: "NOTA" (choice E) means "none of these answers" is correct.

1. A closed rectangular box has a surface area of 1450 square inches. Its length is 5 times its width and its height is 4 times it width. What is its volume?

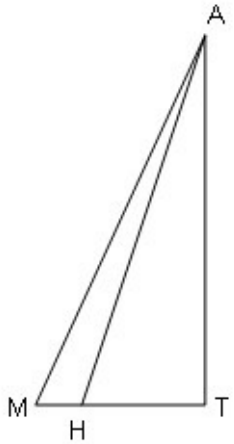
   A) 25 in^3 B) 1050 in^3 C) 2500 in^3 D) 312,500 in^3 E) NOTA

2. For each true statement below assign the value 1. For each false statement below assign the value 0. Find the sum of the values of these statements.

   i) If 2 angles form a linear pair, then they are supplementary.
   ii) The sum of 3 sides of a triangle is equal to 180.
   iii) It is impossible to have an obtuse isosceles triangle.
   iv) A rhombus can be a rectangle.
   v) Two given rectangles are always similar.

   A) 1 B) 2 C) 3 D) 4 E) NOTA

3. In the diagram below, $\overline{AT} \perp \overline{MT}$. If $\overline{MA} = 65$, $\overline{HA} = 61$, and $\overline{HT} = 11$, find the length of $\overline{MH}$.



   A) 14
   B) 15
   C) 25
   D) 36
   E) NOTA

4. Jen, Janelle, and Julie are sisters of Matt, Michael and Mitch, but not necessarily in that order. Janelle has more letters in her name than her brother does and Mitch's grandmother lives with his family of 3 brothers, 1 sister, and his mother and father. If Julie never met either of her grandmothers because they died before she was born, and Jen, who is Matt's cousin, is the youngest in her family of 3 siblings, then who is the sister of Michael?

   A) Jen B) Janelle C) Julie
   D) Michael is an only child E) NOTA

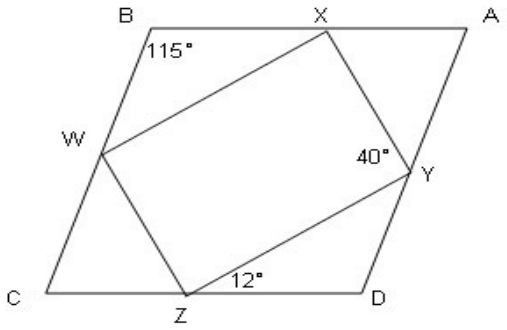
5. x and y are integers with a geometric mean of 10 and an arithmetic mean of 12.5. Find the sum of $x^2 + y^2$

A) 5 B) 25 C) 425 D) 625 E) NOTA

6. If 27, 63, 41, and 35 represent the lengths of segments, what is the probability that a triangle can be formed if three of these numbers are chosen at random without replacement as side lengths?

A) 0.25 B) 0.50 C) 0.67 D) 0.75 E) NOTA

7. Given that ABCD and WXYZ are parallelograms, find m $\angle$ AXY



A) 40˚ B) 28˚ C) 38˚ D) 12˚ E) NOTA

8. Two circles, each with a radius of r, are tangent at exactly one point. If point A is on one circle, and point B is on the other circle, what is the greatest possible length of AB?

A) 4r B) 2r C) r/2 D) $\sqrt{2}$r E) NOTA

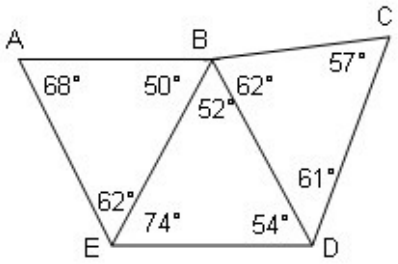
9. What is the area of an equilateral triangle with an altitude of 8?

A) 32 B) $16\sqrt{3}$ C) $\frac{64\sqrt{3}}{3}$ D) $\frac{128\sqrt{3}}{3}$ E) NOTA

10. In a convex quadrilateral, 2 angles have the same measure, a third angle is two-thirds the sum of the first two angles, and the fourth angle is 40 degrees more than the sum of the first two angles. What are the measures of the 2 congruent angles?

A) 30˚ B) 60˚ C) 90˚ D) 120˚ E) NOTA

11. Which segment is longest in the given diagram on the right?



A) $\overline{BE}$ B) $\overline{BD}$ C) $\overline{CD}$

D) $\overline{DE}$ E) NOTA

12. Find the equation of a circle that is tangent to the x-axis, the y-axis and the lines y = 6, and x = 6.

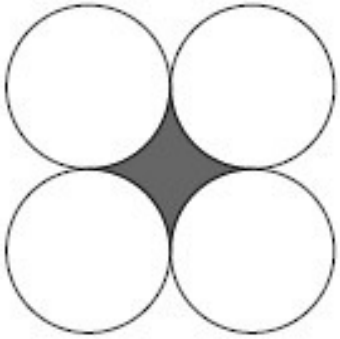
A) $(x+3)^2+(y+3)^2=6$ B) $(x-3)^2+(y-3)^2=6$

C) $(x+3)^2+(y+3)^2=9$ D) $(x-3)^2+(y-3)^2=9$ E) NOTA

13. Find the shaded area (in square feet) if each of the circles has a radius of ½ foot.

A) $1-\frac{\pi}{4}$ B) $\frac{\pi}{4}-\frac{1}{2}$ C) $\pi-\frac{1}{2}$

D) $\pi-\frac{\sqrt{2}}{2}$ E) NOTA



14. Given the hexagon ABCDEF, what would be the location of point A if the hexagon is reflected over the line y = 2 and then rotated about point F 90˚ counterclockwise?

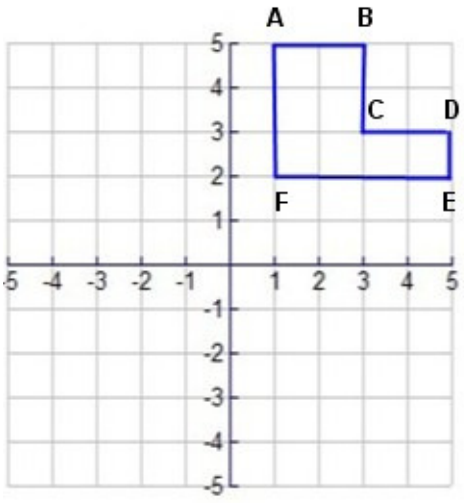
A) (4, -2)

B) (2, -2)

C) (5, 2)

D) (1, -2)

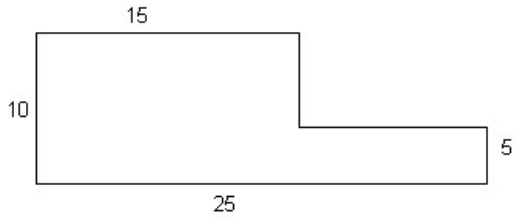
E) NOTA



15. If the perimeter of a square is equal to the circumference of a circle, then the ratio of the area of the square to the area of the circle is:

A) 4π B) $\frac{\pi}{4}$ C) $\frac{\pi}{2}$ D) $\frac{4}{\pi}$ E) NOTA

16. Mrs. Craig is planting a flower garden in the shape of 2 adjoining rectangles of different size as shown in the diagram below. (All measurements are given in feet.) If one flat of flowers covers 10 square feet of garden space, and a flat costs $5.99, how much will is cost Mrs. Craig to plant her flower bed?



A) $119.80

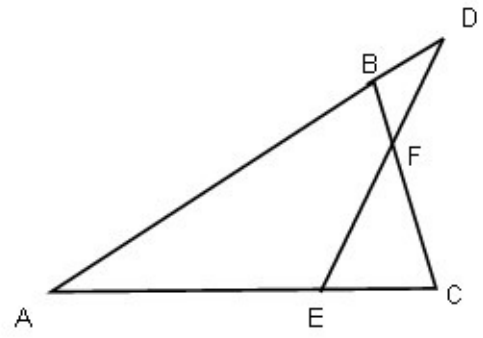
B) $149.75

C) $1198.00

D) $1294.00

E) NOTA

17. Given $\triangle ABC$ is isosceles with base BC. A point E is placed on AC and a point F is placed on BC and a point D lies on the exterior of the triangle, such that isosceles triangle BDF is formed with base DF. If $m\angle ADE = 15^o$ find $m\angle AED$.



A) 55˚

B) 35˚

C) 65˚

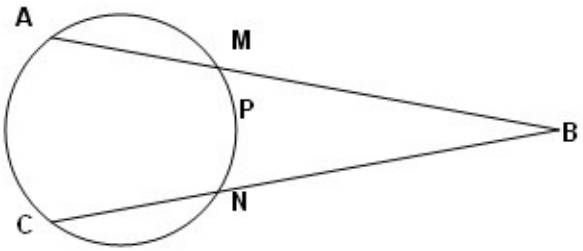
D) 85˚

E) NOTA

18. On Sharky Beach, which has a north-south shoreline, there are 2 lifeguard stations which are 500 yards apart. A surfer has an injury in the water between the lifeguard stations. If the angle from the south lifeguard station to the surfer is 62˚, and the angle from the north lifeguard station to the surfer is 42˚, what is the distance (rounded to the nearest tenth of a yard) between the south-based lifeguard and the injured surfer?

A) 344.8 B) 446.3 C) 455.0 D) 725.0 E) NOTA

19. $\overline{AB}$ and $\overline{CB}$ intersect the circle shown at points M and N respectively. Point P lies on the circle between M and N. $m\overset{\frown}{ACM} = 270^o, m\overset{\frown}{NAC} = 260^o, and\ m\overset{\frown}{CPA} = 235^o$. If $m\angle ABC = 40^o$ find $m\overset{\frown}{MN}$



A) 125˚ B) 85˚ C) 80˚ D) 45˚ E) NOTA

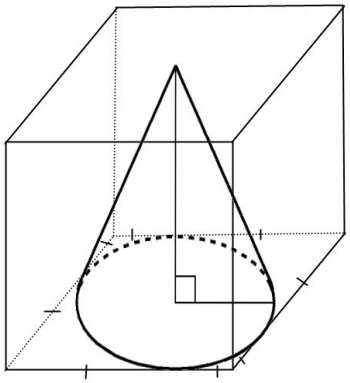
20. Triangle ABC has a right angle at B and altitude $\overline{BD}$. Given that AB = 4, and DC = 6, find the measure of $\overline{BD}$.

A) 2 B) $2\sqrt{3}$ C) 4 D) $4\sqrt{3}$ E) NOTA

21. The base of a cone is circumscribed in the rectangular base of a cube. The vertex of the cone is tangent to the top of the cube. If the volume of the cube is 64 cubic inches, find the volume of the cone in cubic inches.

A) 8π B) $\frac{64\pi}{3}$ C) 32π

D) $\frac{16\pi}{3}$ E) NOTA



22. Find the length of the median (in inches) to the longer leg of a triangle with side lengths 3 inches, 4 inches and 5 inches.

A) 2.5 B) $\frac{\sqrt{65}}{2}$ C) $\sqrt{13}$ D) 5 E) NOTA

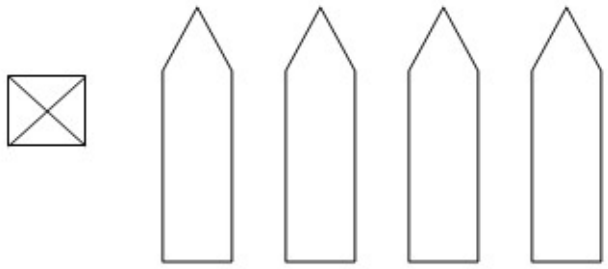
23. Equilateral triangle MNP is situated on the coordinate plane so that point M is at (-3a, 0) and point P is at (3a, 0). If point N lies on the positive y-axis find the coordinate for point N.

A) (0, 3a) B) $(0, \sqrt{3a})$ C) (0, 6a) D) $(0, 3a\sqrt{3})$ E) NOTA

24. How many distinct triangles exist with side lengths measuring $\frac{2}{9}, \frac{5}{7}$, and $\frac{10}{11}$?

A) 0 B) 1 C) 2 D) 3 E) NOTA

25. The top, left, right, front, and back views (respectively) of a famous American landmark are pictured below. Which landmark is depicted?



A) Vietnam Memorial B) St. Louis Arch Gateway Arch C) Liberty Bell

D) Brooklyn Bridge E) Washington Monument

Solutions:

1. C
2. B
3. A
4. A
5. C
6. D
7. B
8. A
9. C
10. B
11. C
12. D
13. A
14. E (4,2)
15. B
16. A
17. E 45˚
18. A
19. D (since AC is 125˚, and (AC-MP)/2 = 40˚))
20. B
21. D
22. C
23. D
24. B
25. E