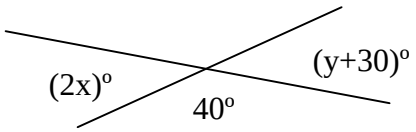
GRISSOM MATH TOURNAMENT
APRIL 17, 2010
GEOMETRY TEST

1. Find the measure of one interior angle of a regular 18-sided polygon.

   A. 20^o B. 40^o C. 120^o D. 140^o E. 160^o

2. Find the value of |x - y| in the given figure.



   A. 10 B. 30 C. 40 D. 90 E. 140

3. Find the volume of a rectangular prism with sides of edges 5, 6, and 7.

   A. 210 B. 105 C. 42 D. 35 E. 18

4. If the measures of three angles in a triangle are $(2x+15)^o$, $(10x - 20)^o$, and $(3x + 2)^o$, then find the value of $15x - 3$.

   A. 30 B. 45 C. 90 D. 180 E. 360

5. Find the coordinates of the centroid of a triangle with vertices at (3, 7), (6, 10), and (9, 1).

   A. (6, 6) B. (5, 6) C. (4, 7) D. (5, 7) E. (3, 8)

6. In rhombus ABCD, AC = AB = 8. Find the area of the rhombus.

   A. $16\sqrt{3}$ B. 32 C. $32\sqrt{3}$ D. 64 E. $64\sqrt{3}$

7. A triangle with sides length 3, 4, and $\sqrt{7}$ is inscribed in a circle. Find the area inside the circle but outside the triangle.

   A. $\frac{7}{4}\pi - 6$ B. $8\pi - \frac{\sqrt{7}}{12}$ C. $7 + \sqrt{7}$ D. $4\pi - \frac{3\sqrt{7}}{2}$ E. $16\pi - 3\sqrt{7}$

8. Five times the complement of an angle is 50^o more than the supplement of the same angle. Find the measure of the supplement of the angle.

   A. 35^o B. 55^o C. 115^o D. 125^o E. 135^o

9. Nidhi has a rectangular shaped flower bed. She wants to plant lilies in half of the bed and roses in the other half, and the dividing line to be a diagonal of the rectangle. If the diagonal is 9 feet long and one side of the flower bed if 4 feet, what is the area of the region in which she plans to plant the lilies?

   A. 6 B. $2\sqrt{65}$ C. $4\sqrt{65}$ D. 36 E. 65

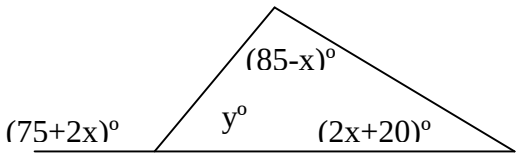
10. One circle with radius 2 and two circles with radii 1 are all externally tangent to each other. Find the area of the triangle with vertices at the centers of the circles.

A. $\sqrt{2}$ B. $2\sqrt{2}$ C. 3 D. 12 E. $12\sqrt{10}$

11. Find the perimeter of a regular hexagon with area $54\sqrt{3}$.

A. 12 B. 27 C. 30 D. 36 E. 54

12. Find the value of y:



A. 30 B. 45 C. 55 D. 80 E. 135

13. Points A, B, C, and D are collinear. Point B is the midpoint of $\overline{CD}$. If AB = 11, BC = 3, AD = 8, and DA>DC>DB, which of the following is largest?

A. AB B. AC C. AD D. BC E. CD

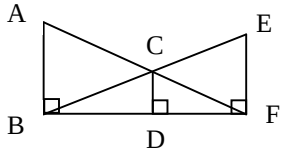
14. Find the length of the line segment with endpoints at the coordinate(s) of the point(s) of intersection of the graphs of $(x+4)^2+(y-2)^2=25$ and $x-3y=5$.

A. 3 B. $\sqrt{10}$ C. 4 D. $2\sqrt{10}$ E. $2\sqrt{15}$

15. In right triangle ABC with right angle at C, point D lies on $\overline{AB}$ such that $\overline{AD}\cong\overline{DB}$. If AD=x+4, AB=42, and DB = y – 2x, find the length of $\overline{CD}$.

A. $\frac{13}{3}$ B. 17 C. 21 D. $\frac{55}{2}$ E. 55

16. In the figure shown, AB = 12, CD = 3, and BD = 6. Find the area of triangle BEF.



A. 12 B. 16 C. 24 D. 32 E.cannot be determined

17. Two congruent cones share a base. The diameter of the base of the cones and the distance between the vertices of the cones are both equal to 6. What is the volume of the entire solid?

A. 9π B. 18π C. 36π D. 72π E. 144π

18. The area of a parallelogram ABCD is 36, AB = 12, and BC = 6. Find the measure of the smaller angles in the parallelogram.

A. 15° B. 30° C. 45° D. 60° E. 90°

19. In circle O, diameter $\overline{AB}$ intersects chord $\overline{CD}$ at point E. If $BE = \frac{2}{3}DE$, AD = 12, and the area of triangle ADE = 60, find the distance from E to $\overline{BC}$.

A. B. C. D. E.

20. Square ABCD has side length 6 cm. The four sides are trisected by points M, N, P, Q, R, S, T, and U, respectively. Points M and N lie on AB with M closer to point A, points P and Q lie on BC with P closer to B, points R and S lie on CD with R closer to C, and points T and U lie on DA with T closer to D. Find the area of MNQRTU.

A. 10 B. 12 C. 18 D. 20 E. 24

21. A circle is inscribed in an equilateral triangle which is inscribed in a circle which is inscribed in a square. If the area of the square is 16, what is the area of the smaller circle?

A. π B. 2π C. 3π D. 4π E. 5π

22. In triangle ABC, AB = 16, AC = 10, and BC = 12. Point D is drawn on side BC such that BD is twice CD. Find the length of AD.

A. $2\sqrt{15}$ B. 30 C. $4\sqrt{15}$ D. $2\sqrt{30}$ E. 60

23. The area of the smaller base of a frustum of a cone is 25π, and the height of the frustum is 6. If the greatest possible distance between two points on the frustum is $\sqrt{157}$, find the volume of the frustum.

A. 182π B. 201π C. 336π D. 402π E. $\frac{1331®}{3}$

24. Three congruent circles are tangent as shown. Their centers lie on the same line $\overleftrightarrow{PQ}$. Line $\overleftrightarrow{PT}$ is drawn from point P on the left circle, and tangent to the right circle at point T. Find the ratio of chord $\overleftrightarrow{XY}$ of the middle circle to the radius of the middle circle.

A. $\frac{4}{5}$ B. $\frac{8}{5}$ C. $\frac{\sqrt{442}}{13}$ D. E.

25. Let A, B, C, D, E, and F be the vertices of a regular polygon and let the area of the larger circle be 1. What is the area of the smaller circle?

A. $\frac{4}{5}$ B. $\frac{8}{5}$ C. $\frac{\sqrt{442}}{13}$ D. E.

TB1: The sum of the measures of five of the interior angles in a decagon is 800, find the average of the other five angles.

TB2: In trapezoid ABCD, AD = 8, BC = 4, $\angle A = 60^\circ$, and $\angle D = 30^\circ$, find the square of the area of the trapezoid.

TB3: How many triangles with integral side lengths and perimeter equal to 25 can be formed?

If the number of diagonals of an n-sided convex polygon is equal to the number of degrees in an exterior angle of a regular 40 sided polygon, what is the area in square units of a square with side length n.