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Florida Invitational - Vero Beach
February 7, 1998

Geometry Individual

1. If two poles 20" and 80" high are 100" apart, then the height of the intersection of the lines joining the top of each pole to the foot of the opposite pole is:

   a) 50" b) 40" c) 16" d) 60"

   e) NOTA

2. The diameters of two circles are 8" and 12" respectively. The ratio of the area of the smaller to the area of the larger circle is:

   a) $\frac{2}{3}$ b) $\frac{4}{9}$ c) $\frac{9}{4}$ d) $\frac{1}{2}$ e) NOTA

3. A triangle and a trapezoid are equal in area. They also have the same altitude. If the base of the triangle is 18", the median of the trapezoid is:

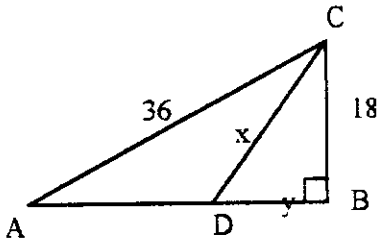
   a) 36" b) 9" c) 18" d) not obtainable from these data

   e) NOTA

4. Determine X in the figure given that AD = $12\sqrt{3}$.

   a) $4\sqrt{3}$ b) $12\sqrt{3}$ c) $6\sqrt{3}$

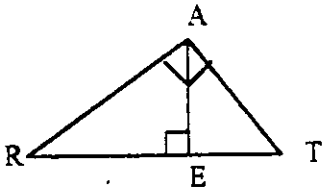
   d) $6\sqrt{6}$ e) NOTA

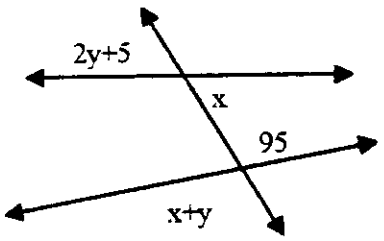


5. Triangle RAT is a right triangle with right angle at A. $\overline{AE}$ is an altitude. AE = 8; RE = 16; Find AT.

   a) $2\sqrt{5}$ b) $4\sqrt{2}$ c) $8\sqrt{5}$

   d) $4\sqrt{5}$ e) NOTA



6. 

Find x.

a) 65 b) 45

c) 50 d) 30

e) NOTA

7. Find the measure of an interior angle of a regular undecagon.

a) 180 b) 156 c) $\frac{1620}{11}$ d) $\frac{1980}{13}$ e) NOTA

8. The measure of acute angle is 50° less than the measure of it's supplement. Find the measure of it's complement.

a) 75 degrees b) 25 degrees c) 15 degrees d) 65 degrees

e) NOTA

9. A parallelogram is a square if:

a) Diagonals bisect each other and opposite sides are parallel.

b) Diagonals are congruent and opposite sides are congruent.

c) Diagonals bisect opposite angles and diagonals are congruent.

d) Diagonals are perpendicular bisectors and opposite angles are congruent.

e) NOTA

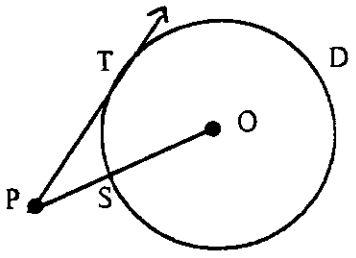
10. Given a regular polygon with 50 sides, how many diagonals will it have ?

a) 1175 b) 1050 c) 100 d) 50 e) NOTA

11. Through the point on a radius of a circle which is $\frac{1}{5}$ of the way from the circle to the center, a chord is drawn perpendicular to the radius. If the length of this chord is 36, find the length of the radius of this circle.

a) 30 b) 20 c) 60 d) 25 e) NOTA

12. Given: $\overline{PT}$ is tangent to the circle at T; $m\overset{\frown}{TDS} = 290$. Find the measure of angle P. (the point labled O is the center of the circle)



a) 55 b) 70 c) 40 d) 20 e) NOTA

13. A circle is inscribed in a regular hexagon. If the radius of the hexagon is 9, find the area of the circle.

a) $\frac{49\pi}{2}$ b) 61π c) $\frac{243\pi}{4}$ d) 243π e) NOTA

14. Find the slope of the line perpendicular to the line $3x - 4y = 10$

a) $\frac{3}{4}$ b) $-\frac{3}{4}$ c) $\frac{4}{3}$ d) $-\frac{4}{3}$ e) NOTA

15. A piece of paper is in the shape of an equilateral triangle. The corners are snipped off to form a regular hexagon. If the area of the hexagon is $\sqrt{3}$, what is the area of the original triangle?

a) $2\sqrt{3}$ b) $3\sqrt{3}$ c) $\frac{3\sqrt{3}}{2}$ d) $\frac{2\sqrt{6}}{3}$ e) NOTA

16. Two vertical angles have measures of $3x^2 + 1$ and $2x^2 + 5$. What is the measure of each angle?

a) 2 b) 10 c) 13 d) 12 e) NOTA

17. A man walks **x** miles due west, turns 150° to his left and walks 3 miles in the new direction. If he finishes at a point $\sqrt{3}$ miles from his starting point, then **x** is:

a) $\sqrt{3}$ or $2\sqrt{3}$ b) $\frac{3}{2}$ or 3 c) $2\sqrt{3}$ d) $\frac{3}{2}$ e) NOTA

18. The area of an isosceles right triangle is 16. How long is the hypotenuse?

a) 4 b) $4\sqrt{2}$ c) $8\sqrt{2}$ d) 16 e) NOTA

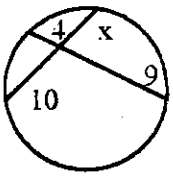
19. Find the area of a right triangle whose longest two sides are 16 and 24.

a) $8\sqrt{5}$ b) $64\sqrt{5}$ c) $128\sqrt{13}$ d) 12 e) NOTA

20. The sides of a triangle are in the ratio of **2:3:4**. If the perimeter of the triangle is 54, what is the area?

a) 27 b) $12\sqrt{15}$ c) $20\sqrt{15}$ d) 108 e) NOTA

21. Find x.



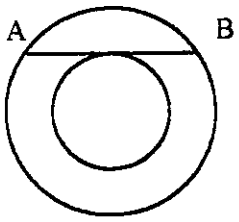
a) 5 b) $\frac{4}{9}$ c) $\frac{18}{5}$

d) 36 e) NOTA

22. What is the area of a triangle formed by joining the points (1, -1), (4,7), and (0,8)?

a) 13.5 b) 17.5 c) 27 d) 61 e) NOTA

23. Find the area of the annulus if AB = 20 and is tangent to the smaller circle .



a) 20π b) 100π c) 200π

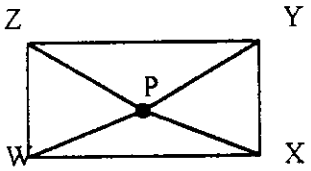
d) 400π e) NOTA

24. The hypotenuse of a 30 - 60 - 90 right triangle has a length $12\sqrt{6}$. Find its area.

a) $18\sqrt{3}$ b) $54\sqrt{2}$ c) $108\sqrt{3}$

d) $54\sqrt{6}$ e) NOTA

25. If P is in the interior of a rectangle WXYZ such that PW = 3, PX = 4 and PY = 5. What is PZ?



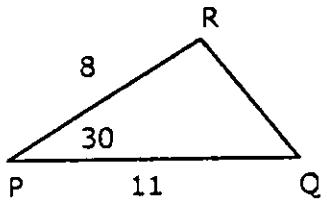
a) $2\sqrt{3}$ b) $3\sqrt{2}$ c) $3\sqrt{3}$

d) $4\sqrt{2}$ e) NOTA

26. PQRS is an isosceles trapezoid whose area is 60. $\overline{PQ}$ and $\overline{SR}$ are the two bases. If QS = 13 and QR = $\sqrt{29}$, find what the length of the median of PQRS?

a) 5 b) 12 c) 5 or 12 d) 25 e) NOTA

27.



In $\Delta PQR, m < P = 30$, $PR = 8$, $PQ = 11$. Find the area of ΔPQR.

a) 22 b) $22 - 8\sqrt{3}$ c) $11 - 4\sqrt{3}$

d) 4 e) NOTA

28. The bisectors of the opposite angles of a nonrhombic parallelogram are _____ ?

a) parallel b) collinear c) perpendicular d) skew

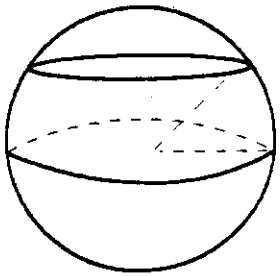
e) NOTA

29. Which of the following is the circle tangent to both the x- and y- axes, given that the radius is 3 and its center is in the fourth quadrant.

a) $x^2 + y^2 = 3$ b) $(x-3)^2 + (y+3)^2 = 9$ c) $x^2 + y^2 + 6x - 6y = 3$

d) $2x^2 + 2y^2 + 12x + 9 = 0$ e) NOTA

30. The radius of the earth is approximately 6450 km. As the earth rotates, objects on its surface are constantly traveling at various speeds with respect to the earth's axis, depending upon the latitude of each object. What is the approximate speed, in kilometers per hour, of an object near the equator?



a) 2700 km/h b) 600 km/h c) 1560 km/h d) 1690 km/h

e) NOTA