

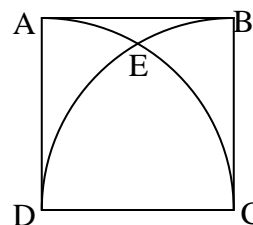
NOTA means “None of these answers is correct.”

1. The measures of the interior angles in a convex hexagon form an arithmetic sequence. If the difference between the second largest and second smallest angle is 36 degrees; what is the measure of the smallest angle, in degrees?
- A) 75 B) 90 C) 97.5 D) 105 E) NOTA

2. A square has a perimeter of 4π which is also the circumference of a circle. What is the ratio of the area of the circle to that of the square in a:b form?
- A) $3:\pi$ B) $\pi:4$ C) $\pi:3$ D) $4:\pi$ E) NOTA

3. In the figure, ABCD is a square with side length 1. Arcs AC and BD are quarter circles with centers D and C respectively. If the arcs intersect at point E, what is the length of arc DE ?

- A) $\frac{\pi}{4}$ B) $\frac{2}{3}$ C) $\frac{\pi}{3}$
 D) $\frac{\pi}{2}$ E) NOTA



4. \overline{AC} and \overline{AD} are constructed in a regular pentagon ABCDE. What is the measure, in degrees, of angle $\angle CAD$?

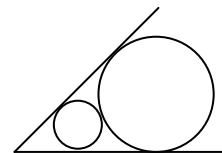
- A) 36 B) 42 C) 48 D) 54 E) NOTA

5. The perimeter of a right triangle is 35 and one leg is 10. What is the length of the hypotenuse?

- A) $27\frac{1}{2}$ B) $41\frac{1}{3}$ C) $29\frac{1}{2}$ D) 15 E) NOTA

6. Two lines intersect at a 60° angle, a circle of radius 3 is tangent to both lines. What is the radius of the largest circle that can be placed between the first circle and the point of intersection, tangent to both lines and the first circle?

- A) $\frac{\sqrt{3}}{2}$ B) 1 C) $\frac{3}{2}$
 D) $\sqrt{3}$ E) NOTA

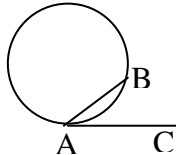


7. An interior angle of a regular polygon measures 170° . How many sides does it have?

- A) 12 B) 15 C) 30 D) 36 E) NOTA

8. Chord \overline{CD} of a circle is bisected by chord \overline{AB} intersecting at point E. If $AC=5$, $CD=6$ and $AE=4$, what is the diameter of the circle?

- A) 6 B) $25\frac{1}{4}$ C) 8 D) $4+2\sqrt{3}$ E) NOTA

9. Two sides of an isosceles triangle have length 2. What should be the length of the third side to maximize the area of the triangle?
- A) $\frac{\sqrt{3}}{2}$ B) 2 C) $2\sqrt{2}$ D) 3 E) NOTA
10. In a plane, points A and B are 3 units apart. What is the area of the shape enclosed by all the points that are twice as far from A as they are from B?
- A) π B) 4π C) 9π D) infinite E) NOTA
11. In the figure, minor arc AB measures 80 degrees. \overline{AC} is tangent to the circle at A. What is the measure, in degrees, of angle $\angle BAC$?
- A) 20° B) 30° C) 60°
D) 80° E) NOTA
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12. A circle of radius 1 circumscribes a square. Another circle is inscribed in the square which then circumscribes another square. If this process continues indefinitely, what is the total area of all the circles, if each circle is considered individually?
- A) 2π B) 3π C) 4π D) 6π E) NOTA
13. My barn is in the shape of a regular hexagon of side length 10 meters, surrounded by pasture. If I chain my goat on the outside of the building at one of the vertices with a 20 meter chain, how many square meters of pasture can the goat access? Disregard the height and length of the goat.
- A) 200π B) 225π C) 300π D) 400π E) NOTA
14. Points A, B, C and D are distinct points on a circle with diameter 25. We connect consecutive points constructing quadrilateral ABCD. If angle A is 90 degrees and all sides are distinct integers, what is the perimeter of quadrilateral ABCD?
- A) 60 B) 62 C) 66 D) 70 E) NOTA
15. I have a strange dart board in the shape of a triangle ABC with $AC = 6$, $BC = 8$ and $AB = 10$. If a randomly thrown dart hits the board, what is the probability that the closest vertex is A?
- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) cannot be determined
E) NOTA
16. Given a regular hexagon ABCDEF with side length 1. Diagonals \overline{AC} , \overline{BD} , \overline{CE} , \overline{DF} , \overline{EA} , \overline{FB} , are drawn forming another hexagon in the middle. What is the area of the smaller hexagon?
- A) $\frac{\sqrt{3}}{6}$ B) $\frac{\sqrt{3}}{3}$ C) $\frac{\sqrt{3}}{2}$ D) $\frac{2\sqrt{3}}{3}$ E) NOTA

17. What is the area of a regular dodecagon inscribed in a circle of radius 1?

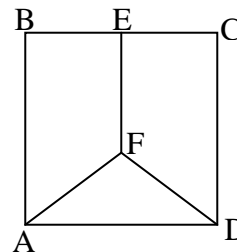
A) $\frac{3\sqrt{3}}{2}$ B) $\frac{3+\sqrt{3}}{2}$ C) $\frac{4+\sqrt{3}}{2}$ D) 3 E) NOTA

18. The vertices of a quadrilateral are placed at the points A(0,0), B(0,3), C(6,3) and D(4,0). If a point E is chosen at random from the interior of the quadrilateral, what is the probability that $\angle AED$ is obtuse?

A) $\frac{1}{3}$ B) $\frac{2\pi}{15}$ C) $\frac{1}{2}$ D) $\frac{\pi}{5}$ E) NOTA

19. ABCD is a square with side length 32 and \overline{EF} is perpendicular to \overline{BC} . What is the length of \overline{EF} , if $EF = AF = DF$?

A) 16 B) $12\sqrt{2}$ C) 20
D) 24 E) NOTA

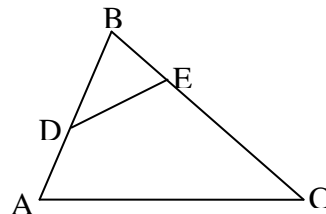


20. Triangle ABC has sides of length 13, 14 and 15. Point P in the interior of the triangle is equidistant from each of the vertices. How far is P from the vertices?

A) $\frac{\sqrt{505}}{3}$ B) $\frac{65}{8}$ C) $\frac{33}{4}$ D) $\frac{57}{7}$ E) NOTA

21. In triangle ABC, $AB=6$, $BC=9$ and $BE=2$. D is the midpoint of \overline{AB} . What is the ratio of the area of triangle DBE to the area of the quadrilateral ADEC?

A) 1:8 B) 1:5 C) 1:3
D) cannot be determined E) NOTA



22. Triangle ABC has side lengths of 7, 8 and 9. What is the length of the altitude to the longest side?

A) $4\sqrt{5}/3$ B) 3 C) 4 D) $8\sqrt{5}/3$ E) NOTA

23. What is the ratio of the radius of the circumscribed circle to the radius of the inscribed circle of the triangle with side lengths of 12, 35 and 37?

A) 3:1 B) 7:2 C) 37:10 D) 7:2 E) NOTA

24. Using three of its vertices, an equilateral triangle is inscribed in a regular nonagon. How many diagonals of the nonagon intersect the interior (not just border) of the triangle?

A) 9 B) 18 C) 24 D) 27 E) NOTA

25. Three congruent circles of radius 3 are stacked so that each is externally tangent to the other two. A smaller circle is placed in the middle so that it is tangent to all three larger circles. What is the radius of the smaller circle?
- A) $2\sqrt{3}-3$ B) $\sqrt{3}-1$ C) 1 D) $\sqrt{3}$ E) NOTA
26. In a right triangle, with legs of length 5 and 12, what is the length of the angle bisector to the hypotenuse?
- A) 4 B) $\frac{60\sqrt{2}}{17}$ C) 6 D) $6\sqrt{2}$ E) NOTA
27. The altitude of a right triangle to the hypotenuse divides the hypotenuse into segments of length 4 and 9. What is the length of that altitude?
- A) 4 B) 5 C) 6 D) 9 E) NOTA
28. A circle of radius 1 is divided into quarters by two perpendicular diameters. A circle is inscribed in a quarter circle tangent to the first circle and the two diameters. What is the radius of this circle?
- A) $\frac{1}{3}$ B) $\sqrt{2}-1$ C) $\frac{1}{2}$ D) $\frac{\sqrt{2}}{2}$ E) NOTA
29. There are 7 distinct points on a circle. How many convex quadrilaterals can be drawn using these points as vertices?
- A) 35 B) 210 C) 420 D) 840 E) NOTA
30. The medians to the two legs of a right triangle have lengths 22 and 31. What is the length of the hypotenuse?
- A) 34 B) 38 C) $22\sqrt{3}$ D) 42 E) NOTA