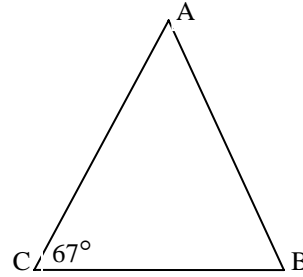


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1. What is the measure of angle A, in degrees, given that $AB=AC$?

(A) 27° (B) 46° (C) 56°
(D) 67° (E) NOTA



2. What is the midpoint of the line segment connecting $(2, -8)$ and $(-6, 5)$?

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

3. If the radius of a sphere is halved, what is the ratio of the new volume to the old?

(A) 8:1 (B) 4:1 (C) 1:4 (D) 1:8 (E) NOTA

4. A right triangle has legs of lengths 12 units and 9 units. What is the length of the hypotenuse?

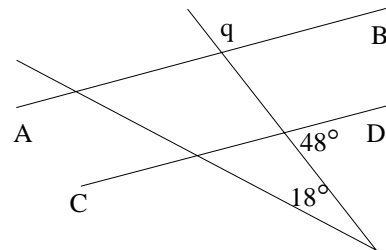
(A) 13 units (B) 15 units (C) 16 units (D) 20 units (E) NOTA

5. The base of a triangle is nine centimeters longer than the perpendicular height. If the area of the triangle is 180 square centimeters, what is the length of the base, in centimeters?

(A) 15 cm (B) 18 cm (C) 24 cm (D) 27 cm (E) NOTA

6. What is the measure of angle q, in degrees, given that lines AB and CD are parallel?

(A) 30° (B) 66° (C) 114°
(D) 132° (E) NOTA



7. What is the length of a 100° arc in a circle of diameter 48?

(A) $\frac{40\pi}{3}$ (B) 14π (C) $\frac{29\pi}{2}$ (D) 15π (E) NOTA

8. A regular n-gon has interior angles of 171° . What is the value of n?

(A) 40 (B) 42 (C) 45 (D) 60 (E) NOTA

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9. A cube made of black material is painted red on all sides, then cut into 216 smaller cubes. How many of the smaller cubes are red on three sides?

- (A) 6 (B) 8 (C) 12 (D) 18 (E) NOTA

10. A square with 25-centimeter sides is inscribed in a circle. What percentage of the circle's area lies within the square?

- (A) $\frac{100(\pi - 2)}{\pi}$ (B) $\frac{200}{\pi}$ (C) $\frac{100}{\pi}$ (D) $\frac{100(\pi - 1)}{2\pi}$ (E) NOTA

11. What is the area, in square centimeters, of a rhombus whose sides are of length five centimeters, and one of whose diagonals is of length six centimeters?

- (A) 16 cm^2 (B) 18 cm^2 (C) 20 cm^2 (D) 24 cm^2 (E) NOTA

12. How many 6-centimeter by 6-centimeter tiles would it take to completely tile the floor of a 30-meter by 39-meter room?

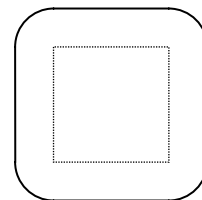
- (A) 275,000 (B) 300,000 (C) 325,000 (D) 400,000 (E) NOTA

13. Cherie has a fenced rectangular back yard which contains a rectangular pool surrounded by lawn. If the pool is 40 meters by 15 meters, and is exactly 1.5 meters from the fence at all points, what is the area of Cherie's lawn?

- (A) 174 m^2 (B) 200 m^2 (C) 208 m^2 (D) 212 m^2 (E) NOTA

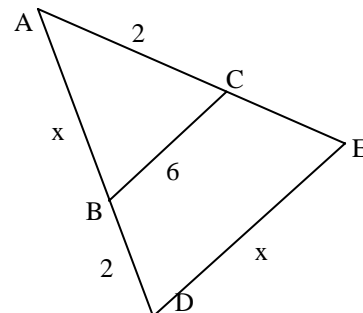
14. An ant walks around a square of insect repellent that is one-half meter on a side, always remaining exactly 20 centimeters away from it. What is the total area enclosed by his path, in square centimeters?

- (A) $6000 + 100\pi \text{ cm}^2$ (B) $6000 + 200\pi \text{ cm}^2$
 (C) $6500 + 400\pi \text{ cm}^2$ (D) $6500 + 800\pi \text{ cm}^2$
 (E) NOTA



15. Given that BC is parallel to DE, what is x?

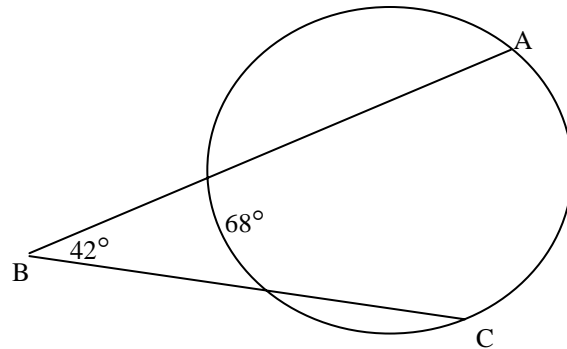
- (A) 7 (B) $3 + \sqrt{21}$
 (C) 8 (D) 9 (E) NOTA



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16. What is the measure of minor arc AC, in degrees?

- (A) 104° (B) 131°
 (C) 152° (D) 171°
 (E) NOTA

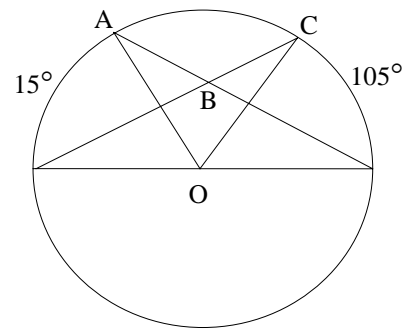


17. An out-of-control flying saucer is observed moments before it crashes into the Earth. The army rushes to the scene, but the saucer crashed with such force that it is completely buried, even though its orientation is vertical (on edge). The engineers immediately begin digging, first reaching the saucer at a depth of five meters. By the time they have dug to 15 meters, they have uncovered a width of 30 meters. Assuming the saucer to be a perfect circle, how far below ground level, in meters, is the lowest point buried?

- (A) 37.5 m (B) 48 m (C) 50.25 m (D) $30\sqrt{3}$ m (E) NOTA

18. What is the measure of angle ABC in circle O, in degrees?

- (A) 90° (B) 120° (C) 135°
 (D) 145° (E) NOTA



19. What is the area of the triangle with vertices at the points $(-8, 5)$, $(3, 1)$, and $(5, -4)$?

- (A) $\frac{47}{2}$ (B) $5\sqrt{22}$ (C) $6\sqrt{15}$ (D) $10\sqrt{6}$ (E) NOTA

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20. What is the ratio of the volume of a cone of height 3 and base radius 12 to the volume of a cylinder of height 12 and radius 3?

- (A) $\frac{4}{3}$ (B) 1 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$ (E) NOTA

21. Two circles have radii of 12 and 6, and the length of their common internal tangent is 18. How far apart are the centers of the circles?

- (A) $18\sqrt{2}$ (B) $18\sqrt{3}$ (C) 24 (D) $24\sqrt{2}$ (E) NOTA

22. The center of the circle defined by $2x^2 + 2y^2 + 8x + 16y = 81$ is (h, k). What is the sum of h and k?

- (A) 6 (B) 2 (C) -2 (D) -6 (E) NOTA

23. What is the volume of a rectangular box if the areas of three mutually adjacent faces are 18, 15, and 30?

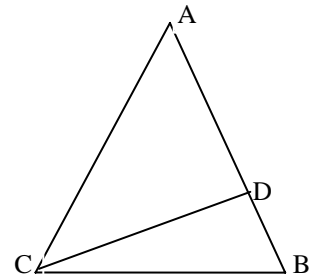
- (A) 85 (B) 90 (C) 96 (D) 100 (E) NOTA

24. What is the surface area of a sphere whose volume is 288π ?

- (A) 27π (B) 36π (C) 64π (D) 96π (E) NOTA

25. What is the measure of angle A, in degrees, given that $AC=CD=DB$ and angle B measures 12° ?

- (A) 12° (B) 24° (C) 36°
(D) 48° (E) NOTA



26. A cow is tethered to an external corner of a rectangular barn. If the length of the tether is thirty meters, and the dimensions of the barn are twenty by twenty-five meters, what is the total area, in square meters, that the cow can graze?

- (A) $\frac{2725\pi}{4}$ m² (B) $\frac{2825\pi}{4}$ m² (C) $\frac{2925\pi}{4}$ m² (D) $\frac{3025\pi}{4}$ m² (E) NOTA

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27. Determine the area, in square centimeters, of a regular hexagon if parallel sides are 24 centimeters apart.
- (A) 240 cm^2 (B) $196\sqrt{3} \text{ cm}^2$ (C) $240\sqrt{3} \text{ cm}^2$ (D) $288\sqrt{3} \text{ cm}^2$ (E) NOTA
28. A square's perimeter is x centimeters, and its area is x square centimeters. What is x ?
- (A) 8 (B) 9 (C) 12 (D) 16 (E) NOTA
29. Find the sum of all values of b such that the minimum distance from the point $(5, 3)$ to the line $y = \frac{4}{3}x + b$ is 5.
- (A) $-\frac{35}{3}$ (B) -9 (C) $-\frac{22}{3}$ (D) $\frac{7}{3}$ (E) NOTA
30. A carpet of dimensions 30 meters by 40 meters by 1 centimeter is rolled into a cylinder with length 30 meters and diameter D centimeters. What is D , assuming the carpet experiences no change in volume when it is ideally rolled into a perfect cylinder with no hole in the center?
- (A) $\frac{70\sqrt{2}}{\pi}$ (B) $60\sqrt{2\pi}$ (C) $\frac{80\sqrt{2}}{\pi}$ (D) $\frac{40\sqrt{10\pi}}{\pi}$ (E) NOTA
31. In circle O , chords AB and CD intersect at right angles at E . If $AE = 4$, $BE = 6$, and $CE = 12$, what is the radius of the circle?
- (A) $\frac{7\sqrt{3}}{2}$ (B) 7 (C) $5\sqrt{2}$ (D) 8 (E) NOTA
32. Clyde owns a PivotPlus riding lawn mower, which can mow square corners easily due to its patented omnidirectional steering system. Clyde likes to mow his front lawn, which is ten meters by twenty-five meters, by starting at an outer corner and "rectangularly spiraling" in to the center. Thus, he mows around the outer edge until he's completed a complete circuit, then he mows the outer edge of the unmown region, etc. What is the minimum number of complete circuits that Clyde has to mow in this manner to have mown at least half of his front lawn, if the PivotPlus mows a path one meter wide?
- (A) 1 (B) 2 (C) 3 (D) 4 (E) NOTA
33. DE is a diameter of circle O , and is perpendicular to chord AB at C . If $AB = 24$ and $CD = 8$, what is the length of OC ?

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- (A) 2 (B) 3 (C) 5 (D) 8 (E) NOTA

34. Two circles intersect such that their centers and their points of intersection form a square of side length three. What is the area of intersection of the two circles?

- (A) $\frac{9\pi - 18}{2}$ (B) $9\pi - 9$ (C) $\frac{10\pi - 27}{4}$ (D) $\frac{10\pi - 9}{4}$ (E) NOTA

35. What is the maximum possible perimeter of a right triangle with hypotenuse 25?

- (A) $25\sqrt{2} + 25$ (B) $25\sqrt{2}$ (C) 50 (D) $25\sqrt{5}$ (E) NOTA

36. What is the surface area, in square meters, of a right rectangular pyramid of height 8 meters, base width 12 meters, and base length 30 meters?

- (A) $125\sqrt{15} \text{ m}^2$ (B) $125\sqrt{17} \text{ m}^2$ (C) 864 m^2 (D) $325\sqrt{12} \text{ m}^2$ (E) NOTA

37. What is the minimum value of y if $y = 4x^2 - 9x + 7$?

- (A) 2 (B) $\frac{31}{16}$ (C) -3 (D) $\frac{9}{4}$ (E) NOTA

38. Given points A (-10, 12), B (5, 9), and C (1, 1), what is the center of the circle through these points?

- (A) $\left(-4, \frac{17}{2}\right)$ (B) $\left(-\frac{11}{3}, \frac{22}{3}\right)$ (C) $\left(-\frac{7}{2}, \frac{17}{2}\right)$ (D) (-3, 8) (E) NOTA

39. In triangle ABC, AB=8, BC=9, and AC=6. Line segment DE is drawn parallel to side AC, with D on AB and E on BC, such that it divides the triangle into two equal areas. What is the length of DE?

- (A) 3 (B) $3\sqrt{2}$ (C) $3\sqrt{3}$ (D) $\frac{3\sqrt{5}}{2}$ (E) NOTA

40. A triangle has sides of 6, 16, and 18 units. Find the length of the angle bisector to the side with length 16 units.

- (A) $2\sqrt{15}$ units (B) $\frac{9\sqrt{5}}{2}$ units (C) $3\sqrt{5}$ units (D) $\frac{18\sqrt{2}}{5}$ units (E) NOTA

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