

For all questions, answer choice "E) NOTA" means none of the above answers is correct.

1. $\{a_n\}$ is a geometric sequence with $a_7 = 50$ and $a_{11} = 250\sqrt[3]{5}$. What is the value of a_3 ?

- A) $2\sqrt{5}$ B) $2\sqrt[3]{25}$ C) $-2\sqrt{5}$ D) $-2\sqrt[3]{25}$ E) NOTA

2. Evaluate $i^{2\ln(e^{-34}) - 5\ln(e^{-68})}$

- A) i B) -1 C) $-i$ D) 1 E) NOTA

3. Josh Hamilton, Texas Rangers slugger, was forced to go to IKEA with his wife, Katie.

Katie immediately headed 255 feet north, straight to the kitchen section to pick out new cabinets, while Hamilton got distracted by the 48-inch plasma screen at the front door. Trying to find his wife in the Sea of Denmark furniture, Josh moved 56 feet west to the living room section before heading 32 feet north to the bedroom section. He stopped to sign some autographs before moving west 44 feet, then south 17 feet to reach another fan. Assuming Josh can walk 5 feet per second and that he has supernatural powers that enable him to walk through the walls that make up IKEA's infamous maze, how many minutes will it take him to reach his wife if he takes the shortest possible route?

- A) 52 B) 26 C) $\frac{13}{15}$ D) $\frac{13}{30}$ E) NOTA

4. Find the sum of the solutions to the equation $2e^{2x} + 3e^x - 14 = 0$.

- A) $\ln(-7)$ B) $\ln 7$ C) $\ln 2$ D) $-\frac{3}{2}$ E) NOTA

5. On rainy days, the probability Sara gets to work on time is 25%, and the probability she leaves work on time is 50%. On non-rainy days, the probability Sara doesn't get to work on time is $\frac{1}{3}$, and the probability she doesn't leave work on time is $\frac{1}{10}$. Whether or not Sara arrived to work on time is unrelated to whether or not she leaves work on time. Today there is a 40% chance of rain where Sara lives and works. What is the probability Sara gets to work on time and leaves work on time?

- A) 41% B) 36.5% C) 9.6% D) 7.8% E) NOTA

6. Find the greatest common divisor of the sum of the interior angles of a convex nonagon and the shortest distance from the point $(-3, 8)$ to the line $24x - 7y = 497$.

- A) 25 B) 5 C) 2 D) 1 E) NOTA

13. A circle is inscribed inside a rhombus with side length 5. If the circle encloses an area of 5.76π , find the length of the longer diagonal of the rhombus.

- A) 8 B) 6 C) 4 D) 3 E) NOTA

14. Simplify: $2 + \frac{3}{2 + \frac{3}{2 + \frac{3}{2 + \dots}}} + 2\sqrt{3 + 2\sqrt{3 + 2\sqrt{3 + \dots}}}$

- A) 10 B) 11 C) 12 D) 13 E) NOTA

15. Kyle is in downtown Dallas and needs to feed the meter for 30 minutes of time while he runs into his office to pick up some files. He has 4 quarters, 7 dimes, and 8 nickels in his pocket, and every five cents buys two minutes of time. In how many distinguishable ways can Kyle buy exactly 30 minutes of time in the meter?

- A) 10 B) 13 C) 14 D) 18 E) NOTA

16. If $f(2 - \sqrt[3]{x}) = \frac{\sqrt[5]{5-x}}{\sqrt[3]{x^2}}$, find the value of $f(5)$.

- A) 0 B) $\frac{2}{9}$ C) $-\frac{2}{9}$ D) $\sqrt[5]{2}$ E) NOTA

17. There are 442 juniors at Frisco High School. Of those juniors, 185 like the Rangers, 264 like the Cowboys, and 219 like the Mavericks; 91 like the Cowboys and Mavericks, 100 like the Cowboys and Rangers, and 71 like the Rangers and Mavericks. If 12 of Frisco's juniors don't like any of the three teams, how many like all three teams?

- A) 29 B) 36 C) 24 D) 41 E) NOTA

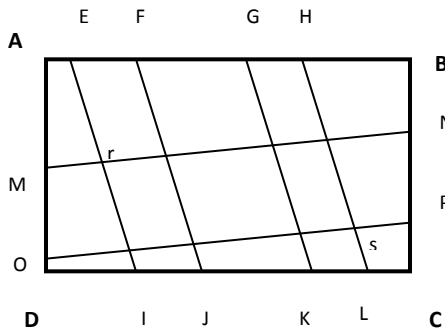
18. What is the equation of the line that passes through the center of the ellipse with equation $25x^2 + 9y^2 - 100x + 54y - 44 = 0$ and is perpendicular to $60 - x + 5y = 0$?

- A) $5x + y = 7$ B) $5x + y = 13$ C) $5x + y = -7$ D) $5x - y = -13$ E) NOTA

19. Express the sum in base 6: $1_2 + 12_3 + 123_4 + 1234_5$

- A) 1015_6 B) 1111_6 C) 1115_6 D) 1051_6 E) NOTA

20. In rectangle $ABCD$, shown below, line segments \overline{EI} , \overline{FJ} , \overline{GK} , and \overline{HL} are parallel, as are line segments \overline{MN} and \overline{OP} . If $m\angle r = 97^\circ$, what is the value of $m\angle s$?



- A) 97° B) 108° C) 62°
 D) 83° E) NOTA

21. Texas Hold'em is a popular version of poker in which a dealer begins by dealing 2 cards, one at a time, to each of 9 players from a standard 52-card deck of playing cards. If Navin R. Johnson is the second person to be dealt a card, what is the probability he is dealt an ace as his first card?

- A) $\frac{4}{51}$ B) $\frac{1}{13}$ C) $\frac{16}{221}$ D) $\frac{1}{17}$ E) NOTA

22. If $a_n = n \cdot n!$, find the value of $\frac{a_5 + a_6}{41}$.

- A) 4920 B) 11 C) 120 D) 720 E) NOTA

23. Kim bought a shirt originally priced at \$120 for 20% off at Neiman Marcus in Dallas' NorthPark Mall. Sales tax in Texas is 10%, which was charged on the discounted price. The next week, Texas' sales tax holiday weekend in which clothing can be purchased tax free, Chloe bought the same shirt at Neiman Marcus for \$15 off its original ticket price. Who purchased the shirt for the least amount?

- A) Kim B) Chloe C) They spent the same amount D) Not enough information
 E) NOTA

24. Rationalize: $\frac{1}{\sqrt[3]{5} + \sqrt[3]{7}}$

- A) $\frac{\sqrt[3]{49} - \sqrt[3]{25}}{12}$ B) $\frac{\sqrt[3]{25} + \sqrt[3]{35} - \sqrt[3]{49}}{12}$ C) $\frac{\sqrt[3]{25} - \sqrt[3]{35} + \sqrt[3]{49}}{12}$ D) $\frac{\sqrt[3]{25} + \sqrt[3]{49}}{12}$ E) NOTA

25. Lucy puts 6 ice cubes measuring 2 cm on an edge into her cylindrical glass that has base radius 4 cm and height 10 cm. How much space, in cm^3 , is left in the glass for lemonade?

- A) 112 B) $160\pi - 48$ C) $160\pi - 8$ D) 112π E) NOTA

26. Find the area enclosed by the triangle formed by the line $x = 28$ and the two asymptotes of the hyperbola $16x^2 - 49y^2 - 784 = 0$.

- A) 256 B) 896 C) 1372 D) 2744 E) NOTA

27. Three identical circles are all externally tangent to each other. If the perimeter around the region enclosed by any number of the circles is 10π , what is the area of the enclosed region that is not inside any of the circles?

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

28. What is the volume of the figure formed when the region bounded by $y = 3$, $y = -2$, $3x = 2y$, and $x = 0$ is rotated around the y -axis?

- A) $140\pi/9$ B) $124\pi/27$ C) $124\pi/9$ D) $140\pi/27$ E) NOTA

29. The Dallas Chamber of Commerce has 12 members. The officers include a president, a secretary, and a treasurer, and no person may hold more than one of the three offices. There is also a board of directors, made up of 5 equal directors; an officer may also be one of the five directors. How many possible distinct combinations of officers and directors are there?

- A) $2^9 \cdot 3^4 \cdot 5^2 \cdot 11^2$ B) $2^5 \cdot 3^2 \cdot 5 \cdot 11^2$ C) $2^6 \cdot 3^3 \cdot 5 \cdot 11^2$ D) $2^7 \cdot 3^3 \cdot 5 \cdot 11^2$ E) NOTA

30. Two circles X and S have radii of lengths 8 and 5, respectively. The common external tangent between these circles has length 3 and intersects circles X and S at points T and E , respectively. The centers of the two circles are connected with a line segment that intersects circle S at point A . Find the length of minor arc AE of circle S .

- A) $15\pi/8$ B) 3π C) $15\pi/4$ D) 6π E) NOTA