For all questions, answer choice (E) NOTA means that none of the given answers are correct. Good Luck!

1. What is the slope of the line passing through the points (6, 5) and (4, 8)?
   (A) 4 (B) $\frac{3}{2}$ (C) -2 (D) $-\frac{2}{3}$ (E) NOTA

2. Calculate: $\sqrt{3+\sqrt{3+\sqrt{3+\ldots}}}$
   (A) $\frac{1+\sqrt{13}}{2}$ (B) $-\frac{\sqrt{13}}{2}$ (C) $\frac{\sqrt{13}}{2}$ (D) $\frac{1-\sqrt{13}}{2}$ (E) NOTA

3. Cherry and Chanda are building a fence together. It takes Cherry 4 hours and Chanda 5 hours to build the fence alone. Cherry works on the fence for 1 hour before Chanda joins her. Unfortunately, Chanda brings RJ who can destroy the same fence in 3 hours. RJ tells Cherry and Chanda that he will stop destroying the fence when it is completely finished. How long do Cherry and Chanda work together, in hours, to finish building the fence?
   (A) $\frac{4}{3}$ (B) $\frac{45}{47}$ (C) $\frac{65}{7}$ (D) $\frac{45}{7}$ (E) NOTA

4. Find the value of i^{2017}
   (A) 1 (B) i (C) -1 (D)$-i$ (E) NOTA

5. What is the value of c, given that $32^c = 128$?
   (A) $\frac{7}{5}$ (B) $\frac{5}{7}$ (C) 4 (D) 8 (E) NOTA

6. Cherry wants to make an A in her chemistry class. Homework counts for 10% of her grade, tests count for 70%, and labs are 20%. Cherry has a 75% in the homework category and a 90% in labs category. What is the lowest percentage she needs in the test category to have an A (90%−100%) in chemistry. Round your answer to the nearest whole percent.
   (A) 90 (B) 92 (C) 93 (D) 94 (E) NOTA

7. If $m(x) = 8x + 4$ and $n(x) = 7x - 2$, what is $n \circ m(9)$?
   (A) 61 (B) 492 (C) 76 (D) 530 (E) NOTA

8. In how many distinct variations can the letters in the word *SOUTHSIDE* be arranged so that the D and the E are not next to each other?
   (A) 362,880 (B) 181,440 (C) 141,120 (D) 40,320 (E) NOTA

9. Compute the value of $\frac{x}{y}$ for the following system of equations:
   $5y + 2x = 24$
   $3x + 10y = 16$
   (A) 40 (B) -4 (C) 24 (D) -256 (E) NOTA

10. Find the remainder of $\frac{x^4+2x^2-8x+2}{x+4}$
    (A) 322 (B) 258 (C) -254 (D) 250 (E) NOTA

11. Your math teacher, Dominique Halimvaha, tells you that x is directly proportional to z and inversely proportional to y. If x is 7 when z is 3 and y is 8, what is y when x is 7 and z is 5?
    (A) 4.8 (B) 5 (C) 3.2 (D) 8 (E) NOTA

12. Find the sum of the squares of the roots for the equation, $x^2 - 12x + 35 = 0$.
(A) 12 (B) 144 (C) 74 (D) -74 (E) NOTA

13. Bus A which travels at a constant rate of 20 miles per hour and Bus B which travels at a constant rate of 25 miles per hour are driving towards each other as Carson the fly flies between them at 10 miles per hour. Carson starts from Bus A and flies to Bus B, and when he reaches Bus B, he immediately turns back to fly to Bus A. This pattern continues until he is squished. The initial distance between the buses is 135 miles. Assuming that both buses and Carson start at the same time, how many miles has Carson flown before he is squished between the buses?
(A) 20 (B) 30 (C) 60 (D) 45 (E) NOTA

14. Which of the following is a prime factor of 7,999,999 ?
(A) 17 (B) 40,201 (C) 283 (D) 199 (E) NOTA

15. When Simon is asked to factor $xy - 6y + 5x = 10$, he gets an answer in the form of $(x - 6)(y + 5) = z$ where z is a natural number. What is the value of z?
(A) 30 (B) 40 (C) -20 (D) -30 (E) NOTA

16. Isaiah is reorganizing chairs for his cello concert. For one hour, he reorganizes $14+(2a+8)$ chairs, where a represents the length of time, in minutes, spent reorganizing the chairs. After this, his friend, Samay, takes over the effort and reorganizes $4b + 15$ chairs for two hours, with b representing the length of time, in hours, spent reorganizing the chairs. At the end of these three hours, how many chairs have Isaiah and Samay reorganized together?
(A) 631 (B) 165 (C) 43 (D) 627 (E) NOTA

17. Shreya deposits \$100 into a bank account that compounds 2% every 6 months. How many dollars does Shreya have in her account 1 year later?
(A) 102.00 (B) 120.00 (C) 104.04 (D) 102.01 (E) NOTA

18. $x^3 - y^3$ can be factored into the form $(x - y)(Ax^2 + Bxy + Cy^2)$. What is the sum of $A + B + C$?
(A) 3 (B) 0 (C) -2 (D) 2 (E) NOTA

19. Karthik finds two integer roots for the quadratic equation $x^2 + 4x + 5$. Cherry tells him that the quadratic in fact does have 2 roots, but that the two numbers are not integers. Who is right and what type of number are the two roots?
(A) Karthik, Integer (B) Karthik, Imaginary (C) Cherry, Complex (D) Cherry, Natural (E) NOTA

20. Solve the equation, $y = zx + (w - v)$, in terms of x.
(A) $\frac{y-w+v}{z}$ (B) $\frac{y}{w} - v - z$ (C) $\frac{y+w-v}{z}$ (D) $w + \frac{y}{z} + v$ (E) NOTA

21. If the center of parabola $y = x^2 + 12x + 32$ is given in the form of (h, k), find $h - k$.
(A) 10 (B) -2 (C) 44 (D) 2 (E) NOTA

22. 5 plus 3 times my number is 6 times the number plus 8. What is my number?
(A) 1 (B) -1 (C) 3 (D) 11 (E) NOTA

23. Calculate $p + q$ of $\sqrt{p} - 6 = 3$ and $\sqrt{q} + 3 = 14$.
(A) 214 (B) 200 (C) 256 (D) 215 (E) NOTA

24. Solve $\frac{1}{\sqrt{100}+\sqrt{99}}+\frac{1}{\sqrt{99}+\sqrt{98}}+\frac{1}{\sqrt{98}+\sqrt{97}}\ ...\ +\frac{1}{\sqrt{2}+\sqrt{1}}$

(A) 10 (B) $\sqrt{101}$ (C) 9 (D) $3\sqrt{11}$ (E) NOTA

25. Everyone at James S. Rickards High School takes Siddhi's food at lunch. During the summer of 2017, Siddhi decides that enough is enough. He searches online for nearby safe houses to eat his food peacefully at during lunch, and his query returns 4 results. Safe house A is located at the point (4, 10), safe house B is located at the point (5, 8), safe house C is located at the point (6, 5), and safe house D is located at the point (8, 4). If Siddhi starts at James S. Rickards High School, located at the point (2, 3), and wants to use the shortest route possible, which safe house should he head towards?

(A) Safe house A (B) Safe house C (C) Safe house B (D) Safe house D (E) NOTA

26. Solve $(1004)^2-(1004)(2000)+(1000)^2$.

(A)1004 (B) 4 (C) 16 (D) 2004 (E) NOTA

27. Thing One and Thing Two are heading on different roads to different places, but there does exist a single point where their paths will intersect. If Thing One takes the route of $y=4x+18$, and Thing Two takes the route of $y=5x-12$, then what is the sum of the abscissa and ordinate of the aforementioned point at which the brothers' path will intersect?

(A) 167 (B) -168 (C) 170 (D) 168 (E) NOTA

28. What is the area bounded by $y\leq 2x+1, y\leq -3x+6$, and y $\geq$ 1? All answers are given in $units^2$.

(A) 5 (B) 4.5 (C) 1.5 (D) 2.5 (E) NOTA

29. Simplify: $\frac{x^2-9}{2x^3+2x^2-16x-24}$.

(A) $\frac{x+3}{2x^2+8x+8}$ (B) $\frac{1.5}{x^2+4x+4}$ (C) $2x^2+8x+8$ (D) $\frac{x-3}{2x^2+8x+8}$ (E) NOTA

30. You have a bag with 20 blue balls and 20 yellow balls. Every turn, you pick 2 balls at random from the bag. If the balls are the same color, then you place a blue ball into the bag. If the color of the balls differs, a yellow ball is put into the bag. The other balls are discarded. After playing to completion, what is the color of the last ball? Assume that you have 10 additional blue balls outside of the bag.

(A) Either color (B) Blue (C) Yellow (D) No ball is left. (E) NOTA