

Pre-Algebra Written Instructions

2025 James Clemens Math Tournament

1. You have 90 minutes to complete this test.
2. This exam consists of 25 multiple-choice questions and 3 free-response questions used as tie-breakers. The multiple-choice questions are each worth 4 points if answered correctly and no points if left unanswered. 1 point will be deducted for each incorrect answer. The free-response questions are each worth 0.1 point if answered correctly, and no points if answered incorrectly or left unanswered. The maximum score for this test is 100.3 points.
3. Calculators, books, and other aides are prohibited during this examination. Scratch paper will be provided for calculations. Diagrams are not necessarily drawn to scale.
4. Mark your answers to the questions in the provided Scantron form. You may use the test booklets for scratch work, but only answers marked in the Scantron form will be counted. If you require additional scratch paper, simply raise your hand and a volunteer will assist you.
5. In the event of a tie, answers will be evaluated starting backwards from question 25 to 1 to determine a winner.
6. Although this math tournament is intended to demonstrate your knowledge and skills in math, it is also a great opportunity for you to interact with your fellow peers, so be sure to enjoy yourself and have fun!

1. Find the thousands digit of the sum of $3 + 333 + 3333 + 333333 + 33333333 + 333333333$.

A. 0 B. 3 C. 6 D. 9 E. NOTA

2. An arithmetic sequence has 3rd term 18 and 6th term 42. What is the 9th term of this sequence?

A. 2 B. 8 C. 24 D. 66 E. NOTA

3. A snake is chasing a mouse up a 5 foot wall. The snake moves at 3 inches a second and the mouse moves at 2 inches a second, but the mouse starts with a 10 second head start. How far up the wall, to the nearest whole percentage, is the mouse when he gets caught?

A. 25 B. 33 C. 67 D. 100 E. NOTA

4. A school district has 3 schools with a total of 5400 students. School A has twice the number of students as School B, and School B has a third of the number of students of School C. What is the average number of students in Schools A and B?

A. 900 B. 1350 C. 1800 D. 2700 E. NOTA

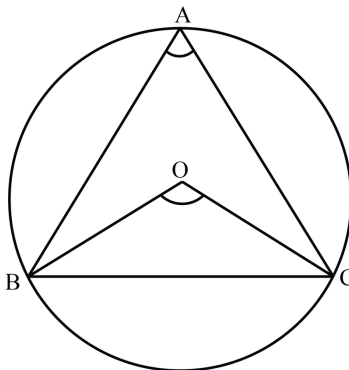
5. Kriti is building a rectangular fence with 49 evenly spaced fence posts of negligible size and 192 feet of fencing connecting the posts. However, when ordering, Kriti makes a typo and buys x extra fence posts. If the amount of fencing between each of the new posts is 12 inches less than the original amount of fencing between each post, what is x ?

A. 16 B. 32 C. 48 D. 64 E. NOTA

6. If the pattern continues, what is the 2025th letter in ALABAMAALABAMA...?

A. A B. B C. L D. M E. NOTA

7. An equilateral triangle inscribed in a circle has centroid (center) O, and vertices A, B, and C. What is the measure of angle $\angle BOC$?



A. 30 B. 60 C. 90 D. 120 E. NOTA

8. A cafeteria serves 3 sides, 3 main courses, and 3 drinks, shown in the menu below. How many different meals (one main course, one side, and one drink) can you make with a budget of 5 dollars?

| Sides | Main Course | Drinks |
|--------------------|------------------|--------------|
| Potatoes - 2.00 | Spaghetti - 3.00 | OJ - 1.00 |
| Green Beans - 1.00 | Sandwich - 2.00 | AJ - 1.00 |
| Yogurt - 1.00 | Curry - 4.00 | Water - 0.50 |

A. 9 B. 15 C. 18 D. 27 E. NOTA

9. Harshtha has 4 red socks, 3 blue socks, 6 black socks, and 2 white socks, for a total of 15 socks. If Harshtha randomly gets out socks one by one, how many socks does Harshtha need to get to guarantee that he gets a pair?

A. 4 B. 5 C. 10 D. 14 E. NOTA

10. Erik plans to record at least 75 names in his notebook every month. He writes 2 names every day from Monday to Wednesday, 3 names on Thursday, and no names on weekends. Assuming there are 30 days in this month, and the first day is a Tuesday, what is the minimum number of names Erik needs to write every Friday to accomplish his goal?

A. 3 B. 5 C. 7 D. 9 E. NOTA

11. A square is inscribed in a right triangle with side lengths 3, 4, and 5 so that one vertex of the square coincides with the right angle vertex of the triangle. A circle of maximum possible area is inscribed in another right triangle with side lengths 3, 4, and 5. If the area of the square is S and the area of the circle is C , determine the value of $S - C$.

A. $\frac{144}{49} - \pi$ B. $\frac{225}{49} - \pi$ C. $4 - \pi$ D. $8 - \pi$ E. NOTA

12. In how many ways can the letters in CLEMENS be arranged so that no "E" is adjacent to another?

A. 144 B. 360 C. 1800 D. 5040 E. NOTA

13. Heidi picks a random number between 1 and 99, inclusive. She then adds up all the numbers above her number up to and including 100. What is the probability that the sum is either less than 1000 or greater than 3000?

A. $\frac{1}{4}$ B. $\frac{1}{3}$ C. $\frac{73}{100}$ D. $\frac{37}{50}$ E. NOTA

14. Jeffrey is reading the 192 page book Twelfth Night. He decides to read 16 pages of the book each Friday, Saturday, and Sunday until he finishes. If he starts on Friday, January 1st, 2025, what is the sum of the digits of the date, in XX/XX/XXXX form, in which Jeffrey finishes reading Twelfth Night?

A. 2020 B. 2028 C. 2050 D. 2056 E. NOTA

15. Find the sum of all solutions of the equation $x! = x - 1 + (x - 1)!$.

A. 0 B. 1 C. 2 D. 3 E. NOTA

16. A point $(1, 2)$ is first reflected across the x - axis to point (a, b) . Point (a, b) is then rotated 270 degrees clockwise around the point $(4, 1)$ to point (c, d) . What is the area of the triangle with vertices $(1, 2)$, (a, b) , and (c, d) ?

A. 4 B. $4\sqrt{6}$ C. 10 D. 12 E. NOTA

17. Alex, Beth, Carl, Derek, and Edward sit in a circle. If Alex refuses to sit next to Beth or Derek and Beth refuses to sit next to Edward, how many possible ways can they sit?

A. 2 B. 4 C. 8 D. 24 E. NOTA

18. An apple orchard contains 25 apple trees, each of which bearing an equal amount of ripe apples. When Farmer John puts an equal amount of apples in each of 18 buckets, he has 3 apples left over. When Farmer John puts an equal amount of apples in each of 12 buckets, he still has 3 apples left over. How many apples does each tree have?

A. 1 B. 2 C. 3 D. 4 E. NOTA

19. Eddie accidentally writes the expression $\frac{1}{3} \times \sqrt{x}$ instead of $\sqrt[3]{x}$. Find the sum of all values of x for which the two expressions are equal.

A. No Solutions B. 0 C. 27 D. 729 E. NOTA

20. Two medians (Segments connecting a vertex to the midpoint of the opposite side) are drawn in triangle ABC , from points B and C to D and E respectively. AB and AC are congruent in length and BC equals 8. Given that the area of $\triangle ABC$ is 32, what is the area of trapezoid $BCED$?

A. 16 B. 18 C. 24 D. 48 E. NOTA

21. 9 points are arranged in a 3×3 grid. 3 distinct points are then selected out of the grid. Which of the following is closest to the probability the three points do not form a triangle?

A. 0 B. 0.3 C. 0.7 D. 1 E. NOTA

22. Determine x such that $\sqrt{x + \sqrt{x + \sqrt{x + \dots}}}$ is equal to 3.

A. 3 B. $3\sqrt{3}$ C. 6 D. 9 E. NOTA

23. Abigail, Eddie, and Joel decide to play a dice game with a fair, six - sided die. The game starts with Abigail rolling the die, and passing the die to Joel. If Abigail rolls an even number, then she is safe; however, if Abigail rolls an odd number, then she is eliminated. Joel then repeats the process, rolling the die and passing it on to Eddie. Eddie then rolls the die and passes it back to the next person still in the game. What is the probability that Abigail and at least one other person is still in the game after 3 rolls?

- A. $\frac{1}{8}$ B. $\frac{3}{8}$ C. $\frac{1}{2}$ D. $\frac{7}{8}$ E. NOTA

24. Let

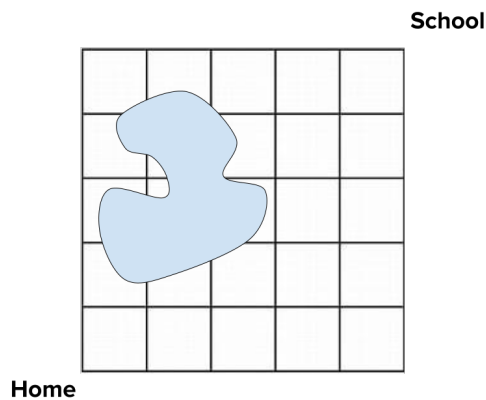
$$f(x + y) = 2f(xy) + 3$$

$$f(xy) = f^2(x + y) + 6.$$

where $f^2(x)$ denotes $f(f(x))$. What is the absolute difference between $f(x + y)$ and $f(xy)$?

- A. 2 B. 8 C. 12 D. 35 E. NOTA

25. Neyan is rushing from home to school in a 5×5 grid. He starts on the bottom left corner, then begins walking towards the top right corner while only moving right and up. However, it rained heavily the night before, so a lake is formed where Neyan cannot cross any edges the lake touches. How many ways can Neyan get from his home to school?



- A. 21 B. 60 C. 67 D. 81 E. NOTA

TB1. The three intercepts of the polynomial

$$f(x) = (x - 2)(x - 3)$$

are the height, width, and length of a rectangular prism. What is the volume of this rectangular prism?

TB2. In how many numbers between 1 and 111 inclusive, is the letter “o” used at least once?

TB3. Given that the statement ”Anyone who owns a Genshin Impact figurine is a weeb.” is true, how many of the following statements is guaranteed to also be true?

- I) Anyone who is a weeb owns a Genshin Impact figurine.
- II) Anyone who is not a weeb does not own a Genshin Impact figurine.
- III) Anyone who does not own a Genshin Impact figurine is not a weeb.