JCMT Pre-Algebra Team Test
2025 James Clemens Math Tournament

1. Your team has 60 minutes to complete this exam. Four students from each grade level will participate in this round.
2. This exam consists of 15 free-response questions, each worth 10 points if answered correctly and 0 points if answered incorrectly or left unanswered.
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 team answer sheet. You may use the test booklets for scratch work, but only answers marked in the team answer sheet will be counted. If you require additional scratch paper, simply raise your hand and a volunteer will assist you.
5. All answers for the team test will be an positive integer from 1 to 999.
6. A team's final score will be calculated by adding each school's top 4 written test scores per grade (excluding tie breaking questions) as well as the team round score, for a maximum of 550 points.
7. In the event of a tie, the team with the highest team round score will be favored. If team round scores result in another tie, answers will be evaluated starting backwards from question 15 to 1 to determine a winner.
8. 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!
9. This test will be taken in teams of 4, with unofficial teams being able to compete (i.e., groups can take it for fun).

1. On Old McDonald's farm, there are many pigs and chickens. Mr. McDonald counts 17 total heads and 44 legs. How many pigs are on the farm?

2. A rectangular park is 10 meters longer than wide and has an area of 375 square meters. The election for the next mayor is coming up and Mr. Teddy decides to add posters for his campaign every 5 meters around the perimeter of the park, how many posters will he use?

3. Solve the system of equations for x, y, and z below to find $x^2 + 2xy + z^2$:

$$3x + 15y + 13z = 110$$
$$2x + 12y + z = 68$$
$$4x + y + 6z = 29$$

4. A company manufactures two types of widgets, A and B. Each type A widget requires 3 hours of labor and 4 units of material, while each type B widget requires 2 hours of labor and 5 units of material. The company has a maximum of 60 hours of labor and 80 material units available. What is the maximum number of widgets (A and B combined) that the company can produce?

5. Find $C * L/E + (M^E)/N + S$ to the nearest integer if

   - C is the LCM of 145 and 30.
   - L is the x coordinate of the solution to the system of equations:

$$y = \frac{4}{3}x + 2$$
$$3y = \frac{5}{2}x + 6$$

   - E is the solution for x in the radical equation. $\sqrt{x+2} = 2$.
   - M is the number of families owning a cat and a dog when out of 20 families, 12 own a dog and 15 own a cat.
   - N is the number of ways to rearrange the letters in SIGMA.
   - S is the volume of a square pyramid with the side lengths of the base measuring $5\sqrt{2}$ ft and the length of the edges being 13 ft.

6. A 5-foot ladder is leaning against a building with its base 3 feet away from the building. The ladder is then moved such a way that the top of the ladder is 1 foot farther down causing the bottom of the ladder to move away from the building. How far from the building is the bottom of the ladder now?

7. A right circular cone has a height that is twice the radius of its base. If the radius is in the form of $x\sqrt[3]{y}$, then find $y - x$ if the volume of the cone is 72π cubic centimeters.

8. A cube has a surface area of 96 square inches. A is the length of each edge of the cube and B is the number of smaller cubes that will have one side painted if the cube is painted and cut into smaller cubes with edge length 1. Find the LCM of A and B.

9. In a special quadrilateral, the measures of the angles are in the ratio 3:4:5:6. Find the measure of the largest angle.

10. A mad scientist creates a new solution which, when mixed with marshmallows, creates mini-marsh monsters at a rate of 20 marsh monsters for every 5 minutes passed. When leaving his office at half past 10 in the morning, he accidentally knocks the solution over into his snack bowl filled with marshmallows and doesn't realize until later when he comes back with his co-worker. They both are met with a terrifying amount of marsh monsters. If they had come back to his office at 11:47 AM, how many marsh monsters did they see?

11. A number N has the prime factorization $2^3 \times 3^2 \times 5 \times 7^2$. How many positive divisors does N have, including 1 and N itself?

12. Amy bought an outfit for 130 dollars composed of a shirt, jeans, and a necklace. The necklace is 20% of the price of the T-shirt and the jeans cost \$50 more than the original price. If the necklace costs \$10 then how much is the original price of the jeans?

13. A box contains 5 red, 4 blue, and 3 green balls. Four balls are drawn at random without replacement. Find the sum of the numerator and denominator of the probability that the balls drawn are the colors blue, red, green, and red in that order.

14. Find the 10^{th} term in the arithmetic sequence whose 3^{rd} term is 13 and 7^{th} term is 25.

15. Stacy and Trix get into a fight and never want to see each other again so they get into their respective cars and start driving in opposite directions. Stacy travels 60 miles per hour and Trix 75 miles per hour. If Stacy had started an hour earlier than the other, how far apart would they be after the Trix had traveled for 4 hours?