CALIFORNIA STATE UNIVERSITY, BAKERSFIELD
Lee Webb Math Field Day 2023
Team Medley, Freshman-Sophomore Level

Each correct answer is worth ten points. Answers require justification. Partial credit may be given. Unanswered questions are given zero points.

You have 50 minutes to complete the Exam. When the exam is over, give only one set of answers per team to the proctor. Multiple solutions to the same problem will invalidate each other.

Elegance of solutions may affect score and may be used to break ties.

All calculators, cell phones, music players, and other electronic devices should be put away in backpacks, purses, pockets, etc. Leaving early or otherwise disrupting other contestants may be cause for disqualification.

1. The perimeter of square S and the circumference of circle C both equal 4 and they have the same center. At a corner of the square, S hangs out x units past C. At the center of a side of S, C hangs out y units past S. Solve for x+y.

2. How many subsets of {1,2,3,4,5,6,7,8,9} are there that contain at least one even number, one multiple of 3, and one prime number?

3. Two parallel lines are given by the equations $y = mx + b_1$ and $y = mx + b_2$. In terms of b1, b2, and m, what is a formula for the distance between the two lines?

4. The values of A, B, C, D, E, F, G, H, I are a permutation of 1, 2, 3, 4, 5, 6, 7, 8, 9. Determine the values of each of the variables, given that:

$$\frac{A+B}{C} = \frac{D+E}{F} = \frac{G+H}{I}$$

$$A+B+H = C+F+I = D+E+G$$

$$C-E = A-F = G-D = H-I$$

$$A+B+C+D+E+F+G = 28$$

$$C+D+E+F+G+H+I = 39$$

$$A-B+C-D+E-F = -1$$