Bergen County Math League

NO Calculators Permitted

Good Luck to You 

Good Luck to All

Contest #6 **2023-2024** **12 minutes** **Questions 1 & 2**

6-1. Alice, Bob, Carol, and Dave had dinner together. When they parted, each of them was wearing the hat belonging to another member of the party and the coat belonging to yet another. The person who took Dave's hat took Carol's coat. The hat taken by Carol belonged to the owner of the coat taken by Dave. Alice took Bob's hat. Who took Alice's coat?

6-2. A customer ordered fifteen Zingers. Zingers are placed in packages of four, three, or one. In how many different ways can this order be filled?

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Contest #6 **2023-2024** **12 minutes** **Questions 3 & 4**

6-3. The ordered 4-tuple $(a, b, c, d) = (1, 5, 7, 10)$ is a solution of the simultaneous system

$$a + b = 6,$$
$$b + c = 12,$$
$$c + d = 17, and$$
$$a + d = 11.$$

How many other ordered 4-tuples (a, b, c, d) are solutions of this simultaneous system?

6-4. Find the least positive value of x which satisfies

$$\sin 20° + \sin(x - 20)° = \sin(x + 20)° .$$

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Contest #6 **2023-2024** **12 minutes** **Questions 5 & 6**

6-5. For all positive values of x, the functions f and g are respectively defined by the equations $f(x) = \frac{x-1}{x+1}$ and $g(x) = \frac{2x-1}{2x+1}$.
Write an **EQUATION** expressing $g(x)$ explicitly in terms of $f(x)$.

6-6. A square is inscribed in a circle and is circumscribed about a smaller concentric circle. What is the ratio of the area of the inner circle to the area of the annulus formed by the two circles?