

Bergen County Math League

NO Calculators Permitted

Good Luck to You



Good Luck to All

Contest #6

2024-2025 12 minutes

Questions 1 & 2

- 6-1. Two vertices of a square are located on a diameter of a circle, and the other two vertices are on a semicircle drawn on that diameter. If the area of the square is 20, find the length of a radius of the circle.
- 6-2. If $x + y + z = x^3 + y^3 + z^3 = a$ and $x^2 + y^2 + z^2 = a^2$, write an EQUATION expressing xyz explicitly in terms of a .

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Questions 3 & 4

6-3. If $a_0 = 2$, $a_1 = 4$, and $a_{n+2} = \frac{3a_{n+1} - 2a_n}{3}$ for $n \geq 0$, find the numerical value of a_3 .

6-4. The length of one side of a triangle is 30, and the lengths of the medians drawn to the other two sides are 39 and 42. Find the area of the triangle.

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Questions 5 & 6

- 6-5. Let $y_1 = \log[f(x)]$, where $f(x) = \frac{1+x}{1-x}$ and $-1 < x < 1, x \neq 0$. If $y_2 = \log\left[f\left(\frac{3x+x^3}{1+3x^2}\right)\right]$, find the numerical value of the ratio $y_2 : y_1$.
- 6-6. A book with 250 pages has its pages numbered consecutively from 1 to 250. How many times will the digit 2 be used in the numbering process?