# Bergen County Mathematics League

Good Luck To You

BCML

Good Luck To All

**Contest #5 (No Calculators)**

**2015-2016**

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**Part I** *Time Limit: 12 minutes*          On contest #6, *any S.A.T. calculator will be allowed.*

5-1. Weird Town uses three types of currencies: Cons, Flegs, and Leus. If 3 Leus are equal to 9 Cons, and 2 Cons are equal to 4 Flegs, how many Flegs are equal to 5 Leus?

5-2. What is the smallest positive integer which has a remainder of 1 when divided by 3, a remainder of 2 when divided by 4, and a remainder of 3 when divided by 5?

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**Part II** *Time Limit: 12 minutes*

5-3. The 2016 binomial factors $(x-1)(x-2)(x-3)\times\ldots\times(x-2015)(x-2016)$ are multiplied and the product is written as a polynomial $P$ in standard form. What is the sum of all of $P$'s coefficients, including the constant term?
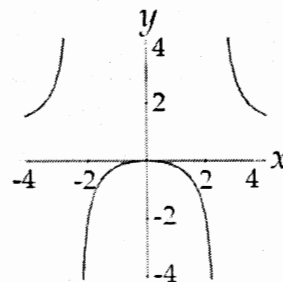
5-4. The graph of $f(x) = \dfrac{x^2}{x^2-6}$ is shown at the right. How many solutions does $f(f(x)) = 3$ have?



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**Part III** *Time Limit: 12 minutes*

5-5. What are both positive integer values of $n$ which satisfy

$$\sin^2\left(\tfrac{\pi}{6}\right) + \sin^2\left(\tfrac{2\pi}{6}\right) + \sin^2\left(\tfrac{3\pi}{6}\right) + \ldots + \sin^2\left(\tfrac{(n-1)\pi}{6}\right) + \sin^2\left(\tfrac{n\pi}{6}\right) = 2016?$$

5-6. In trapezoid $ABCD$, $\overline{AB} \parallel \overline{CD}$, and both $\angle A$ and $\angle B$ are obtuse. What is the area of the trapezoid if $AB = 10$, $BC = 15$, $CD = 24$, and $DA = 13$?

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**Answers**

5-1. 30

5-2. 58

5-3. 0

5-4. 4

5-5. 4031, 4032

5-6. 204