

Bergen County Mathematics League

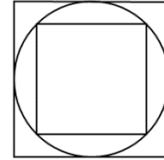
Good Luck To You



Good Luck to All

Part I *Time Limit: 12 minutes* On contests #4 and #6, *any S.A.T. calculator will be allowed.*

3-1. As shown at the right, the circle is inscribed in the larger square and circumscribes the smaller square. What is the ratio, larger to smaller, of the areas of the squares?



3-2. Grandmaster GM played an exciting chess match with Master M. The probability that GM wins is 60%; the probability that M wins is 20%; the probability of a tie is 20%. If M did not win, what is the probability that GM won?

Part II *Time Limit: 12 minutes*

3-3. When I divide x by y , the remainder is 3. When I divide y by x , the remainder is 4. What is the minimum value of $20x + 16y$?

3-4. A kit for a baseball catcher consists of a glove, a ball, and a helmet. I can spend all my money to buy 21 gloves and 21 balls, or, I can spend all my money to buy 28 helmets. If I decide to order these items by kits, then I can buy exactly n kits, spending all my money. What is the value of n ?

Part III *Time Limit: 12 minutes*

3-5. Factor $(x^2 + 2x - 1)(x^2 + 2x - 5) - 21$ as far as possible into the product of polynomials with integer coefficients.

3-6. In the piecewise function f defined below, what is the value of $f(1)$?

$$f(x) = \begin{cases} f(f(x + 5)), & \text{if } x < 20 \\ x - 3, & \text{if } x \geq 20 \end{cases}$$

Answers

3-1. 2:1 or 2

3-2. 3/4 or 0.75 or 75%

3-3. 204

3-4. 12

3-5. $(x + 4)(x - 2)(x^2 + 2x + 2)$

3-6. 18