Bergen County Mathematics League

Good Luck To You

Good Luck To All

Contest #3 (No Calculators) **2017-2018**

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

3-1. I went to the post office where I bought 40 stamps for \$1. Each stamp had a face value of 1¢, 4¢, or 12¢. If I bought at least 1 of each of these 3 types, how many 4¢ stamps did I buy?

3-2. In $\triangle ABC$, altitude $\overline{CD}$ intersects median $\overline{AM}$ at a point P in the interior of the triangle. If $CD = 6$ and $AM = 5$, what is the numerical value of the ratio $AD{:}AP$?

Part II *Time Limit: 12 minutes*

3-3. Bases $\overline{AB}$ and $\overline{CD}$ of trapezoid $ABCD$ are each perpendicular to leg $\overline{AD}$. If $CD = 6$, $AB = 8$, and $AD = 10$, what is the average of the areas of all non-congruent triangles two of whose vertices are A and D, and whose third vertex is a point on $\overline{BC}$.

3-4. Three numbers are in arithmetic progression. The sum of the first and third numbers exceeds the second by 18. The sum of the squares of the first and third numbers exceeds twice the square of the second also by 18. What is the largest of these three numbers?

Part III *Time Limit: 12 minutes*

3-5. What are all two-digit numbers N for which the sum that I get when I add N to three times the sum of N's digits is a number with the same digits as N, but in reverse order?

3-6. If $\cos 36° = (1+\sqrt{5})/4$, what is the value exact of $\cos 108°$? [To get credit, you must write your answer as a reduced fraction with a rational denominator.]

Answers

3-1. 9

3-2. 4:5 or 4/5 or 0.8

3-3. 35

3-4. 21

3-5. 12, 24, 36, 48

3-6. $(1-\sqrt{5})/4$