Maine Math, Science and Engineering Talent Search
Round 7 Problems/Grades 6-9
Due: April 8, 2000. Send solutions to MMSETS, Dept of Mathematics, University of Maine, Orono, ME 04469

1.   **(The Tricky King)**   From 36 prisoners a king wants to punish 6 and free the rest. However, wants to do this with the appearance of impartiality so he arranges the 36 prisoners in a circle and then, starting at some prisoner he goes around the circle selecting every 10th prisoner to punish. In what places should he place the prisoners he wishes to punish ?

2.   **(Cryptarithmeic Puzzle)**   Solve the cryptarithmetic

$$
\begin{array}{r}
A\ B\ C \\
A\ B\ C \\
\hline
D\ E\ F\ C \\
C\ E\ B\ H \\
E\ K\ K\ H \\
\hline
E\ A\ G\ F\ \ F C
\end{array}
$$

3.   **(Round Table Puzzle)**   A total of 25 boys and 25 girls are seated around a round table. Show that a least one person has boys for both neighbors.

4.   **(Mystery Code)**   The secret service intercepts a coded message with reads: BLASE $+$ LBSA $=$ BASES. It is known every digit corresponds to a unique letter. Two computers came up with two different answers to the code. Is this possible ?

5.   **(Interesting Game)**   Three men play a game that has one loser and that the loser is to double the money of each of the other two players. After 3 games each player loses once and ends up with $24. How much did each player have at the start ?

6.   **(Folding Cards)**   A rectangular piece of paper is folded so one corner is folded onto the opposite side as illustrated in the diagram below forming 3 triangles, #1 (smallest), #2 (middle sized triangle), and #3 (largest), which is the folded over portion. If the areas of the triangles form an arithmetic progression, $3,\ 3 + a,\ 3 + 2a$, what is a and hence the area of the two larger triangles?

1 = smallest triangle   3 = largest triang[]
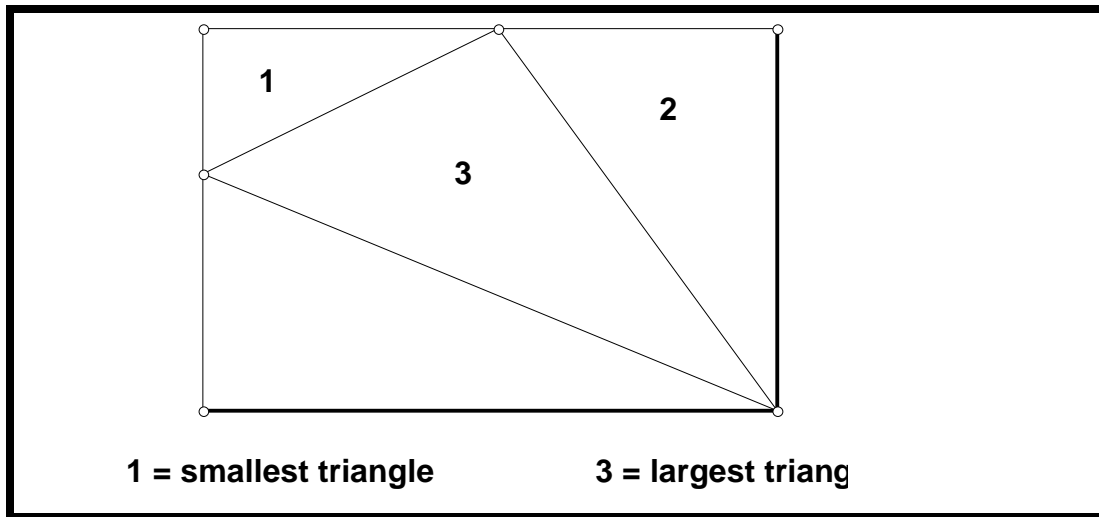
7.   **(King Minsch's Crown)**   King Minsch wants a crown to be made from gold, brass, tin and copper, where the total weight of the crown is to be 60 ounces.   The king insists that together the gold and brass should be 2/3 the weight of the crown, the gold and tin 3/4 the weight, and the gold and tin 3/5 ths the weight.   How many ounces of gold, brass, tin and copper will there be in the crown ?

8.   **(Odd Looking Numbers)**   We call a number 1, 2, 3, ...   an odd-looking number if all of its digits are odd.   For example 3, 57, 719, 135795375 are all odd looking. How many 4-digit odd-looking numbers are there ?

9.   **(Apple Wars)**   One day three stores sell apples at the same price, but change the price once during the day at the same time. At the end of the day store 1 sold 10 apples, store 2 sold 25 apples, and store 3 sold 30 apples, but yet they all take in the same amount of money. How did they manage to do this, and what was the common amount of money each store took in.

10.   **(Simple or Hard?)** Evaluate

$$\frac{423{,}134 \times 846{,}267 - 423{,}135}{423{,}133 \times 846{,}267 + 423{,}132}$$

in the simplest way. Do not use a calculator.