# MATH AUCTION

February 9, 2011

## Rules:

1) We divide into teams and work for a fixed amount of time to solve the problems below.

2) Each team is given $500 to start.

3) The best solution to a problem is worth $200.

4) The problems are put up for auction in the order given. The team with the highest bid is allowed to present its solution.

5) The problem is then put up for bid again (and again), but each time the solution must be better than the previous solution.

6) When no other team wants to buy the problem, the team with the best solution collects the value of the problem. Every team that "bought" the problem pays for its bid, even if it did not have the winning solution.

7) If a team can show that it has found the best solution (by showing that no better solution is possible), then that team gets an additional $50 prize money for the problem.

1) Cut a circle with 7 straight lines to get as many triangles as possible. A triangle cannot have curved sides. Don't count triangles that are unions of smaller triangles or polygons.

2) You have a frying pan that holds at most 10 hamburgers at the same time. Each burger needs to be cooked for 5 minutes on each side. Each burger has two sides. What is the shortest time it takes to cook 17 burgers?

3) A farmer grows bananas in a desert oasis. He has 3000 bananas and the market is 1000 miles away. He has only a camel to transport bananas, but there are two problems:
a) The camel can only carry at most 1000 bananas at a time.
b) The camel will only walk if munching on a banana. He eats one banana for every mile he walks.
What is the maximum number of bananas the farmer can get to the market using ONLY the camel to transport them? Hint: The farmer may carry bananas partway, drop off a supply of bananas, walk back to start (make sure the camel has enough bananas to do this!) re-boost his supply, and so on.

4) In how many different ways can you write 9 as a sum of 4 positive integers, if you consider sums that differ in the order of numbers different?

Thank you to Anna Burago for problems 1 and 2. Thank you to the Boston Math Circle for problem 3.