BLACKSBURG MATH CIRCLE: SATURDAY, OCTOBER 10, 2015

Warm-up Problems

Choose a few of these problems to work on as you get settled in today. You don't need to complete all of the problems now. Once you've thought about a problem on your own, talk to someone sitting near you about your ideas.

1. Three friends - sculptor White, violinist Black, and artist Redhead - met in a cafeteria. "It is remarkable that one of us has white hair, another one has black hair, and the third one has red hair, though no one's name gives the color of their hair" said the black-haired person. "You are right", answered White. What color is the artist's hair?
2. Fröken Bock baked a giant cake for her birthday party. It is known that PeeWee and the cake weighed as much as Karlson and Fröken Bock. After they ate the whole cake Karlson weighted as much as Fröken Bock and PeeWee together. Prove that piece of cake eaten by Karlson weighted as much as Fröken Bock before the birthday party.
3. In a box there are color pencils: 8 red pencils, 8 - blue, 8 green, and 4 yellow. We take pencils from the box without looking at them. What is the minimal number of pencils to take in order to get a) at least 4 pencil of the same color b) at least one pencil of each color c) at least 6 blue pencils.
4. Three people - A,B, and C - are sitting in a row in such a way that A sees B and C, B sees only C, and C sees nobody. They were shown 5 caps - 3 red and 2 white. They were blindfolded, and three caps were put on their heads. Then the blindfolds were taken away and each of the people was asked if they could determine the color of their caps. After A, and then B, answered negatively, C replied affirmatively. How was that possible?
5. Tom multiplied two two-digit numbers. Then he changed all the digits to letters(different letters correspond to different digits). He obtained $AB \times CD = EEFF$. Prove that Tom made mistake somewhere.
6. A special chess piece called a "camel" moves along a 10x10 board like a (1,3) knight. That is, it moves to any adjacent square and then moves three squares in any perpendicular direction (the usual chess knight's move can be described as of type (1,2)). Is it possible for a camel to go from some square to an adjacent square?
7. Using only a 4 minute and 7 minute hourglass or egg timer how would you measure exactly 9 minutes?
8. Is it possible to write numbers 1 through 100 in a row in such a way that the positive difference between any two neighboring numbers is not less than 50?