PFS 26-6 1/2/13 _____

Favorite *Story* Problems

Here are some wonderful story problems. I've tried to arrange them easiest to hardest. Choose one to work on and save your work sheets, so you have a record of your progress. When you write up your work, please make a story of it! Explain the steps you took, who helped you along the way, and what the obstacles were in your journey. Please include a diagram, table or drawing if that will help explain your ideas. Work neatly!

1. Old Macdonald

Mr. MacDonald was older than 50 and less than 80 years old. He told a friend, "Each of my sons has exactly as many sons as brothers. Now if you add up the number of my sons and the number of my grandsons, you get my age!" How many sons and grandsons did he have? How old was Mr. MacDonald? This is a good trial and error problem!

2. Scrambled Labels

You have three boxes. One contains two pennies, one two dimes, one a penny and a dime. Each box has been labeled, but someone switched the labels, so all the boxes are now labeled wrong. You may draw out one coin at a time from any box (without touching or seeing the other coin). What is the minimum number of coins you need to draw out and look at in order to re-label all the boxes correctly? You might want to act out this problem. If you get an answer, check with RAF to see if it's the minimum.

3. Switches and Bulbs

In one room in a science building there are three switches, A, B and C. Their on/off positions are correctly labeled. In another room there are three light bulbs on a lab table, labeled X, Y and Z. You can't see into the bulb room from the switch room. You can spend as long as you like in the switch room, then visit the bulb room only once. How can you determine which switch controls which bulb?

4. White, Black and Brown

Professor Merle White of the math department, Professor Leslie Black of the philosophy department, and Jean Brown, a young secretary, were lunching together.

"Isn't it remarkable," observed the lady, "that our last names are Black, Brown, and White, and that one of us has black hair, one brown hair and one white hair."

"It is indeed," replied the person with black hair, "and have you noticed that not one of us has hair that matches his or her name?"

"By golly, you're right!" exclaimed Professor White.

If the lady's hair isn't brown, what is the color of Professor Black's hair?

(This is a Martin Gardner problem from his book *Sphere Packing, Lewis Carroll, and Reversi.*)

5. How did Kant set his clock?

It is said that the great philosopher Immanuel Kant (1724 – 1804) was a bachelor of such regular habits that the good people of Konigsburg would adjust their clocks when they saw him stroll past certain landmarks.

One evening Kant was dismayed to discover that his clock had run down. He did not reset the hands because he didn't know the time—his watch was off being repaired. He walked to the home of his friend Schmidt, who lived a mile or so away, and he glanced at the clock in Schmidt's hallway as he entered the house.

After visiting Schmidt for several hours, Kant left and walked home along the route he had taken to get there. As always, he walked with a slow, steady gait that had not varied in 20 years. He did not know exactly how long the walk home took, as Schmidt had recently moved to a new house, and Kant had not yet timed this walk. Just the same, when Kant entered his house, he immediately set his clock correctly.

How did Kant know the correct time?

(Another Martin Gardner problem from *Sphere Packing, Lewis Carroll, and Reversi.*)

6. How Many Children

"I hear some youngsters playing in the backyard," said Jones, a college math student, who was visiting her advisor at his home. "Are they all yours?"

"Heavens, no," exclaimed Professor Abbott, the great number theorist. "My children are playing with the children from three other families, although our family is the largest. The Browns have a smaller number of children, the Carters a still smaller number, and the Drakes have the smallest number."

"How many children are there all together?"

"Well," said Abbott, "there are fewer than 18 children, and the product of the numbers in the four families happens to equal my house number."

Jones took out her notebook and pencil and started working. After a while she said, "I need more information. Is there more than one child in the Drake family?"

As soon as Abbott replied, Jones smiled and gave the correct number of children in each family. Knowing the house number, and whether the Drakes had more than one child, and being a good college mathematician, Jones was able to solve this puzzle. Believe it or not, YOU can solve this problem, and give the correct number of children in each family, just with the information given (and a little hard work). Good luck!

(This problem was devised by Lester R. Ford.)

Have fun!