PFS 19-11 4/3/06 _____

Puzzles and Prose

This week let's try some puzzles and practice our writing skills. Choose one puzzle to work on. In your write-up, restate the problem, explain how you worked on it, how you sought help or collaborated, what conclusions you reached, and what you learned. Minimum number of sentences equals your grade number. In addition to writing you may use pictures or diagrams to help your presentation. After you've finished one neat write-up, you may work on another puzzle, or present one of your own.

I. Three-letter Words

There are six permutations of a three-letter word, with three different letters. For example with the word *bat,* we can also make *bta, atb, abt, tab* and *tab.* Of these six only *bat* and *tab* are dictionary words. Can you find a three-letter word that makes a meaningful word in all six permutations? (I think it's impossible, but I'd love to be surprised!) Can you find a three-letter word that works in four or five of its permutations? What's the best you can do? By the way, how many different three-letter "words" can be formed with the 26 letters of the English alphabet?

II. Scrambled Labels

You have three boxes. One contains two white marbles, one two black marbles, one a black and a white marble. Each box has been labeled, but someone switched the labels, so all the boxes are now labeled wrong. You may draw out one marble at a time from any box. What is the minimum number of marbles you need to draw out and look at in order to re-label all the boxes correctly?

III. Weighings

You have four coins, one slightly heavier than the others. How many weighings on a two-pan balance will it take to find the heavier coin? For a harder problem: what if you start with nine coins, one slightly heavier? How many weighings will you need then? And for a *big* challenge: what if you start with twelve coins, one slightly *different*, then how many weighings will you need?

IV. The Absent Minded Teller

Mr. Smith cashed a check, but the teller switched the dollar and cents amounts when she gave him his money. After he bought a five-cent newspaper (boy, is this an old problem!), Mr. Smith noticed he had exactly twice as much money as the correct amount on his original check. What was the original amount of his check?

V. How Many Children

"I hear some youngsters playing in the backyard," said Jones, a college math student. "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 his notebook and pencil and started working. After a while he 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.)