PFS 19-2 9/26/05 _____

The Fraction Game!

The Fraction Game has been popular at PFS for 18 years and comes from the Real Math series of text books. Here's a reminder of how we play it. Richard has four dice. Two are marked 0 to 5, and two are marked 5 to 10. There are three "innings." In each inning Richard rolls the dice. If a 0 or 10 comes up, he rolls again to get a number between 1 and 9. When there are four digits between 1 and 9, every player makes a fraction using two, three or four of the digits. Then they change their fraction to a decimal. After the third inning we add up our three decimals. Whoever has the highest number that is still less than 2 wins. (Reminder: the repeating decimal 1.999999... is not less than 2, it equals 2.) Calculators are allowed. As we play the game, you can't go back and change your fraction once an inning is over. Here's a sample game, played by Freddy Fractal:

Inning #1: 3, 5, 7, 8 Freddy makes 8/5 = 1.6

Inning #2: 1, 4, 5, 5 Freddy makes 5/14 = 0.3571428...

Inning #3: 2, 3, 8, 9 Freddy makes 2/389 = 0.00514138...

His total is 1.962284... That's a pretty good score. Maybe he'll win. Maybe not. For example, someone who chose 5/3 in inning #1 might beat him out.

So what's our problem? It's very simple! **What is the highest possible score that can ever occur in the Fraction Game?!** Remember, we're not asking what is the highest fraction that's smaller than 2. There's no answer to that question! We are asking, what's the highest fraction anyone can ever make in the Fraction Game following our rules. Instead of rolling dice, you're allowed to make up the digits for each inning. (But they have to be digits that could come up with our dice. For example, no more than two of any digit, except 5. There can be up to four 5's.)

How will you approach this problem? How can you know when you've found the highest possible total? Please keep a neat record of your attempts.

Have fun!

PFS 19-2 Alternative

The Return of Pentominoes!

Pentominoes are shapes made of five squares stuck together. There are twelve such shapes. You can have fun with them in lots of ways. Our sets of pentominoes are made of one inch squares. Here's one challenging puzzle: Can you put together the twelve different shapes to make a 6 x 10 inch rectangle? You'll be happy to know there are 2339 different solutions to this puzzle! But you may find it quite a challenge to find even one!

If you'd like another kind of challenge, see if you can find all the possible *hexominoes*, made of six squares joined together.

Can you learn more about "-ominoes"?