PFS 24-7 1/3/11 _____

Stories from Arabia

Story-telling week is here! So Richard is presenting this week's POW orally, as a story teller. Little reminders are given below. Most of these stories are from a wonderful book called *Puzzle-Math*, by George Gamow and Marvin Stern. (I don't know if any of these stories are really from Arabia, or if they were just made up to illustrate a math idea and given an Arabian setting.)

The Inheritance

Seventeen Arabian horses. Older son gets 1/2, next son 1/3, youngest 1/9. The sultan helps.

Horse Race in Reverse

Englishman: "I'll give this gold coin to the one whose horse comes in last." A dervish helps.

The Counterfeit Coins

Twelve bags of silver coins. Each coin weighs one pound. One bag has coins of only 15 ounces. Only one penny for the American scale that measures pounds and ounces!

The Sultan and the Vizier

The vizier wants more girls to be born. The sultan passes a law saying women must not have any more children if they give birth to a son. The vizier thinks this will mean more girl babies. The sultan tells his son he tricked the vizier.

And, finally, here is a problem that really is from an Arabic source:

Abu Ali al-Hasan ibn al-Haytham (sometimes called Alhazen) was born in 965, probably in Basra, Persia (now Iraq). He died in 1040, probably in Cairo, Egypt. He wrote more than 90 works on math and science; 55 of them have survived. Here is a math problem from Alhazen:

Find a number that gives remainder 1 when divided by 2, 3, 4, 5 or 6; but when divided by 7, there is no remainder.

Alhazen probably made up this problem to illustrate a law he discovered: If, and only if, p is a prime number, then $(p-1)! + 1$ is divisible by p. This law was given the name "Wilson's Theorem" in 1770, and proved by the Italian-French mathematician Lagrange in 1773.

Your job: Write an ending to at least one story! (Your ending should explain your solution to the puzzle.) Solve Alhazen's problem. Learn more about Wilson's Theorem. Can you prove either part of it?

Can you make up a story puzzle of your own?

Have fun!

PFS 24-7 Alternative 1/3/11 _____

2011!!

Happy New Year!

Did you know that 2011 is the sum of eleven consecutive prime numbers? Can you find them? (It's a hard job.) Is 2011 itself a prime number? Show and explain your work!

You might want to try some of these as warm-ups:

1) $2 + 3 = 5$, so five is the sum of (two) consecutive prime numbers. How many prime numbers can you find that equal the sum of some number of consecutive prime numbers?

2) Here's a challenge that's a little easier than 2011. 139 is a prime number, and it's the sum of five prime numbers. Can you find them?

3) This is trickier: 457 is a prime number, and it's the sum of a certain number of prime numbers. Can you find them? Can there be more than one answer?

4) Why limit ourselves to prime numbers? $10 = 4 + 6$ so ten is the sum of (two) consecutive composite numbers. Can you find other composite numbers like that?

5) Can you invent and explore a variation?

6) Have fun!