PFS 19-4 10/26/05 _____

Stranded!

Robinson Russo has been stranded on an island in the Pacific. Luckily the island is inhabited! Unluckily the inhabitants are cannibals! Luckily the cannibal king is very merciful. He welcomed Robinson and told him he looked delicious. "That's a beautiful gold chain you have," he added. "How many links are on it?"

"Oh, I'm a good mathematician," said Robinson. "There are sixty."

"Well," said the king, "I'll charge you a rent of one link a day to live on our island without being eaten. And I know a ship is due here in sixty days that can take you home."

"Oh, thank you, Your Majesty! Take the whole chain right now!"

"Oh, no, I cannot accept payment in advance. You must pay me one link every day."

"All right, Your Majesty! My sailor's knife is sharp enough to cut the links. I'll pay you one every day."

"But it is a shame to have that lovely chain all cut up. I will order my Sergeant-at-Arms to bop you on the head each time you make a cut in this lovely chain."

"But Your Majesty! That's sixty bops!"

"And I thought you said you were a good mathematician! I'm willing to give you change in any way that will help you. Think about it. On the second day you can give me, if you wish, two links still joined, and I'll give you one back in change. Or on the tenth day you can give me ten links all joined together, and I'll give you back the nine I already have. That way you can pay me one link a day and not cut the chain very often."

So here's the problem. How can Robinson pay the king his link a day with the minimum number of cuts? Robinson's chain is not linked up to form a loop or necklace. It's just a straight length of chain. Except for the two links on either end, every link is joined to two others. This may be a good problem to work on by solving a simpler problem and by acting it out.

Good luck!

Have fun!

No bopping!

PFS 19-4 Alternate 10/26/05 _____

The Return of Pascal's Triangle!

The French mathematician Blaise Pascal (1623-1662) wrote a book about this triangle, but it was known in many other cultures (e.g. Persian, Chinese) hundreds of years earlier.

1) Continue Pascal's Triangle as far as you can. Check line by line! (A mistake in one line will make all the lines below it wrong!) Make a neat, artistic final copy.

2) Write in your own words the rule for forming the triangle.

3) What is the sum of the numbers in each row? Explain!

4) Where can you find these in Pascal's Triangle: counting numbers, triangular numbers, tetrahedral numbers? Fibonacci Numbers?!

5) Do some research about Blaise Pascal and about this triangle in different cultures.

6) What kind of symmetry does Pascal's Triangle have?

7) Photocopy your finished triangle. Highlight all the odd numbers. What do you get?

8) Make a triangle without numbers but with one-way paths from the top down. In each circle fill in the total number of different paths that lead down to that circle from the very top.

9) What is special about the prime numbered rows?

10) Calculate 11^0; 11^1; 11^2; 11^3; etc. What do you notice?

11) There are seven kids in your singing group. How many different trios could be formed? Where will you find the answer in Pascal's Triangle?

12) If you flip six coins, what is the probability of getting exactly two heads? How can you use Pascal's Triangle to get this answer?

13) Expand (x+y)^0, (x+y)^1, (x+y)^2, (x+y)^3, etc. How high can you go using Pascal's Triangle?

14) Have fun!