PFS 28-3 younger 10/8/14 _____

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, Indian, Chinese) hundreds of years earlier.

1) Continue Pascal's Triangle as far as you can. Check line by line! Make a neat final copy.

2) Write the rule for forming the triangle.

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

4) Can you find these in Pascal's Triangle: counting numbers, triangular numbers, tetrahedral 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) Can you explain the hockey stick rule for Pascal's Triangle?

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) In math the word *combinations* means the number of ways to choose a subset from a group, not caring about order. Pascal's Triangle can help us find these numbers, but remember to think of the top row (the single 1) as Row Zero, and the first entry in each row as Entry Zero. 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? Can you make up and solve another problem with combinations?

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? Do you see why mathematicians call Pascal's Triangle a table of binomial coefficients?

14) You can write Pascal's Triangle in a "left justified" format. This can help you find the Fibonacci numbers in Pascal's Triangle--if you look at things from a different angle.

Have fun!