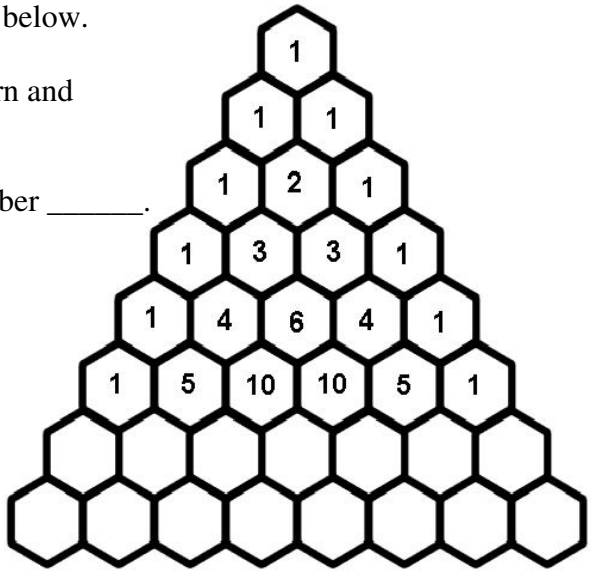
Pascal's Triangle and Polynomials

The figure below is referred to as Pascal's Triangle, named after Blaise Pascal who was a Frenchman from the 1600s, even though it was in use for centuries before his birth. Pascal's Triangle, which contains infinitely many rows (even though in this one, it stops at 8 rows) and contains many patterns. Even the way it's developed is a pattern. Use the figure to answer the questions below.



1) Examine the numbers placed in the triangle. Find the pattern and fill in the bottom two rows.

2) The outer two diagonals of the triangle are always the number _____.

3) Explain how a hexagonal cell is calculated.

4) There is a relationship between Pascal's triangle and polynomials. Multiply out the polynomials below and see what you get. Remember to use the distributive property or a website that expands polynomials. (There is one at http://www.augustatech.edu/math/molik/mathhelp.htm under "**R.4** Interactive Multiplication of polynomials")

a) $(x + y)^2$ b) $(x + y)^3$ c) $(x + y)^4$ d) $(x + y)^5$

5) What is the relationship between the numbers in Pascal's triangle and the polynomials you get above?

6) The second diagonals are what kind of numbers? _____What is the difference between each of the numbers in the diagonal?

7) Add each row of Pascal's Triangle. Fill in the chart below based on the row and sum of numbers in each row.

Row	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Sum								

What kind of numbers are the sums of the numbers in the rows?

8) On the next page is a larger Pascal's Triangle. Fill in the triangle.

9) What would be the sum of the final row of the Pascal's Triangle on the next page?

10) Shade all of the even numbers in with a highlighter pen. Check out the pattern!

Save this sheet. We will be using it for other things this quarter!