**Name:** _____

## Classwork 1

1. Fill in the blanks with numbers to complete the pattern.

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 ___ 10 10 ___ 1
1 6 15 20 __ __ 1
1 __ __ __ __ __ __ 1

What pattern or patterns did you notice that allowed you to fill in the blanks?

2. Distribute. $(a + b)(c + d + f + g)$

3. Expand (multiply out/ FOIL) the following expressions.

a) $(x + 1)^2 =$

b) $(x + 1)^3 =$

c) $(x + 1)^4 =$

d) $(x + 1)^4 =$

e) $(x + 1)^5 =$

b) $(a + b)^3 =$

What do you notice?

4. Evaluate the following combinations.

a) 5 nCr 0 =

b) ${}_5C_1$ =

c) $\binom{5}{2}$ =

d) 5 nCr 3 =

e) 5 nCr 4 =

f) 5 nCr 5 =

What do you notice?

5. Why is Pascal's triangle connected to expressions like $(x + 1)^5$ ? (this is called *binomial expansion*)

In order to figure this out let's follow the following rules:
1) We will find each new expansion from the previous one.
2) We'll write the "times x" part on one line and the "times 1" part on the line below it.
3) When we write the second line, we'll line up like terms vertically.

6. Why are combinations related to binomial expansion?

In order to figure this out, let's try expanding

$(a + b)(c + d)(f + g)(x + y)$

Practice Problems

1. Write the 10th row of Pascal's triangle. (The single 1 is the first row, "1 1" is the second...)

2. Expand the following expressions:

   a) $(x + 1)^6$ b) $(x + 1)^7$ c) $(x + 1)^8$

Justify each answer (show work or provide an explanation of some kind).