Your Name:_____ **Room:**_____

Grade:_____ **Teacher:**_____

Montlake Math Challenge

Montlake Elementary School

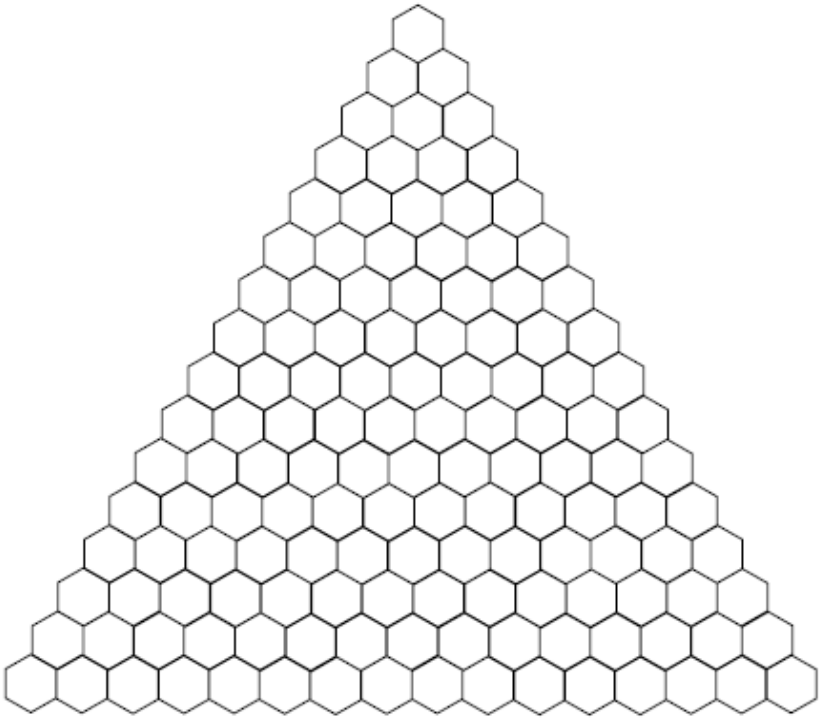
January 17, 2008

Instructions: We will be talking about Pascal's triangle for the next few weeks. This week's worksheet will help you become familiar with Pascal's triangle. Work in groups to complete the following problems.

HOMEWORK: If you don't finish the worksheet, complete it for our meeting next week. Be sure to bring this worksheet to our next meeting.

If you are interested in participating in the Math is Cool contest, make sure you talk to your parents and return the Math is Cool information letter by February 7.

Exercise 1: Fill in the first **ten** rows of pascal's triangle in the diagram shown below. You can use the blank space at the bottom of the page for calculations.



Exercise 2: Look back at the rows of Pascal's triangle that you filled in on the last page. Find the sum of the numbers in each row. Fill these numbers into the following table.

Row Number	**Sum**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

What do you notice about these numbers?

Exercise 3: Pretend you have an "alphabet" with only two "letters": ○ and □. In this alphabet, a "word" is just a list of letters.

For example, two words in this alphabet are □□○□○□□□○ and ○○□○□□○.

Now let's make a list of all the two letter words in our new alphabet. They are:

○○, ○□, □○, □□

Exercise 3a: Make a list of all the three letter words in this alphabet.

Exercise 3b: Make a list of all the four letter words in this alphabet.

Exercise 3c: How many three letter words are there?

Exercise 3d: How many four letter words start with ○?

Exercise 3e: How many four letter words start with □?

Exercise 3f: What do your answers to exercise 3c, 3d, and 3e have in common?

Exercise 3g: How many four letter words are made up of zero ○'s and four □'s?

Exercise 3h: How many four letter words are made up of one ○ and three □'s?

Exercise 3i: How many four letter words are made up of two ○'s and two □'s?

Exercise 3j: How many four letter words are made up of three ○'s and one □?

Exercise 3k: How many four letter words are made up of four ○'s and zero □'s?

Exercise 3l: How many four letter words are there in this alphabet?

Exercise 3m: What do you notice about your answers to exercise 3g – 3l?

Now we are going to look at the five letter words in this alphabet.

Exercise 4: How many five letter words do you think there are?

Exercise 5a: How many five letter words are there that start with the letter ○? (Hint: If a five letter word starts with ○, how many more letters are there in the word? How many ways are there to fill in these remaining letters?)

Exercise 5b: How many five letter words are there that start with the letter □? (The same hint from 5a applies here.)

Exercise 5c: Using exercise 5a and 5b, how many five letter words are there in the alphabet?

Exercise 6: Using the information you found in exercises 3g – 3m, can you guess how many five letter words there are in this alphabet that have three ○'s and two □'s?

Exercise 7: Now we want to see if your guess in exercise 6 was right.

Exercise 7a: How many five letter words with three ○'s and two□'s start with the letter ○? (Hint: If such a word starts with the letter ○, how many more letters are there in the word? How many of them have to be ○'s? How many of them have to be □'s?)

Exercise 7b: How many five letter words with three ○'s and two □'s start with the letter □? (Hint: If such a word starts with the letter □, how many more letters are there in the word? How many of them have to be ○'s? How many of them have to be □'s?)

Exercise 7c: Using your answers to exercise 7a and 7b, how many five letter words are there with three \c's and two \s's?

Exercise 8a: How many 8 letter words are there with six \c's and two \s's?

Exercise 8b: How many 8 letter words are there with two \c's and six \s's?

Exercise 8c: What do you notice about these two numbers? Why do you think that is the case?