Your Name:_____

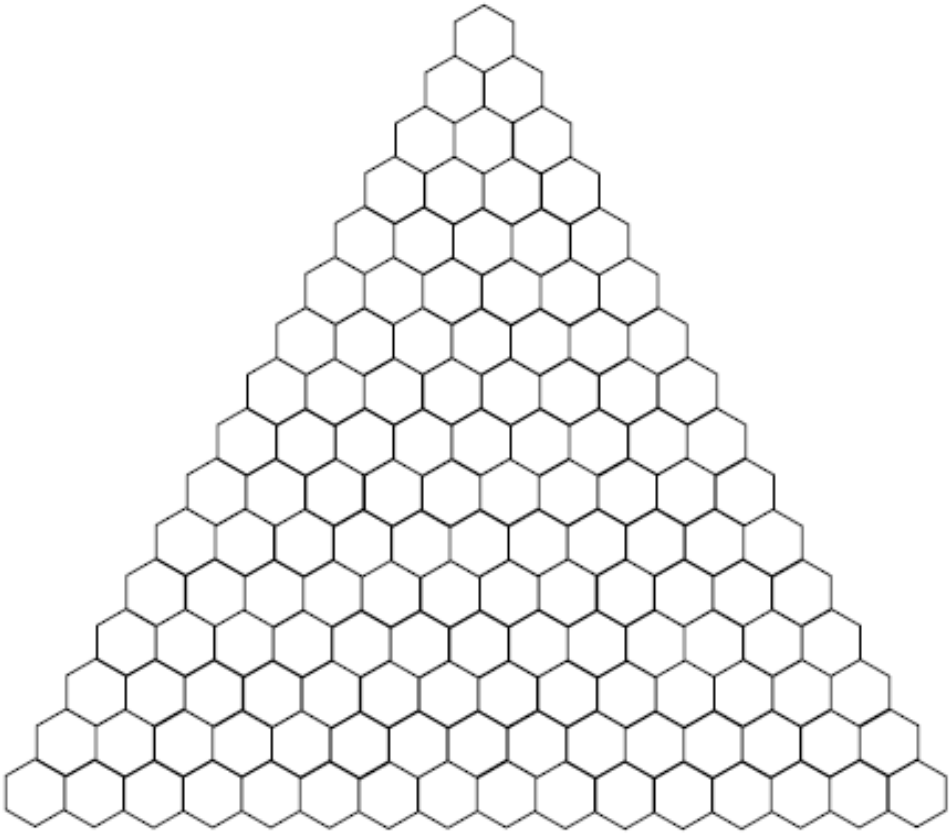
Montlake Math Challenge

Montlake Elementary School

March 5, 2009

Instructions: This week's worksheet continues our exploration of Pascal's triangle. Work in groups to complete the following problems.

Exercise 1: Fill in the first **nine** rows of pascal's triangle in the diagram shown below. You can use the blank space at the bottom of the page for calculations. If you were here last week and still have your worksheet, you don't need to fill in the numbers again.



Exercise 2: It's Friday night and the Pizza Palace is more crowded than usual. At the counter the Pascalini's are trying to order a large pizza, but can't agree on what topping(s) to select. Antonio, behind the counter, says, "I only have 8 different toppings. It can't be that hard to make up your mind. How many different pizzas could that be?"

"Well, we could get a plain pizza with no toppings," says Mr. Pascalini.

"Or we could get a pizza with all 8 toppings," says Mrs. Pascalini.

"What about a pizza with extra cheese and green peppers?" asks Pepe.

"You're not helping!" Antonio yells at Pepe. "Get back to work."

As Pepe starts to clear off the nearest table, he mumbles to himself, "or a pizza with anchovies, extra cheese, mushrooms, and olives."

Antonio hands an order pad to Mr. Pascalini and says, "When you decide, write it down and I'll make it." Then he helps the next people in line, who know what they want: a large pizza with mushrooms, green peppers and tomatoes.

How many different pizzas can be ordered at the Pizza Palace if a pizza can be selected with any combination of the following toppings: Anchovies, Extra Cheese, Green Peppers, Mushrooms, Olives, Pepperoni, Sausage, and Tomatoes?

To solve this problem, answer the following questions:

(a) How many different pizzas can you order with only one topping?

(b) How many different pizzas can you order each with seven toppings?

(c) Are the number of one-topping pizzas and the number of seven-topping pizzas related? (Why or why not?)

(d) How many different pizzas can you order with two toppings?

(e) How many different pizzas can you order with six toppings?

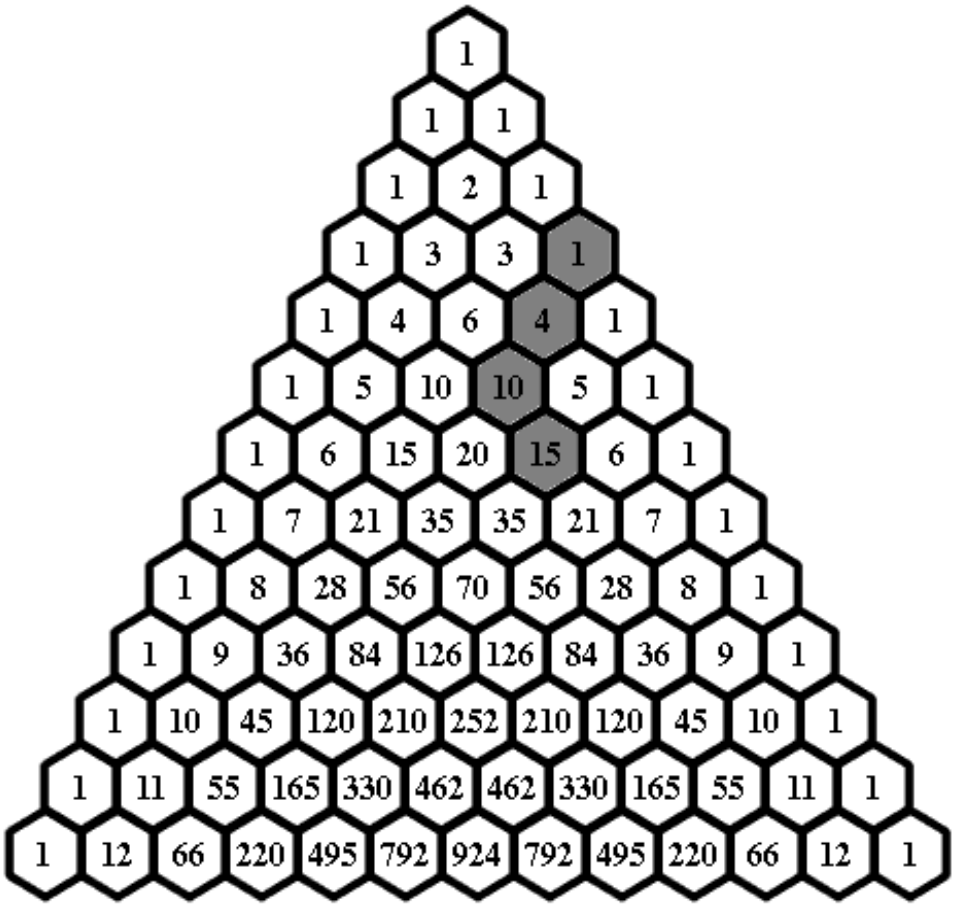
(f) Are the number of two-topping pizzas and the number of six-topping pizzas related? (Why or why not?)

(g) Can you find these numbers in Pascal's triangle?

(h) Can you use Pascal's triangle to help you find the number of pizzas that can be ordered with three, four, or five toppings?

(i) In all, how many different pizzas can be ordered?

Exercise 3: Take a look at the shaded numbers shown below.



(a) What is 1+4+10?

(b) This pattern is called the "hockey stick" pattern. Pick a starting point on the right side of the triangle. Shade it.

(c) Pick a number *K* between 3 and 8.

K = _____

(d) Starting from the cell you picked in part (2), shade *K* cells down a diagonal of Pascal's triangle.

(e) Add up the *K* numbers you shaded.

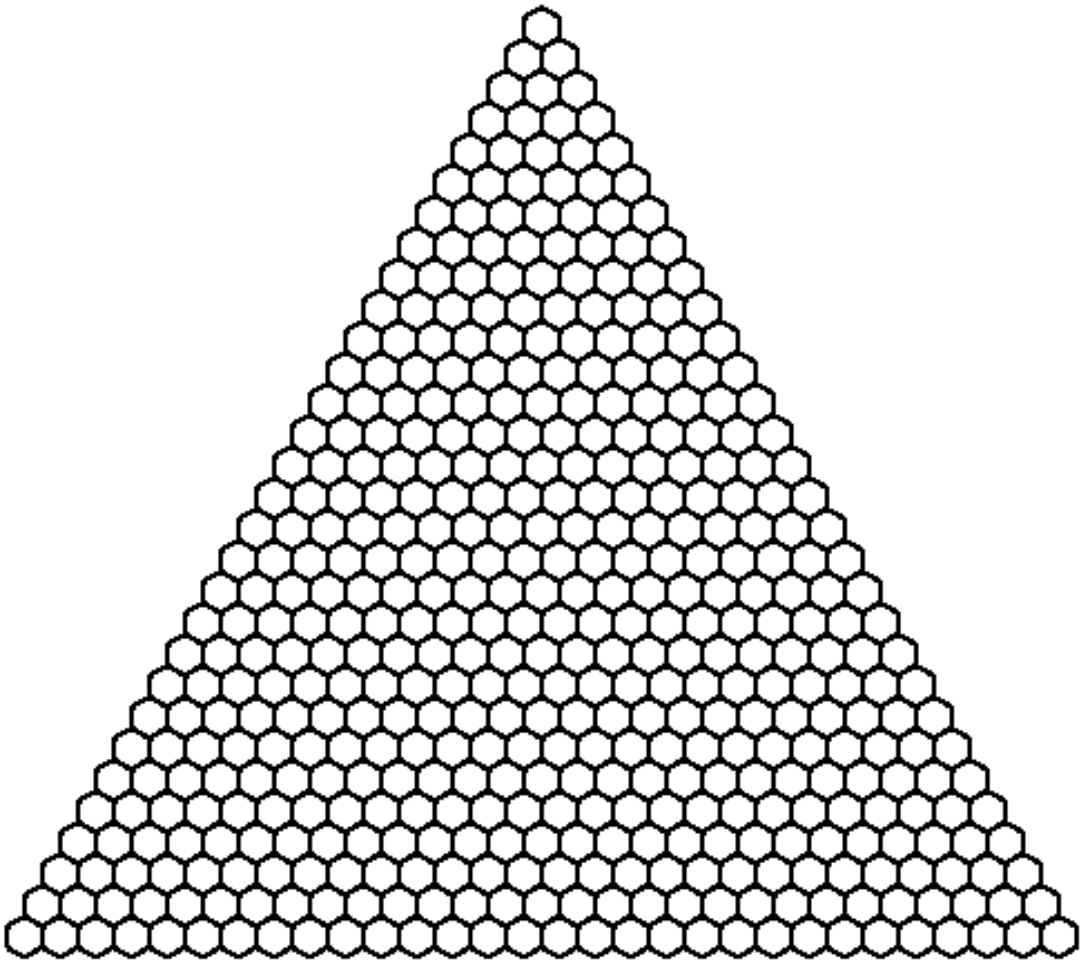
(f) How does this compare to the number below and to the right of the last cell you shaded?

(g) Do you think the hockey stick pattern always holds? Why or why not?

Exercise 3: Look at the following table.

	EVEN	ODD
EVEN		
ODD		

1. Fill in the table. In each square, write what type of number (even or odd) you will get if you add the type of number at the top of its column to the type of number at the left of its row.
2. Fill in Pascal's triangle but this time only use 0's and 1's. Put a 0 in a hexagon if the corresponding entry in Pascal's triangle is even. Put a 1 in a hexagon if the corresponding entry in Pascal's triangle is odd.



3. Now shade all the hexagons that contain a 0.