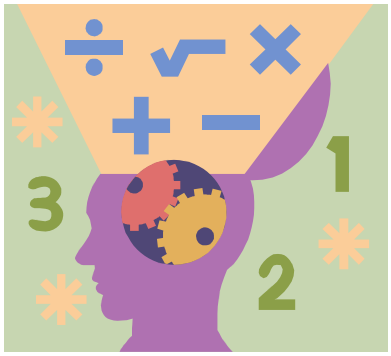
Algebra/Geometry Institute Summer 2008
Lesson: Pascal's Patterned Triangle



Faculty: Harold Billings

School: Shelby Middle School
Shelby, MS

Grade Level: 5th Grade

1. Teaching Objectives
Student will construct Pascal's Triangle and explore patterns within Pascal's Triangle.

2. Instructional Activities

A. The students will receive a brief history of Pascal's Triangle

Blaise Pascal was born in Clermont on June 19, 1623, and died at Paris on Aug. 19, 1662. Before Pascal turned 13 he had proven the 32nd proposition of Euclid and discovered an error in Rene Descartes' *Geometry*. At 16, Pascal began preparing to write a study of the entire field of mathematics. He began designing a calculating machine which he finally perfected when he was thirty. In 1650, when in the midst of these researches, Pascal suddenly abandoned his favorite pursuit to study religion.

B. As a class, we will construct the first few rows of Pascal's Triangle and identify the process of finishing the patterns.

C. The students in each group, will finish a worksheet identifying the total value of each row of the first 16 rows of Pascal's Triangle.

D. In mixed ability groups of four, the students will be asked to find different patterns inside Pascal's Triangle to be presented in class. (The students will shade in their patterns on transparencies and show them on the overhead projector)

Group 1: (Multiples of 2)
Group 2: (Multiples of 3)
Group 3: (Multiples of 4)
Group 4: (Multiples of 5)

3. Materials and Resources

A. Materials

1. Overhead projector
2. Transparencies of the triangle
3. Worksheet (attachment #1)
4. Pencils and markers

B. Resources

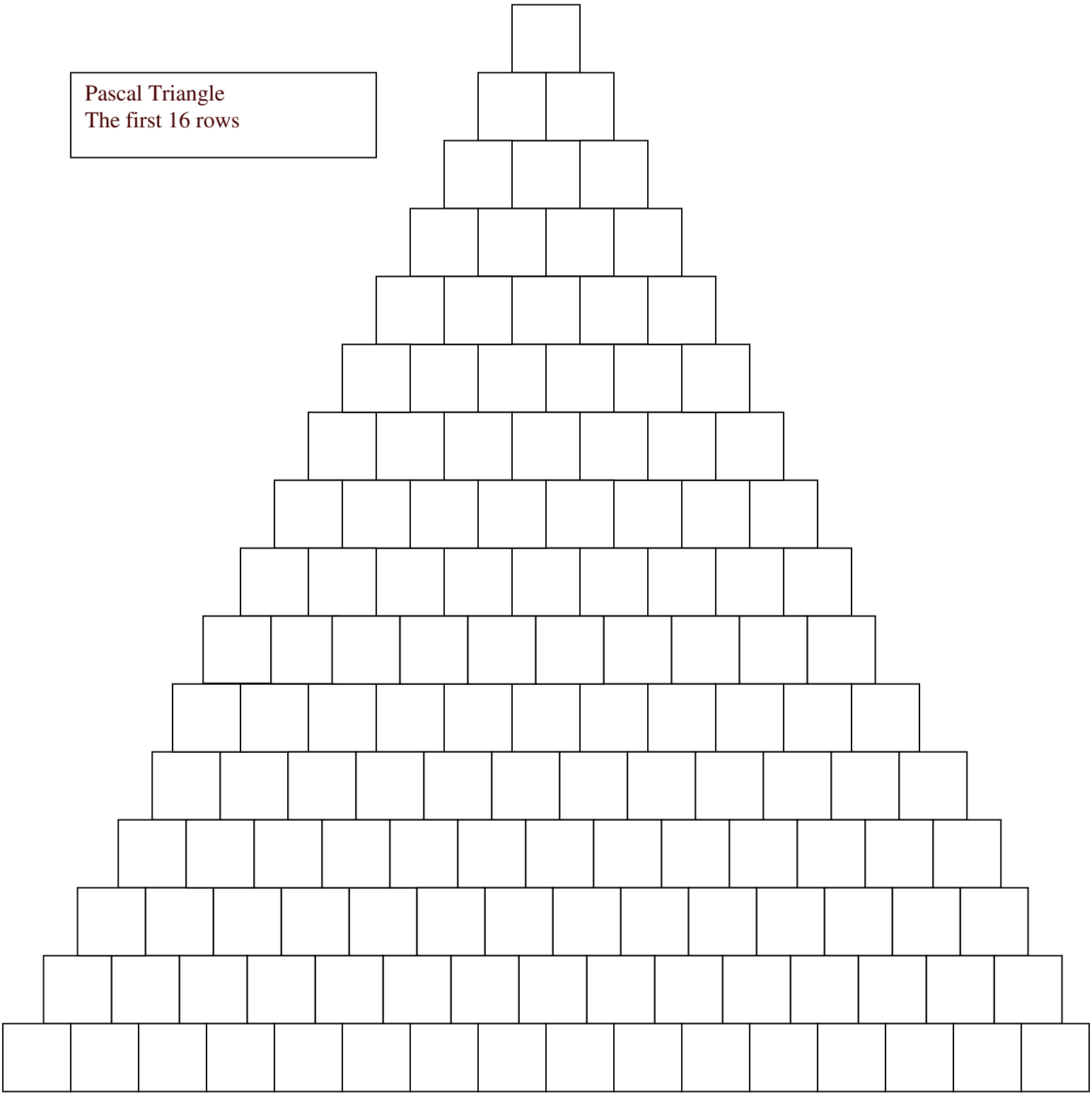
1. Title: *"Pascal's Triangle*" www.mathforum.com 6/24/08.
2. *Visual Patterns In Pascal's Triangle*
   Palo Alto, CA: Dale Seymour Publications 1986.
3. "Blaise Pascal."
   www.history.mcs.st-and.ac.uk/biographies/Pascal.htm . 6/24/08.

4. Assessment

A. Worksheet completion
B. Presentation of patterns

*Note: check the patterns for the correct multiples.
100 points for worksheet completion and correct patterns
85 points for most of the correct patterns
70 points for some correct patterns
Below passing

Pascal Triangle
The first 16 rows



Key to Pascal's Triangle

1

1, 1

1, 2, 1

1, 3, 3, 1

1, 4, 6, 4. 1

1, 5, 10, 10, 5, 1

1, 6, 15, 20, 15, 6, 1

1, 7, 21, 35, 35, 21, 7, 1

1, 8, 28, 56, 70, 56, 28, 8, 1

1, 9, 36, 84, 126, 126, 84, 36, 9, 1

1, 10, 45, 120, 210, 252, 210, 120, 45, 10, 1

1, 11, 55, 165, 330, 462, 462, 330, 165, 55, 11, 1

1, 12, 66, 220, 495, 792, 924, 792, 495, 220, 66, 12, 1

1, 13, 78, 286, 715, 1287, 1716, 1716, 1287, 715, 286, 78, 13, 1

1, 14, 91, 364, 1001, 2002, 3003, 3432, 3003, 2002, 1001, 364, 91, 14, 1

1, 15, 105, 455, 1365, 3003, 5005, 6432, 6432, 5005, 3003, 1365, 455, 105, 15, 1