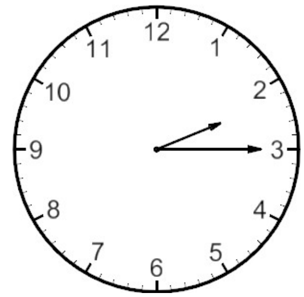
Modular Arithmetic and Pascal's Triangle

Coloring Pascal's Triangle was pretty and created interesting patterns.

1. Why do you suppose the coloring patterns formed upside down triangles? Please explain.

We thought that the filling in of the sums was tedious and that the numbers quickly became too large to write into those small hexagons.

Another way of filling in Pascal's Triangle with the intent of coloring certain multiples would be to use modular arithmetic. You are already familiar with modular arithmetic although you may not have known that this is the name of the process. A 12-hour clock uses what is called Mod 12 arithmetic. When you speak about the time on the clock you never use numbers larger than 12. After 12:00, the next hour is 1:00.



2. What time is 21 hours after 10:00 in the morning?

3. What time is 98 hours after 10:00 in the morning?

4. How are you figuring this out? Please explain.

Now lets consider a different modular counting. For coloring Pascal's Triangle it might be nice to have an easier way to find the multiples of 7. If I numbered the triangle by only adding in Mod 7, I should be able to easily see what numbers are divisible by 7.

Here's a modular 7 addition table.

5. Please complete finding these sums in Mod 7.

+	1	2	3	4	5	6
1	2	3	4	5	6	0
2	3	4	5	6	0	1
3	4	5	6	0	1	2
4						
5						
6						

6. Which sum in the table would you shade to show numbers that are evenly divisible by 7?

7. How would you describe this method of adding?

8. Now try Pascal's Triangle coloring again. Your teacher will tell you which multiples to shade. Enjoy!