Pascal’s Triangle and Modular Math

This activity will allow students to utilize addition in modular systems. Students will see that it is much more practical to use modular math, and they will be able to extend the rows and expand their patterns by using modular arithmetic.

Grade Level: 5 - 8

Materials: Pascal’s Triangle Mod 2 Activity Sheet
Pascal’s Triangle Mod 2 Activity Sheet Transparency
Pascal’s Triangle Mod 2 Activity Sheet Key Transparency
Pascal’s Triangle Mod 2 Activity Sheet Shaded Key Transparency
Pascal’s Triangle Mod 3 Activity Sheet
Pascal’s Triangle Mod 3 Activity Sheet Transparency
Pascal’s Triangle Mod 3 Activity Sheet Key Transparency
Pascal’s Triangle Mod 3 Activity Sheet Shaded Key Transparency
Pascal’s Triangle Mod 5 Activity Sheet
Pascal’s Triangle Mod 5 Activity Sheet Transparency
Pascal’s Triangle Mod 5 Activity Sheet Key Transparency
Pascal’s Triangle Mod 5 Activity Sheet Shaded Key Transparency

Have students complete the Pascal’s Triangle: Mod 2 Activity Sheet. Again, begin by seeding the triangle with a one. Using the results of the mod 2 table from the previous activity, fill in the remaining cells. Once the triangle is complete, shade in the ones. Discuss the results of the shading, including why shading the ones resulted in the same pattern as shading the odds in the first activity. Discuss what would happen if the zeros were shaded.

Have the students complete the Pascal’s Triangle Mod 3 Activity Sheet in a similar fashion. Shade the zeros. Compare these results to the divisibility activity sheets. Discuss why the results are the same and what would cause them to be different.

If time permits, have students complete the Pascal’s Triangle Mod 5 Activity Sheet and shade the zeros. Have students examine the resulting pattern and compare it to the divisibility worksheet, if divisibility by five was done.

Sunshine State Standards
MA.A.1.3.4 MA.A.2.2.2
MA.A.2.3.2 MA.A.5.2.1
Pascal's Triangle Mod 2
Pascal’s Triangle Mod 3
Pascal’s Triangle Mod 5
Answer Keys for
Pascal–Sierpinski Connection Unit 1
Developing Pascal’s Triangle Key
Developing Pascal's Triangle
Shaded Odds Key
Pascal’s Triangle
Odds and Evens Shaded Key
Pascal’s Triangle: Divisibility by 3 Key
Modular Math Answer Key

Mod 3
Clock Arithmetic

Mod 3 Addition Table

<table>
<thead>
<tr>
<th>+</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Mod 5
Clock Arithmetic

Mod 5 Addition Table

<table>
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<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
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<td>4</td>
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<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Mod 2
Clock Arithmetic

Mod 2 Addition Table

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<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Pascal’s Triangle Mod 2 Key
Pascal’s Triangle Mod 2 Shaded Key
Pascal’s Triangle Mod 3 Key
Pascal’s Triangle Mod 3 Shaded Key
Pascal's Triangle Mod 5 Key
Pascal's Triangle Mod 5 Shaded Key