Lesson 8.5 Math Lab: Assess Your Understanding, page 737

1. These are the numbers in row 10 of Pascal's triangle. Use these numbers to generate the numbers in row 11.

<table>
<thead>
<tr>
<th>1</th>
<th>9</th>
<th>36</th>
<th>84</th>
<th>126</th>
<th>126</th>
<th>84</th>
<th>36</th>
<th>9</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 + 9 = 10</td>
<td>9 + 36 = 45</td>
<td>36 + 84 = 120</td>
<td>84 + 126 = 210</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>126 + 126 = 252</td>
<td>126 + 84 = 210</td>
<td>84 + 36 = 120</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 + 9 = 45</td>
<td>9 + 1 = 10</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

So, the numbers in row 11 are: 1, 10, 45, 120, 210, 252, 210, 120, 45, 10, 1

2. Use the completed Pascal's triangle on page 735 to evaluate each expression. Use a calculator to verify your answers.

a) \( \binom{n}{1} \)
   2nd number in row 5 is 4.
   \( \binom{5}{1} = 4 \)

b) \( \binom{n}{2} \)
   3rd number in row 8 is 21.
   \( \binom{8}{3} = 21 \)

c) \( \binom{n}{3} \)
   4th number in row 7 is 20.
   \( \binom{7}{4} = 20 \)

d) \( \binom{n}{0} \)
   1st number in row 6 is 1.
   \( \binom{6}{0} = 1 \)

3. Use combinations to determine the numbers in row 13 of Pascal's triangle.

Use \( \binom{n}{r} \) and a calculator.

\( \binom{13}{0} = 1, \binom{13}{1} = 12, \binom{13}{2} = 66, \binom{13}{3} = 220, \binom{13}{4} = 495, \binom{13}{5} = 792, \binom{13}{6} = 924, \binom{13}{7} = 792, \binom{13}{8} = 495, \binom{13}{9} = 220, \binom{13}{10} = 66, \binom{13}{11} = 12, \binom{13}{12} = 1 \)

So, the numbers in row 13 are:
1, 12, 66, 220, 495, 792, 924, 792, 495, 220, 66, 12, 1

4. Determine the value of each number in Pascal's triangle.
   a) the second number in row 20
      \( n = 19 \) and \( r = 1 \)
      \( \binom{19}{1} = 19 \)

   b) the fourth number in row 24
      \( n = 23 \) and \( r = 3 \)
      \( \binom{23}{3} = 1771 \)