### Rectangle Ruckus!!!

<table>
<thead>
<tr>
<th>Figure Number</th>
<th>A</th>
<th>A</th>
<th>B</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td>6</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Number of Rectangles:**
  - A
  - A, B
  - AB
  - A, B, C
  - AB, BC
  - ABC
  - A, B, C, D
  - AB, BC, CD
  - ABC, BCD
  - ABCD

The pattern continues.

How many rectangles are in:

1. Figure 5? 
2. Figure 6? 
3. Figure 9? 
4. Figure \(n\)? \(R = \) 

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Win the 2011-2012 STEMatician Award

When you send in solutions, we score and keep track of your score.


3 ways to submit:

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- **Fax:** 480-727-0910
- **Mail:** Dixit Patel, Editor at PRIME MATHgazine
  - PO Box 875703
  - Tempe, AZ 85287-5703
Pattern Puzzlers!

For each pattern, identify the next three terms, the 100th term and the nth term.

<table>
<thead>
<tr>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
<th>8th</th>
<th>100th</th>
<th>nth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1/3</td>
<td>8/3</td>
<td>27/3</td>
<td>64/3</td>
<td>125/3</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>2.</td>
<td>6</td>
<td>9</td>
<td>14</td>
<td>21</td>
<td>30</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>3.</td>
<td>4</td>
<td>11</td>
<td>30</td>
<td>67</td>
<td>128</td>
<td>___</td>
<td>___</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>
Factors Please!

What kinds of numbers have:
1. Exactly two factors?
2. Exactly three factors?
3. Exactly five factors?

What is the sum of the factors of a counting number if it:
4. Is a prime number?
5. Has exactly three factors?

Toothpick Challenge!

1. Remove 4 toothpicks so that 6 triangles remain. Draw the picture.

2. Remove 3 toothpicks so that 3 congruent quadrilaterals remain. Draw the picture.

Balzano is a puzzle that will tap into your logical reasoning abilities. Read the directions carefully, then try your hand at Balzano Shapes.

Directions:

Your job is to figure out the Desired Arrangement of three or more shapes from clues that provide information about the shapes and their locations. Each clue consists of two parts.

The Arrangement Column shows sets of shapes in rows. In the Balzano below, the second row is arranged in order from left to right, square, square, circle, triangle.

Correct Shape in the Correct Position identifies the number of shapes that are in the Desired Arrangement AND in the right positions. The second row has zero shapes that are in the Desired Arrangement and in the right positions.

Correct Shape in the Wrong Position identifies the number of shapes in the Desired Arrangement that are the right shapes BUT not in the right positions. There are three of these in the second row.

Incorrect Shape identifies the number of shapes that are not in the Desired Arrangement. There is one of these in the second row. This means that one of the three shapes does not belong in the Desired Arrangement.

<table>
<thead>
<tr>
<th>Arrangement</th>
<th>Correct shape in correct position</th>
<th>Correct shape in wrong position</th>
<th>Incorrect shape</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ □ □</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>△ □</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>○ △ □</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>△ △ △</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>△ △ △</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>