Solution to GOSSIP problem

If there are 2 it takes 1 call  
If there are 3 it takes 3 calls  
If there are 4 it takes 4 calls  
for \( n \geq 4 \), \( 2n-4 \) calls  
so for 5 gossips it takes 6 calls

Basically if you put the \( n \) people at the vertices of an \( n \)-gon, then let the news travel around, the last two (\( n-1 \)) and \( n \) have all the news and must now distribute it to the other (\( n-2 \)) people. So the solution is (\( n-1 \)) calls to get around the \( n \)-gon, then (\( n-2 \)) to inform the rest of the last piece of gossip. So the total is \( 2n-3 \).

Solution to the change places problem.

It can be done in 15 moves. It helps to look at a smaller problem.

Spaces to cover | jumps (2 sp) | slides (1 sp) | moves (j+s) |
----------------|-------------|--------------|-------------|
Take 1 on each side: \((2x2)=4\) | 1 | 2 | 3 |
Take 2 on each side: \((4x3)=12\) | 4 | 4 | 8 |
Take 3 on each side: \((6x4)=24\) | 9 | 6 | 15 |

For \( n \) on each side: \((2n \times n+1)=2n^2+2n\)  
\( n^2 \)  
\( 2n \)  
\( n^2+2n \)

For more information Google: Traffic Rush problems.

Solution to points on a circle

<table>
<thead>
<tr>
<th>Points</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lines</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>15</td>
<td>21</td>
<td>( \frac{n(n-1)}{2} )</td>
</tr>
<tr>
<td>regions</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>31</td>
<td>57</td>
<td></td>
</tr>
</tbody>
</table>

The number of lines looks like a diagonal in Pascal’s Triangle, \( \binom{n}{2} \)  
The number of regions seems to have a pattern which falls apart at \( n=6 \).

It is actually a quartic: \( \left( \frac{n}{2} \right) \left( \frac{n}{3} \right) \left( \frac{n^2-5n+18}{4} \right) \)

Solution to tower of blocks

Number of blocks: middle stack = \( n \)  
Four side stacks: \( 4 \times \) sum of \((n-1)\) consecutive integers. \( 4 \times (n(n-1))/2 \)  
Total blocks \( 2n^2-n \)

\[ n = 5 + 4 * 2 \times \left( \frac{n(n-1)}{2} \right) + 4 * 2 \times (n-1) = 4n^2 + 4n - 3 \]

\[ = 5 \text{ sides of top block} + 8 \text{ lateral faces of sum of } (n-1) + 4 \text{ top and front of } (n-1) \text{ steps.} \]