1. Imagine a cube made of $3 \times 3 \times 3$ smaller cubes glued together. If you dip the large $3 \times 3 \times 3$ cube in paint and then pull the large cube apart into 27 small cubes; how many of the small cubes will have:

   a. Paint on exactly 0 faces?

   b. Paint on exactly 1 face?

   c. Paint on exactly 2 faces?

   d. Paint on exactly 3 faces?

   e. Paint on 4 or more faces?

2. Imagine a cube made of $4 \times 4 \times 4$ smaller cubes glued together. If you dip the large $4 \times 4 \times 4$ cube in paint and then pull the large cube apart into 64 small cubes; how many of the small cubes will have:

   a. Paint on exactly 0 faces?

   b. Paint on exactly 1 face?

   c. Paint on exactly 2 faces?

   d. Paint on exactly 3 faces?

   e. Paint on 4 or more faces?

3. Repeat to extend this idea to any big cube made in this way. Organize your data in this table. Hint Look for general patterns in finding the cubes with 0, 1, 2, and 3 faces painted. Don't just look at the total numbers in the first three rows of the following table.

Dimensions	0 faces painted	1 face painted	2 faces painted	3 faces painted	≥ 4 faces painted
3 × 3 × 3					
4 × 4 × 4					
5 × 5 × 5					
6 × 6 × 6					
n × n × n					