**The Painted Cube Challenge**

Suppose a cube has a length of 3 centimeters for each edge. The cube is then painted **red** on all exposed sides (or “faces”). Finally, it is cut into 27 smaller cubes, each with length of 1 centimeter for each edge.

How many of these smaller cubes will have **red** paint on

 0 sides? \_\_\_\_\_

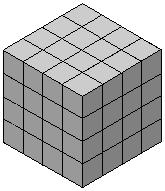
1 side? \_\_\_\_\_

2 sides? \_\_\_\_\_

3 sides? \_\_\_\_\_

Check the total. It should be 33 or27 cubes.

In a similar way, consider the following 4- and 5-centimeter cubes below, painting all exposed sides **red**, as well. Complete the table below. Notice that the table includes the 3 cm case above, and extends the problem to a 6-cm cube and to a 2-cm cube. Look for the pattern!



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Size of large cube** | **Number of small cubes with red paint on** | | | |
| **0 sides** | **1 side** | **2 sides** | **3 sides** |
| 2 cm |  |  |  |  |
| 3 cm |  |  |  |  |
| 4 cm |  |  |  |  |
| 5 cm |  |  |  |  |
| 6 cm |  |  |  |  |

**Do your best! Rise to the challenge! Live and learn!**

**Painted Cube Challenge-Solutions Key**

Suppose a cube has a length of 3 centimeters for each edge. The cube is then painted **red** on all exposed sides (or “faces”). Finally, it is cut into 27 smaller cubes, each with length of 1 centimeter for each edge.

How many of these smaller cubes will have **red** paint on

 0 sides? **1**

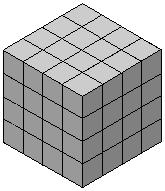
1 side? **6**

2 sides? **12**

3 sides? **8**

Check the total. It should be 33 or27.

In a similar way, consider the following 4- and 5-centimeter cubes below, painting all exposed sides **red**, as well. Complete the table below. Notice that the table includes the 3 cm case above, and extends the problem to a 6-cm cube and to a 2-cm cube. Look for the pattern!



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Size of large cube** | **Number of small cubes with red paint on** | | | |
| **0 sides** | **1 side** | **2 sides** | **3 sides** |
| 2 cm | **03=0** | **0×6 = 0** | **0×12 = 0** | **8** |
| 3 cm | **13=1** | **1×6 = 0** | **1×12 = 12** | **8** |
| 4 cm | **23=8** | **4×6 = 0** | **2×12 = 24** | **8** |
| 5 cm | **33=27** | **9×6 = 0** | **3×12 = 36** | **8** |
| 6 cm | **43=64** | **16×6 = 0** | **4×12 = 48** | **8** |

**Do your best! Rise to the challenge! Live and learn!**