Case 1   Case 2   Case 3   Case 4
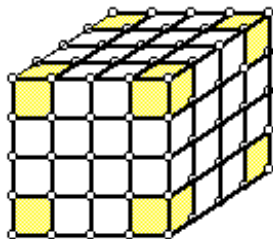
Imagine that we paint a 4x4x4 cube blue on every side.

The 1st thing we want to figure out here is how many small cubes makes up our 4×4×4 cube.

The answer to that is to multiply

$4 \times 4 \times 4 =$ 64 Total Smaller Cubes

How many of the small cubes have 3 blue faces?

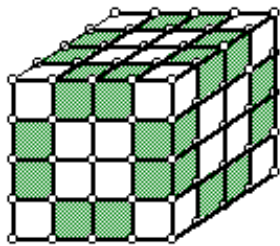Visually, you can see that the only small cubes that will be painted on 3 faces are the cubes at each corner.

The answer is 8.

Visually, you can see that the only small cubes that will be painted on 2 faces are the cubes that have a face on only 2 sides of the larger cube.
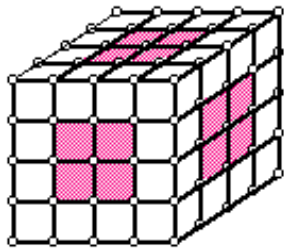

* Be careful to count the cubes and not each face.

There are 8 cubes in each of the first and last row and then 4 cubes in each of the two middle rows.

$8 + 8 + 4 + 4 =$ | 24 is the answer |

Visually, you can see that the only small cubes that will be painted on 1 face are the cubes that have a

face on only 1 side of the larger cube. *This problem is okay to count each face since each face represents one cube.

There are 4 smaller cubes on each side of the larger cube and the larger cube has 6 sides.

$$4 \times 6 = \boxed{24 \text{ is the answer.}}$$

How many have not been painted at all?

Let's use all information we've gathered to answer this question.

$$64 - 8 - 24 - 24 = \boxed{8 \text{ is the answer}}$$

64 ↑ Total Small Cubes	8 ↑ Small Cubes 3 Sides	24 ↑ Small Cubes 2 Sides	24 ↑ Small Cubes 1 Side

That leaves 8 with no paint at all.

How many faces would be painted in a cube of any size? Think visually!

For this problem, the main thing to know is that every larger cube (no matter how many smaller cubes that make it up) will have 6 sides. The other thing to pay attention to is this problem wants the _faces painted_ of the smaller cubes, no how many smaller cubes have paint on them.

For each larger cube, count the number of faces on one side and then multiply by 6 (since there are 6 sides).

$(1 \times 1) \times 1$ $(2 \times 2) \times 2$ $(3 \times 3) \times 3$ $(4 \times 4) \times 4$

$(1)(6) = 6$ $4(6) = 24$ $9(6) = 54$ $16(9) = 144$

For any cube, multiply two of the dimensional numbers by 6.