

Brush Loads

We have 5 cubes and we're going to put them together, following a few simple rules:

- the cubes must be together face-to-face;
- they must not be toppling over.

We're going to paint the faces that can be seen. One Brush Load (a kind of unit that we'll use) will paint one square face.

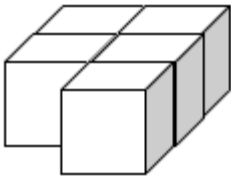
Challenge

Can you find ways of arranging 5 cubes so that:

- you need as few BLs as possible?
- you need as many BLs as possible?

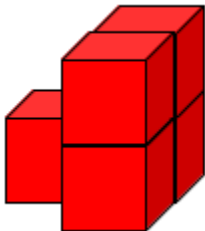
Need more information about counting BLs before you start the challenge?

Here are 5 cubes:



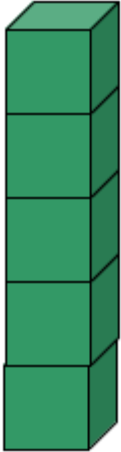
Counting the faces to be painted comes to 15, so 15 Brush Loads are needed. (Remember we're only counting visible faces, so not those that are touching the surface where the cubes are placed.)

But of course we could have placed the 5 cubes differently, for example:



Counting the faces to be painted now, we have 17, so 17 Brush Loads.

And, how about:



Now we'll need 21 Brush Loads (BLs).

Going further

Can you find arrangements that need all the numbers between the largest and the smallest numbers of BLs?

Take more cubes.....

What happens if you use more cubes, for example 6, 7, 8 ...?

Can you find out the smallest number of BLs and the largest number of BLs possible in each case?

Can you predict the arrangements which need as few BLs as possible and as many BLs as possible?