# Six Numbered Cubes

**The aim of this challenge is to find the total of all the visible numbers on the cubes.**

We are using six cubes.
Each cube has six faces of the same number.
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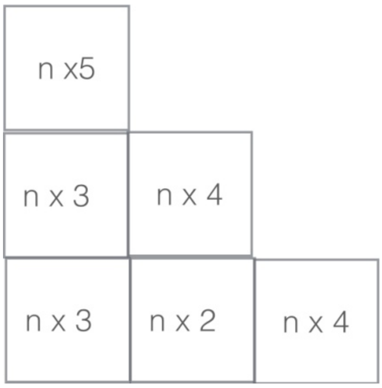
The "wall" has to be only one cube thick.
The one on the left is built correctly by being a wall only one cube thick.
The one on the right is NOT allowed as it is two bricks thick in parts.
The cubes sit neatly - square face against square face.
The total on the left one is 70.

**CHALLENGE 1**

Start by making a staircase shape. An example is shown below:




a/ What is the highest total you can make by using this staircase shape?
*The highest total you can make is 83 because you have to place the biggest number on the place where there are the most faces, and the next biggest on the next place with the second most faces.(Carry on doing this.) You can do this easily by looking at my diagram above.*

b/ What is the lowest total you can make by using this staircase shape?
*The smallest total is 64.You have to put the smallest number 1 on the x5 square 2&3 on x4s and so on. In other words put the smallest number on the cube with the most faces showing and the biggest number on the cube with least faces.*

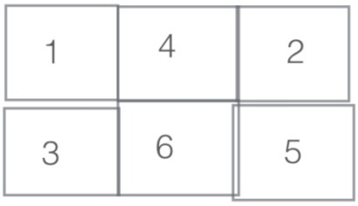
c/ Explain in writing how you calculated the totals for a & b above, making sure you give reasons for your method/s.
*To make it much easier I drew this simple diagram above next to the picture of the staircase.*

d/ Now make a total of 75 using a staircase shape.
*To make 75 you put 6 on the x5, 3 on x4, 1 on x3, 2 on x4, 5 on x2, 4 on x3*

## CHALLENGE 2

Using **any shape** of single cube thickness, what is the **lowest total** you can make?
How can you be sure this is the lowest total whatever the shape?
Can the lowest total be found in more than one way? Justify your answer.

*60 is the smallest you can get, because the wall with the most faces hidden is this shape. This can be found in lots of other ways, because you can swap around the numbers on the cubes with the same number of faces showing, like the x3 or x4 cubes because there are more than one of these..*




## CHALLENGE 3

Using **any shape** of single cube thickness, what is the **highest total** you can make?
How can you be sure this is the highest total whatever the shape?
Can the highest total be found in more than one way? Justify your answer.
*The biggest you can make it is 90. To make the biggest number you need to make a vertical stick shape. At the top it is x5 and the rest towards the bottom it is all x4.To make it the biggest you have to put 6 at the top of the long pole-like stick. You can find this lots of ways by switching around the cubes.*

## CHALLENGE 4

Prove the following by logical reasoning, rather than by calculating the answers:

If the cubes are arranged in a single vertical tower
then whatever the order of cubes you cannot produce a total of 80

If the cubes are arranged in a single vertical tower (like this)

*It is not true because if you add up all the numbers from 1-6 it is 21 then you exclude the top face of the pole it is 21x4 is 84 already so it is more than 80.It is actually very easy if you think of it logically. How Simple!!!!!!!! Amazing!*