cleverblox

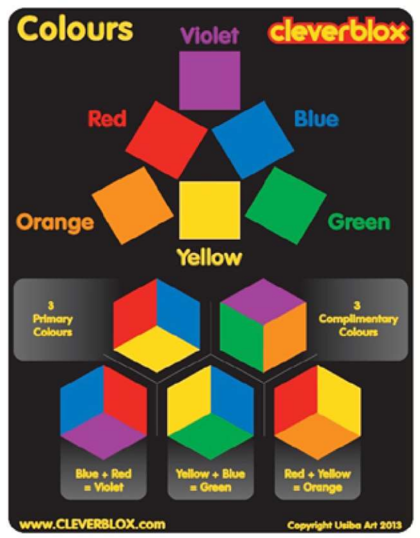
How many patterns could one make ?

In March **Grade 1 readiness skills**, in April **Creating thinkers** and in May it's **Maths**.

Having played with the cubes and made lots of patterns it's natural to wonder just how many patterns could be made. Professional mathematicians would have fun with this question. It is also the kind of question that develops critical thinking and an interest in maths. The tools needed are: Counting, adding, subtracting, multiplying and dividing. Cleverblox can help children to acquire this set of tools to keep in their brain-boxes - tools that will get sharper the more they're used.

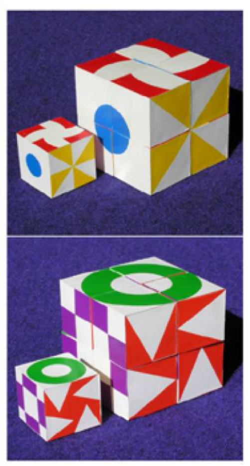
Before exploring that question about patterns, take a quick look at two other Cleverblox features.

RAINBOW COLOURS A novel feature of Cleverblox is the selection of colours and the arrangement of them on the cubes. Artists have long known that three colours, Red, Blue and Yellow, can be mixed to produce Orange, Green and Violet. 'Violet' because that's the name it has in the the visible spectrum of a rainbow between infra-red and ultra-violet.



The Colour Cube has no white; each face is a solid square of colour. The Colour Card illustrates the formal arrangement of the primary colours, red, blue and yellow, and the resultant complimentary colours violet, green and orange when combined.

The six colours appear on each cube in the same arrangement, and where the complimentary colours and their primaries are on opposite faces.



Sorting out muddled sets is made easy. Turn up the Red faces and arrange them with Violet sides facing you. Copy the big picture on the Red card. That pattern requires one set. Note the small orange numeral on each cube'c red face, numbered from 1 to 12.

3D CUBE PUZZLE Finding that identical cubes can be arranged to make a bigger cube is an important discovery for a child. The puzzle here is to find 8 other cubes that make a larger version that looks the same on all sides as the Puzzle Solution Cube.

It is not an easy puzzle to solve, and it's one that requires spatial visualisation and physical manipulation. It's another Reality-First step towards Virtual-Reality.

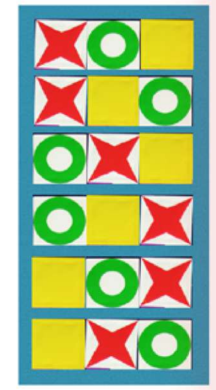
HOW MANY PATTERNS ? We've seen that even cubes of the same colour can be arranged to create different patterns. Children who can count to 8, can add 3 + 5 and multiply 4 x 2 can be introduced to permutation theory. Let's get started !

Find thee *yellow triangles* and call that a *set of 3 yellow triangles*. Now find five *orange triangles* and call that a *set of 5 orange triangles*. Putting the two sets together would make a *set of 8 triangles*.

The different patterns made with a set of objects are called permutations. The easiest way to visualise permutations is when they're arranged in a line.

In this picture 5-year-old Roshy has a set of three cubes in different colours. She arranged them in a line and has drawn that as her first permutation. Now she's rearranged them and is drawing another permutation.

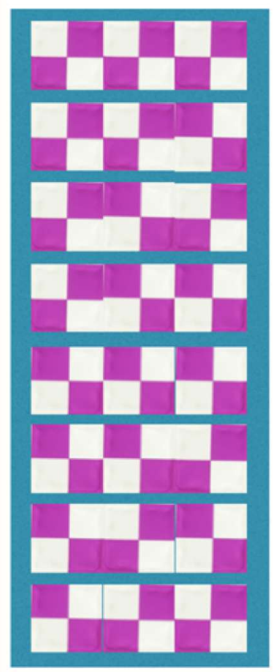
In this way she hopes to find out how many permutations she can make with three cubes. She'll discover that the answer is six.



This can be calculated by thinking about choices. Starting a-fresh with a set of 3 objects this is the process. To make a permutation I have a choice of 3 to fill the first place; then I'm left with a choice of 2 for second place; and finally a choice of 1 for the last. The number of choices is 3 x 2 x 1 = 6

Now suppose you started with a set of identical cubes like this.
Rearranging the row doesn't change the pattern.

But you can change the pattern if you turn a cube around. Each of them has two different positions. So more permutations *are* possible.



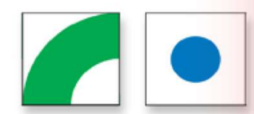
Think about the process being the same as before, with the difference that each time you place a cube you have a choice of two orientations. This thought provides a method of calculating the total number of choices for making each permutation is: 2 x 2 x 2 = 8.

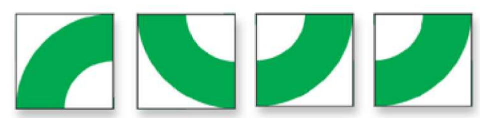
Now think about how you'd count the permutations if you started with these two cubes on the right?

They are different so you could say two permutations.

The choices being 2 x 1 = 2

But the green shape can be placed in four different ways.





How many permutations are there now?

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