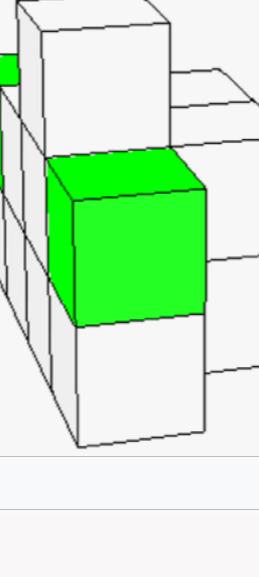
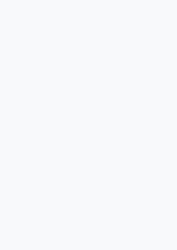


Cube Counting:

• January 05, 2021

Cube Counting

In each question of the cube counting section, you are presented with a shape made of cubes of the same size that are cemented together. After the cubes have been cemented together they were painted on all sides except the bottom side upon which they are resting. Therefore, the sides of the cubes that are cemented to other cubes cannot be painted as well as the bottom side. The only cubes that are considered hidden, are those required to support other cubes (You will see what this means in the example below). Then you will be asked questions such as "how many cubes have three of their sides painted?" or "How many cubes have four/five of their sides painted/exposed?"

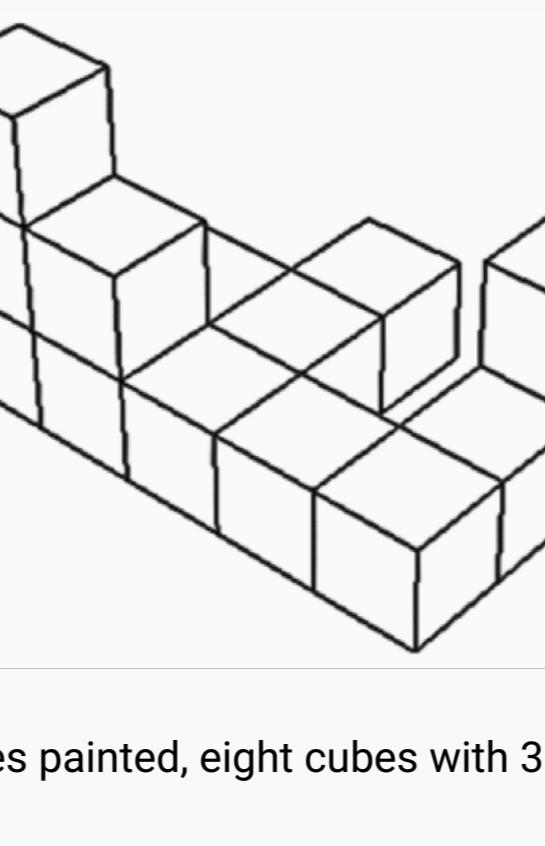


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In this shape we have 4 cubes, the numbers on each cube represent the exposed sides that are painted. In the cubes with 4 sides painted, top, left, right and front side are exposed, so those sides are painted. In the cube that is on top, 5 sides are painted since the back side is exposed as well as the sides mentioned for the cubes with 4 sides.

Now there is a cube which is invisible but the rule here is that if a cube is not visible, it is assumed it exists only if it is supporting another cube or if it needs to be present for the figure to be fully connected. The invisible cube has only its back and right side exposed. Keep in mind that the bottom side is always considered not painted since the cubes are all sitting on the bottom side, it is not exposed to be painted.

Thus in the example below, the red side of the green cube is not another cube, it is the left face of the green cube.



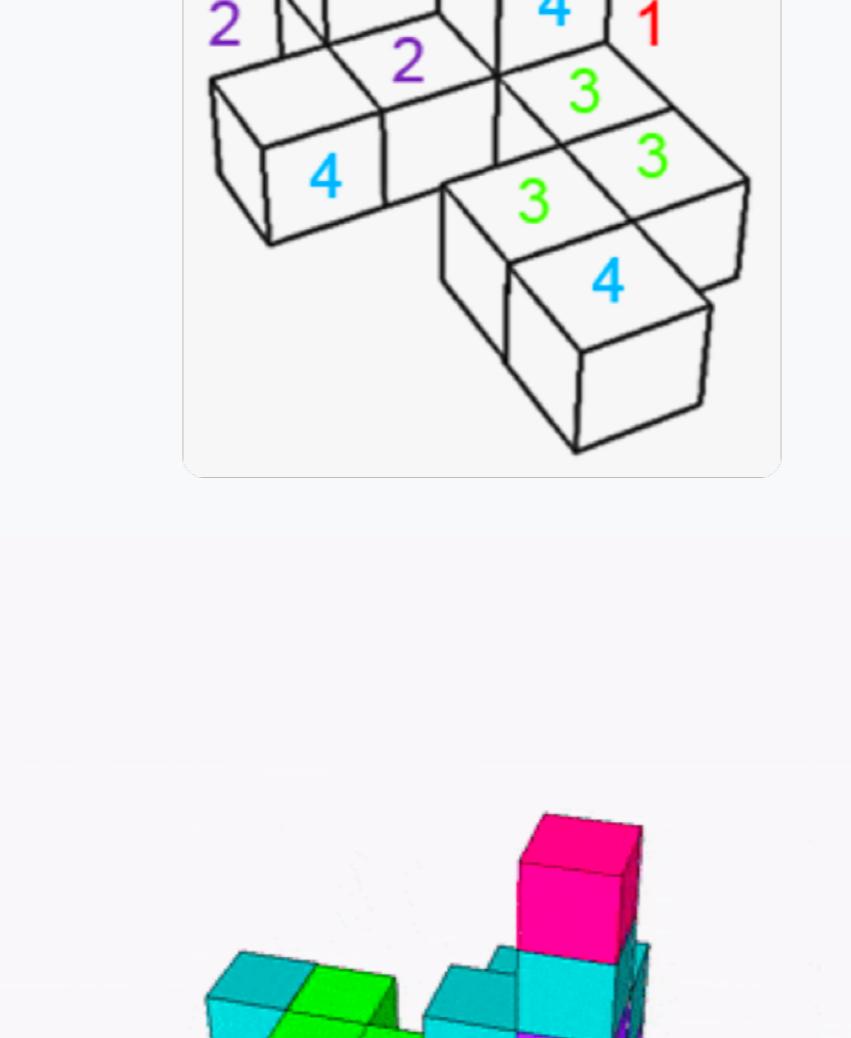
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The most common method for answering cube counting questions is the tally table. In this method, you draw a table. On the left side of the table, we have the number of sides painted in a cube, and on the right side, we have the number of cubes with that many sides painted.

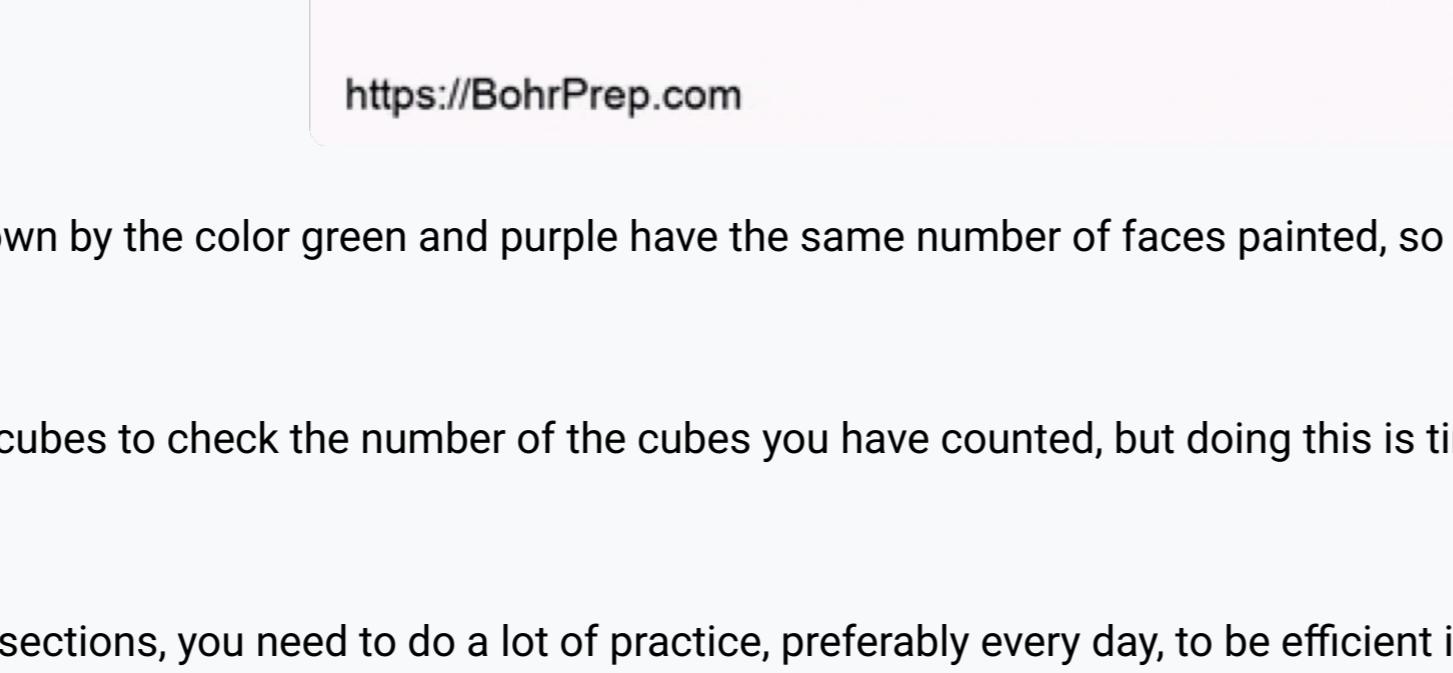
We start from a column/row and count the sides painted for each cube in that column/row and draw a tally in front of each line for every cube we do, and only then we move on to the next column/row of cubes until there are no more columns/rows left. If that makes you confused you could also go for counting the cubes in each level, find the counting method that suits you.



In the shape above, we have one cube with 1 side painted, three cubes with 2 sides painted, eight cubes with 3 sides painted, three cubes with 4 sides painted and two cubes with 5 sides painted. So here is the tally table, you can also put a 1 instead if tally confuses you.

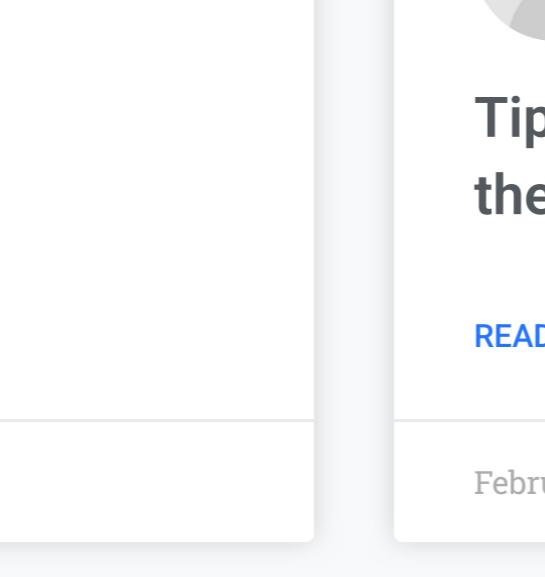
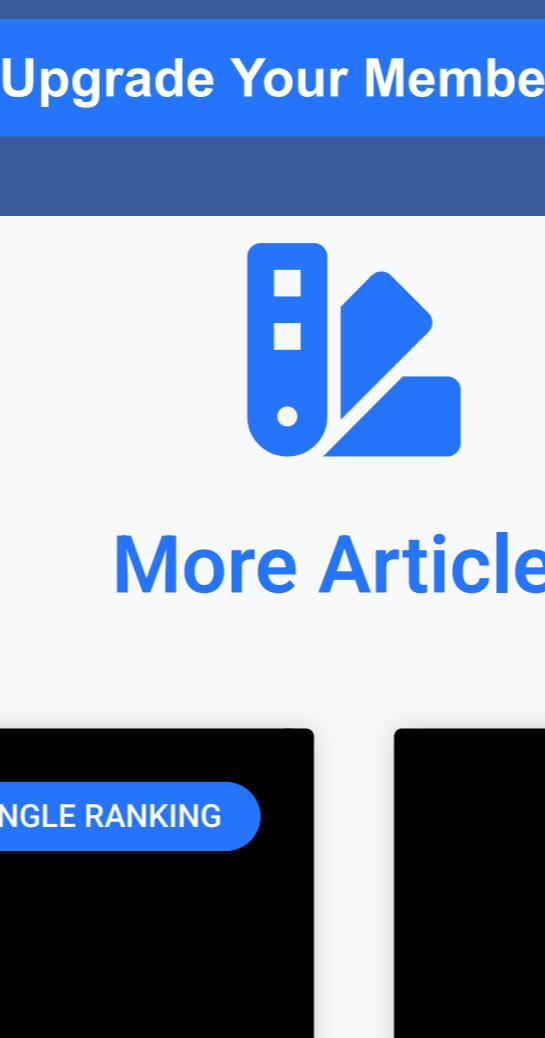
Number of sides painted	Number of cubes
1	1
2	3
3	8
4	3
5	2

Number of sides painted	Number of cubes
1	1
2	3
3	8
4	3
5	2



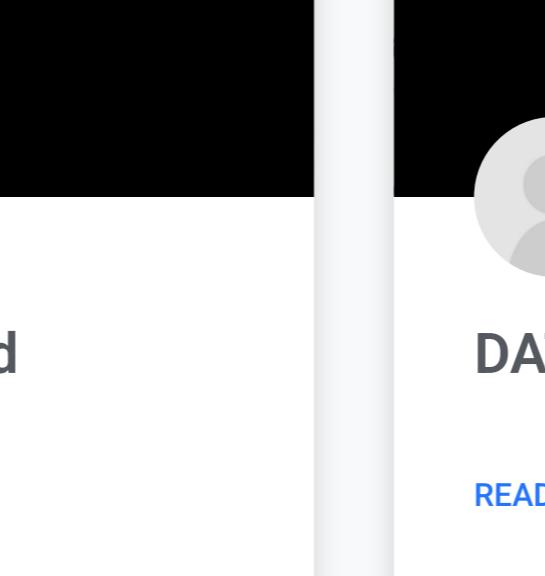
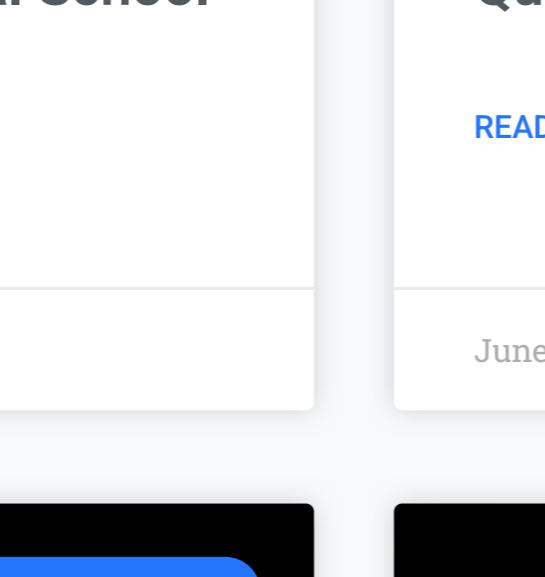
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You can also write the number of painted faces on the cubes. For the invisible cubes, you can write the numbers beside them like the following example.



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Another method you can use is finding symmetry between rows/columns or finding a sister or a twin so to speak for a row/column with the same number of faces painted. If you find it, then instead of spending time to count the painted faces all over again, you can just double the results you got from the identical row/column that you did already for this one.



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In this example, the two columns shown by the color green and purple have the same number of faces painted, so if you count the numbers for one then you can simply have the numbers for the other one as well.

You can count the overall number of cubes to check the number of the cubes you have counted, but doing this is time-consuming so we do not suggest you do this on DAT, but you can check your numbers when you are practicing.

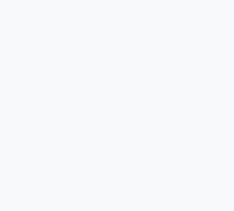
Remember that like all other PAT subsections, you need to do a lot of practice, preferably every day, to be efficient in time management and getting a high score in this subsection.

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