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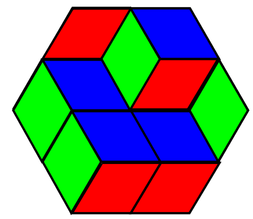
Math Club Teaser #49

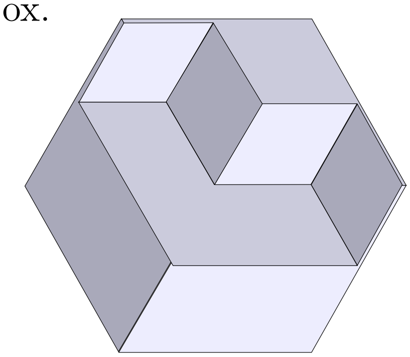
October 1, 2010
(due October 8, 2010)

Solution

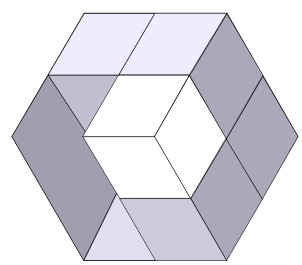
The trick is to think three-dimensionally. Take any chocolate packing like this one.



With three different shading tones for the three orientations, the picture can be interpreted as a stacking of cubes in a $2 \times 2 \times 2$ box.



Converesely, a stacking of cubes corresponds to a chocolate packing, as long as the cubes cannot slide toward the walls (for instance, the only way to complete a chocolate packing when the highlighted cube is present, is to add a cube to its left).



The cube stackings are easier to count than their corresponding chocolate packings, because we can group them by the number of cubes present. You can verify that

# of cubes	0	1	2	3	4	5	6	7	8
# of cube stackings	1	1	3	3	4	3	3	1	1

for a total of 20.

Solved by:

`Captain Nemo, David Laurence, Josh Rafail.`