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Subject: Yet two other D16s

Posted by [Magic](#) on Mon, 22 Oct 2012 21:53:21 GMT

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Hi there,

In my attempts to make a D16, I found a D16 with a tetrahedral symmetry. Basically, take a tetrahedron (triangular pyramid), put it inside a sphere and then replace each vertex by a group of 3 circular faces, and keep one circular face where the tetrahedron had its own faces ( $3 \times 4 + 4 = 16$ ).

Another way to construct is to take a truncated tetrahedron (4 triangular faces and 4 hexagonal faces) and then put a face for each vertex but also at the center of each hexagon.

But as you can see the faces that are at the center of the hexagons do not touch the other faces. They are what AleaKybos call "rattlers". In order to maximize the radius of the faces, you can turn a little bit each group of 3 faces corresponding to one triangle of the truncated tetrahedron, say, counter-clockwise. In this way you get some extra space to make all the faces grow a little bit. Repeat the process until you touch the (former) rattler. It is a similar operation that allows to go from the D24 to the snub-D24. That why I call this new D16 the snub-D16 with Tetrahedral symmetry.

In this image I colored the different groups of faces to better understand the process (the one nearly grey is actually orange, and the one nearly black is actually blue, sorry for the poor rendering).

The gain on the separation (that is the angle at its vertex of the cone that goes from the center of the sphere to one circular face) seems low, but actually this is a big improvement: we go from  $50.48^\circ$  to  $51.92^\circ$

Note that none of these dice would have number on their face, so they cannot compete for the D16 Contest...

#### File Attachments

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1) [D16TetraAllCol.jpg](#), downloaded 313 times

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Subject: Re: Yet two other D16s

Posted by [Magic](#) on Tue, 06 Nov 2012 21:40:13 GMT

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The D16 with a tetrahedral symmetry has been numbered.

Sorry if the markups are odd: I did not find a way to reuse my Excel formulas to set up the

markups depending on the manufacturing prices, and even worse, I did not find any way to manually set up the markup in dollars... Contact me if you wish to order one.

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Subject: Re: Yet two other D16s  
Posted by [natalia](#) on Tue, 20 Nov 2012 20:16:51 GMT  
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Magic, you can set your markup in either Dollars or Euros using the CVS Wizard on your shop page.

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Subject: Re: Yet two other D16s  
Posted by [Magic](#) on Tue, 20 Nov 2012 20:44:59 GMT  
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Ouch! For some reasons I though it had disappeared!  
But it's still here:  
<http://www.shapeways.com/shop/markup-csv>

Great! Thank you very much!

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Subject: Re: Yet two other D16s  
Posted by [natalia](#) on Wed, 05 Dec 2012 22:48:06 GMT  
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No worries!

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Subject: Re: Yet two other D16s  
Posted by [Magic](#) on Wed, 05 Dec 2012 23:05:32 GMT  
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I used the CSV file to make the current 15% discount in my shop.

Under Excel:

- I added a column (called "total") to add the "price" to the "markup"
- I added another colum ("total with discount") to get this value minus 15% ( ("total with discount" =  $0.85 * \text{total}$ )

- And a third column to calculate the new markup to reach this price ("markup with discount" = "total with discount" - "price")  
- Then I renamed this last column "markup", erased the original "markup" column and all the other columns I created and exported the CSV.  
I uploaded the CSV to the Shapeways website et voilà !

Works perfectly!