
Subject: Triacontahedron

Posted by [Magic](#) on Sun, 25 Nov 2012 16:38:06 GMT

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The Rhombic Triacontahedron is one of my favorite polyhedron.

You can include a dodecahedron and an icosahedron inside it.

I made a model showing those two polyhedra included into a Triacontahedron.

The Triacontahedron is in yellow, the dodecahedron in red and the icosahedron in blue.

The goal of this model is to show how to calculate the volume of the Triacontahedron using those two inclusions. You also need to know that the diagonal (that is the distance between two non consecutive vertices) of a pentagon is the size of its side multiplied by $\sqrt{5}$, and you need to know how to calculate the volume of a pyramid (one third of the area of its base multiplied by its height). This video can help.

So can you calculate its volume?

Subject: Re: Triacontahedron

Posted by [bartv](#) on Mon, 03 Dec 2012 14:13:17 GMT

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Subject: Re: Triacontahedron

Posted by [Magic](#) on Mon, 03 Dec 2012 19:00:24 GMT

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OK, perhaps some hints are needed...

Hint #1:

The volume of the triacontahedron is 30 times the volume of a pyramid whose base is one of the 30 rhombi and whose apex is the center of the triacontahedron.

Subject: Re: Triacontahedron

Posted by [Magic](#) on Tue, 04 Dec 2012 20:11:55 GMT

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Hint #2:

The volume of a pyramid is one third of the area of its base multiplied by its height.

Subject: Re: Triacontahedron

Posted by [Magic](#) on Wed, 05 Dec 2012 22:07:41 GMT

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Hint #3:

AB and A"B" are parallel and have the same size.

This is due to the facts that

- ABB'A' is a parallelogram (actually a rhombus) thus AB and A'B' are parallel and have the same size.

- A'B'B"A" is a also parallelogram (actually a rhombus too) thus A'B' and A"B" are parallel and have the same size.

- By transitivity, AB and A"B" are also parallel and have the same size.

File Attachments

1) [tria010.jpg](#), downloaded 86 times
