

Segments Without Math

There is a lot of math to figure out how to construct a segmented ring. Some of it is simple, like calculating the angle to cut the segment. That is 360° divided by the number of segments, then divided in half. For example: a 12 sided ring requires an angle of 360 divided by 12 divided by 2

$$360/12/2 = 15^\circ$$

This is the angle for the miter cut. Reasonably easy to remember if you think of a square. Four sides means each corner is 90° . Divide that by 2 for the miter = 45° .

Figuring out the length of the side to create a specific outside diameter involves a bit more work. A reference I wrote for all of the calculations can be found in the article “Beads Of Courage” at the **Resources** tab of our website. If you enjoy math this document has all of the formulas that you should need.

If you enjoy math, you wouldn't be reading this article! I promised no math. I have done all of the math and created a few tables that you can look up the answers on.

1) Segment Length Only.pdf

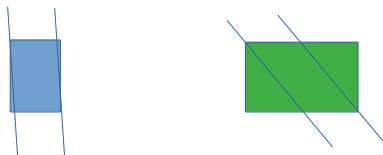
This table shows you the length you need for a desired ring diameter and number of sides. The angle is shown at the top for the number of sides.

For example if you want 24 sides you need an angle of 7.5° , for 12 sides it is 15° . Then you follow down the column to the row for the diameter. For example if you want a 7” diameter ring of 12 segments you down the 12 column to the 7 row:

No. Of Sides → Angle → Diameter ↓	8	12	16	20	24	30	36	40	48	64
	22.5	15	11.25	9	7.5	6	5	4.5	3.75	2.8125
	LENGTH ↓									
6 1/2	2.692	1.742	1.293	1.029	0.856	0.683	0.569	0.512	0.426	0.319
6 3/4	2.796	1.809	1.343	1.069	0.889	0.709	0.591	0.531	0.442	0.332
7	2.899	1.876	1.392	1.109	0.922	0.736	0.612	0.551	0.459	0.344
7 1/4	3.003	1.943	1.442	1.148	0.954	0.762	0.634	0.571	0.475	0.356
7 1/2	3.107	2.010	1.492	1.188	0.987	0.788	0.656	0.590	0.492	0.368

The length of the segment (along the long edge) is **1.876”**. You glue 12 into a ring and the finished diameter will be 7”. If you want 7-1/2” the length is 2.010”. The change is only 0.134” (a shade over 1/8”) to increase by 1/2” diameter.

The chart does not tell you how wide the segment needs to be, only the length of each segment. The width of the segment depends on the wall thickness at the point you are inserting the ring. This is best determined by drawing the vessel on graph paper, at full scale, and measuring the wall. Remember to account for the slope of the segment. You need to measure from the outside to the inside as if it were a full square accounting for the angle of the wall. The BLUE and GREEN segments widths result in the same wall thickness at different wall angles.



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2) Segments With Width *.pdf

To show the width require a lot more restate so there is one chart for each number of segments in a ring. I will use the 8 sides table as an example. The number of sides and cut angle are shown at the top. Each row is for a desired finished outer diameter. You then look up the required width for a given thickness. The total board length, including saw cuts, is shown in the **Board Length** column.

For example – an eight segment ring with a diameter of 7” and a 1” thick wall requires a 1.190” wide board, and 24.196” segment length. Please note that the board will have to be somewhat longer so that you have something left to hold on to and keep against the fence!

SIDES = 8		ANGLE = 22.5										Board Length	
Outside Diameter	Seg. Len.	Board Width for Desired Wall Thickness										Blade Kerf	
		1/4	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	0.100	0.125
1	0.414	0.269	0.500	-	-	-	-	-	-	-	-	4.114	4.314
1 1/2	0.621	0.288	0.519	0.750	-	-	-	-	-	-	-	5.771	5.971
2	0.828	0.307	0.538	0.769	1.000	-	-	-	-	-	-	7.427	7.627
2 1/2	1.036	0.326	0.557	0.788	1.019	1.250	-	-	-	-	-	9.084	9.284
3	1.243	0.345	0.576	0.807	1.038	1.269	1.500	-	-	-	-	10.741	10.941
3 1/2	1.450	0.364	0.595	0.826	1.057	1.288	1.519	1.750	-	-	-	12.398	12.598
4	1.657	0.383	0.614	0.845	1.076	1.307	1.538	1.769	2.000	-	-	14.055	14.255
4 1/2	1.864	0.402	0.633	0.864	1.095	1.326	1.557	1.788	2.019	2.250	-	15.712	15.912
5	2.071	0.421	0.652	0.883	1.114	1.345	1.576	1.807	2.038	2.269	2.500	17.369	17.569
5 1/2	2.278	0.440	0.671	0.902	1.133	1.364	1.595	1.826	2.057	2.288	2.519	19.025	19.225
6	2.485	0.459	0.690	0.921	1.152	1.383	1.614	1.845	2.076	2.307	2.538	20.682	20.882
6 1/2	2.692	0.478	0.709	0.940	1.171	1.402	1.633	1.864	2.095	2.326	2.557	22.339	22.539
7	2.899	0.497	0.728	0.959	1.190	1.421	1.652	1.883	2.114	2.345	2.576	23.996	24.196
7 1/2	3.107	0.516	0.747	0.978	1.209	1.440	1.671	1.902	2.133	2.364	2.595	25.653	25.853
8	3.314	0.535	0.766	0.997	1.228	1.459	1.690	1.921	2.152	2.383	2.614	27.310	27.510

Each table is only for one number of sides. This is from the **Segments With Width 8.pdf**

I have created tables for 8, 12, 16, 24 and 36 sides. All of the tables should be available in the **Resources** tab of our website.