

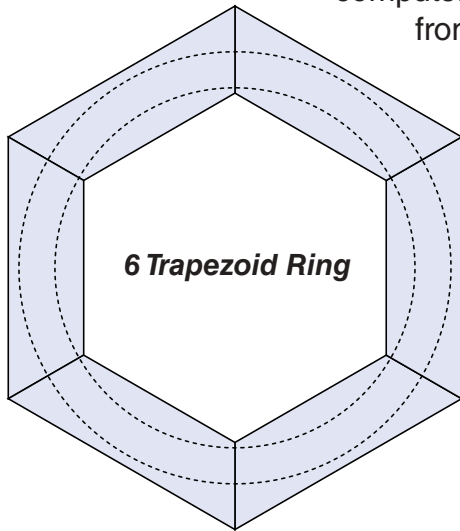
Planning your 8 Trapezoid Circle and Border project

Step 1... pick one of three trapezoid ring options. Unless you have a special reason for choosing the 6 or 12 the 8 trapezoid ring option is usually best.

Step 2... you can plan your project in inches or millimeters but making the trapezoids will be in millimeters. If you think in inches pick inches and vice versa.

Step 3... now that you have some idea of your options and have read all of page 1, go to page 2 and learn about the inch and millimeter charts.

Available Spreadsheet: If you have Excel or Numbers on your Windows or Mac computer you can download a spreadsheet file called "Trapezoid Strip Width" from mortonglass.com. Tables from this PDF needed for spreadsheet.



6 Trapezoid Ring... this option requires trapezoids that are made using a 60 degree angle setting on your Portable Glass Shop. This option might be considered if your design is based on the hexagon. The disadvantage of this option is the length and width of the trapezoids needed.

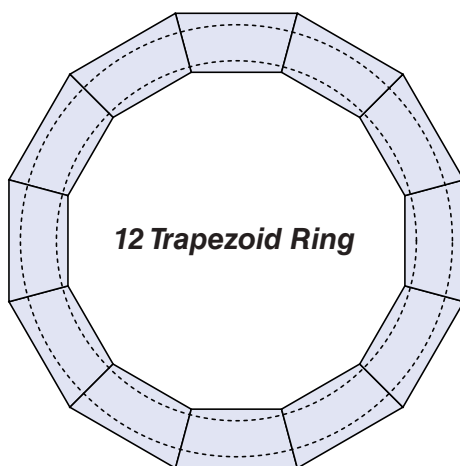
This PDF is for the 6 Trapezoid Ring. Use the PDF named "6 Trapezoid Ring" for this option. Spreadsheet table option is named "6 Trapezoid Ring"



8 Trapezoid Ring... this option requires trapezoids that are made using a 67.5 degree angle setting on your Portable Glass Shop. This option might be considered if your design is based on the octagon. This option is usually preferred over the 6 trapezoid option because the strips needed to make the trapezoids are not as wide and yield less scrap.

The inch and millimeter charts in this PDF are to be used only for the 8 Trapezoid Ring option.

Spreadsheet table option is named "8 Trapezoid Ring"



12 Trapezoid Ring... this option requires trapezoids that are made using a 75 degree angle setting on your Portable Glass Shop. This option will require more time to make. An example of how this might be appropriate is as a clock face using two different colors such as black and white in an art deco design.

This PDF is for the 12 Trapezoid Ring. Use the PDF named "12 Trapezoid Ring" for this option. Spreadsheet table option is named "12 Trapezoid Ring"

Sizing the Trapezoids

Making the correct trapezoids for your project is important and the 1st step is to know what you want to make.

A simple sketch for your border project might be a productive way to start. As you look at this plate it is quite easy to see that 8 elements will be needed to make the border and that will lead you to the 8 Trapezoid ring. The black center



circle is what we refer to as the inner circle.

Let's just say that the inner circle is 6 inches. We decide that the border will be 1.5 inches wide. Now we know that our plate will be 9 inches. The 9 inch diameter of the plate is what we refer to as the outer circle.

The information we have for the 9 inch plate is all that is needed to determine the strips that will be needed to make the project. The 9 inch outer circle, 6 inch inner circle, 8 sections in the border and circle sizes in inches tell where to look for the information needed for the strips.

Many of you prefer millimeters. Let's define the 9 inch plate as a 228 mm plate and the black center circle as 152 mm. We still need 8 sections but we are now planning in millimeters. The only difference between planning in millimeters or inches is the chart used to find the information.

The examples on page 3 will help you understand the basics. In the USA many of us tend to think and plan our projects in inches. The option to inches is millimeters but no matter how you think or plan the trapezoids are made in **millimeters** on your Portable Glass Shop.

Information from the Charts

Some needed information for the 9 inch design above is found on page 4. Because 9 inches is the outer circle the information needed will be a red number. The red numbers are the length of the trapezoid base in millimeters. For a 9 inch diameter the base length is **100 mm**.

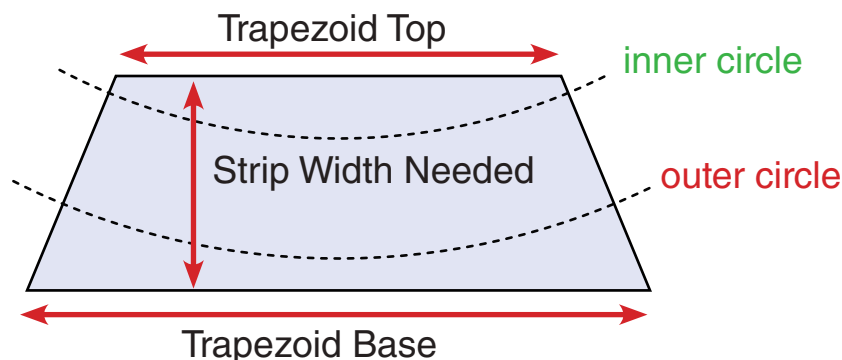
If you were planning in millimeters the plate size from above is 228 mm and the information we need is found on page 5. For a 228 mm diameter the base length is **100 mm**.

The inner circle diameter for the plate above is 6 inches. The inner circle information from the

charts will be a green number and will be the length of the trapezoid top. The green number in the 6 inch diameter row, on page 4, is **55 mm**.

The 152 mm inner circle diameter we used to plan the project above in millimeters shows the trapezoid top length on page 5 is **55 mm**.

The red base length number and the green top length number are used to calculate the strip width. The strip width calculation is explained on page 3. The strip width used to make the border above is about 55 mm in both the inch and millimeter project above.

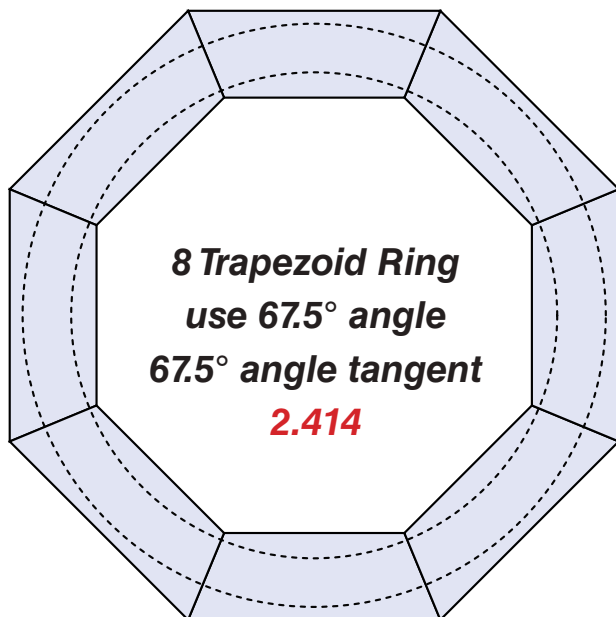


The 8 Trapezoid Ring

All sizes are not available in the inch and metric charts and it is suggested that you modify your project slightly to the sizes listed.

Important: If you need a size not listed you must pick the next larger size for the outer circle (red number in mm) and the next smaller size for the inner circle (green number in mm) to make the strip width calculations.

The inch and millimeter examples should help you understand the charts. The 10 inch plate is 2 mm larger than the 252 mm plate. The strip width ends up being the 1 mm larger on the millimeter example because the border is slightly larger.



8 Trapezoid Strip Width Formula

$(\text{base length} - \text{top length}) \div 2 \times 2.414 = \text{strip width}$
round up strip width to next millimeter
if decimal greater than .3

Inch example - 8 Trapezoid Ring

10 inch plate... 8 inch center circle with a 1 inch border. Border made from 8 trapezoids.

1. Go to page 4 and find the base length for a 10 inch circle. Base lengths are red numbers.

base length found = 111 mm

2. Go to page 4 and find the top length for a 8 inch circle. Top lengths are green numbers.

top length found = 75 mm

3. Calculate trapezoid strip width.

$$111 - 75 = 36 \div 2 = 18 \times 2.414 = 43.452$$

round up to 44 mm strip width

4. Use 44 mm wide strips and a 67.5° angle to make 8 trapezoids with a base length of 111 mm.

Millimeter example - 8 Trapezoid Ring

252 mm plate... 200 mm center circle with a 26 mm border. Border made from 8 trapezoids.

1. Go to page 5 and find the base length for a 252 mm circle. Base lengths are red numbers.

base length found = 110 mm

2. Go to page 5 and find the top length for a 200 mm circle. Top lengths are green numbers.

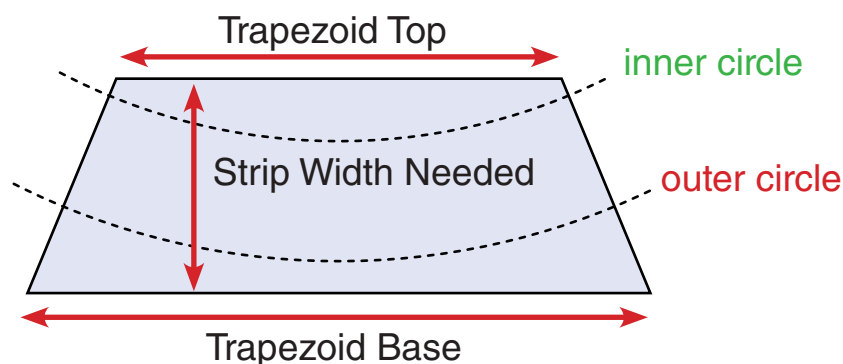
top length found = 73 mm

3. Calculate trapezoid strip width.

$$110 - 73 = 37 \div 2 = 18.5 \times 2.414 = 44.659$$

round to 45 mm strip width

4. Use 45 mm wide strips and a 67.5° angle to make 8 trapezoids with a base length of 110 mm.



Inch Circle Sizes 8 Trapezoid Ring

Although you have planned your project in inches you will be sizing trapezoids for the 8 Trapezoid Ring in millimeters.

From the chart, find the circle size of your project and select the red number in that row. The red number is in millimeters and it is the base length of the trapezoids you will make.

From the chart, find the diameter of your inner border and select the green number from that row. The green number is the top length of the trapezoid.

Once you have a red number and a green number you can calculate the strip width needed to make the 8 trapezoids on your Portable Glass Shop.

Half of the circle's diameter is the radius. To make your border elements from the trapezoids, using your Circle & border equipment, you will use the radius. The blue number on the right side of the chart is the radius and the black number is the diameter.

Important: If you have a circle size between 2 inches and 14 inches that is not listed you will need to go to the next size larger for the red numbers and the next size smaller for the green numbers.

Circle Diameter	8 Trapezoid base length	8 Trapezoid top length	Circle Diameter	Circle Radius
2 inch	27 mm	16 mm	2 inch	1 inch
2.25	29	19	2.25	1.125
2.5	32	21	2.5	1.25
2.75	35	24	2.75	1.375
3	37	26	3	1.5
3.25	40	28	3.25	1.625
3.5	43	31	3.5	1.75
3.75	45	33	3.75	1.875
4	48	36	4	2
4.25	50	38	4.25	2.125
4.5	53	41	4.5	2.25
4.75	56	43	4.75	2.375
5	58	45	5	2.5
5.25	61	48	5.25	2.625
5.5	64	50	5.5	2.75
5.75	66	53	5.75	2.875
6	69	55	6	3
6.25	72	58	6.25	3.125
6.5	74	60	6.5	3.25
6.75	77	62	6.75	3.375
7	79	65	7	3.5
7.25	82	67	7.25	3.625
7.5	85	70	7.5	3.75
7.75	87	72	7.75	3.875
8	90	75	8	4
8.25	93	77	8.25	4.125
8.5	95	80	8.5	4.25
8.75	98	82	8.75	4.375
9	100	84	9	4.5
9.25	103	87	9.25	4.625
9.5	106	89	9.5	4.75
9.75	108	92	9.75	4.875
10	111	94	10	5
10.25	114	97	10.25	5.125
10.5	116	99	10.5	5.25
10.75	119	101	10.75	5.375
11	122	104	11	5.5
11.25	124	106	11.25	5.625
11.5	127	109	11.5	5.75
11.75	129	111	11.75	5.875
12	132	114	12	6
12.25	135	116	12.25	6.125
12.5	137	118	12.5	6.25
12.75	140	121	12.75	6.375
13	143	123	13	6.5
13.25	145	126	13.25	6.625
13.5	148	128	13.5	6.75
13.75	150	131	13.75	6.875
14	153	133	14	7

8 Millimeter Circle Sizes

8 Trapezoid Ring

From the chart, find the circle size of your project and select the red number in that row. The red number is the base length for the trapezoid.

From the chart, find the diameter of your inner border and select the green number from that row. The green number is the top length of the trapezoid.

Once you have a red number and a green number you can calculate the strip width needed to make the 8 trapezoids on your Portable Glass Shop.

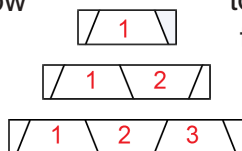
Circle Diameter	8 Base	8 Top	Circle Radius
50 mm	27 mm	16 mm	25 mm
52	27	17	26
56	29	18	28
60	31	20	30
64	32	21	32
68	34	23	34
72	36	24	36
76	37	26	38
80	39	28	40
84	41	29	42
88	42	31	44
92	44	32	46
96	46	34	48
100	47	35	50
104	49	37	52
108	51	38	54
112	52	40	56
116	54	41	58
120	56	43	60
124	57	44	62
128	59	46	64
132	60	47	66
136	62	49	68
140	64	51	70
144	65	52	72
148	67	54	74
152	69	55	76
156	70	57	78
160	72	58	80
164	74	60	82
168	75	61	84
172	77	6	86
176	79	64	88
180	80	66	90

Circle Diameter	8 Base	8 Top	Circle Radius
184	82	67	92
188	84	69	94
192	85	70	96
196	87	72	98
200	89	73	100
204	90	75	102
208	92	77	104
212	94	78	106
216	95	80	108
220	97	81	110
224	99	83	112
228	100	84	114
232	102	86	116
236	104	87	118
240	105	89	120
244	107	90	122
248	109	92	124
252	110	93	126
256	112	95	128
260	113	96	130
264	115	98	132
268	117	99	134
272	118	101	136
276	120	103	138
280	122	104	140
284	123	106	142
288	125	107	144
292	127	109	146
296	128	110	148
300	130	112	150
304	132	113	152
308	133	115	154
312	135	116	156
316	137	118	158
320	138	119	160
324	140	121	162
328	142	122	164
332	143	124	166
336	145	126	168
340	147	127	170
344	148	129	172
348	150	130	174
352	152	132	176
356	153	133	178
360	155	135	180

For 8 Trapezoid Ring - Calculating Strip Length for Multiple Trapezoids

Once you determine the strip width needed for your project you may want to know something about the strip length.

When more than one trapezoids are made from a strip the angles and the end scrap make the length harder to determine. You can often avoid costly mistakes by knowing in advance the strip length needed for one or more trapezoids.



The examples below will show you how to calculate the strip length for one or more trapezoid. Simple math is all that is needed.

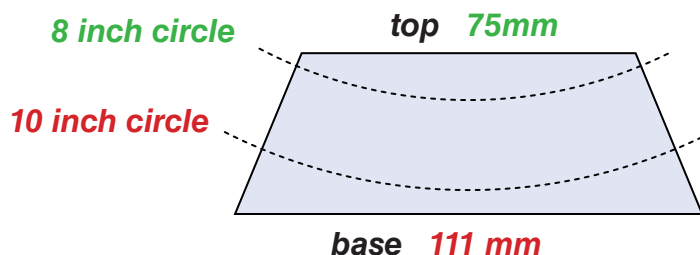
Using the spreadsheet file named "Trapezoid Strip Width" can make the trapezoid calculations easier for you. Using the charts, from this PDF, and the Excel or Numbers application on your computer, you can quickly find the strip width and the strip lengths required for multiple trapezoids.

Example for 8 Trapezoid Ring

From inch chart on page 4

10 inch outer circle - 111 mm base length

8 inch inner circle - 75 mm top length



1. Calculated trapezoid strip width.

$$111 - 75 = 36 \div 2 = 18 \times 2.414 = 43.452$$

round up to 44 mm strip width

2. 67.5° PG01B angle and base length of 111 mm.

3. Make 8 trapezoids using 44 mm wide strips.

4. Determine number of strips needed for 8 trapezoids. Use example below to calculate strip lengths for one or more trapezoids.

Important: • 12 mm for end scrap needed

• Additional calculation for the 2 & 4 trapezoids:
(base - top) ÷ 2 = 111 - 75 = 36 ÷ 2 = 18 mm

5. Millimeter strip length to inches:

Divide the mm by 25.4

$$123\text{mm} \div 25.4 = 4.84 \text{ inch}$$

$$216 \text{ mm} \div 25.4 = 8.50 \text{ inch}$$

1. $12 + \text{base} = \text{length}$
 $12 + 111 = 123 \text{ mm}$

2. $12 + \text{base} + \text{top} + (\text{base} - \text{top} \div 2) = \text{length}$
 $12 + 111 + 75 + 18 = 216 \text{ mm}$

3. $12 + \text{base} + \text{top} + \text{base} = \text{length}$
 $12 + 111 + 75 + 111 = 309 \text{ mm}$

4. $12 + \text{base} + \text{top} + \text{base} + \text{top} + (\text{base} - \text{top} \div 2) = \text{length}$
 $12 + 111 + 75 + 111 + 75 + 18 = 402 \text{ mm}$

5. $12 + \text{base} + \text{top} + \text{base} + \text{top} + \text{base} = \text{length}$
 $12 + 111 + 75 + 111 + 75 + 111 = 495 \text{ mm}$

Calculating the strip length is for project planning.

Calculated results will be the minimum length needed.

Zero Border Option - Millimeters or Inches

There may be a reason why you would want to make just one score to your 8 trapezoids instead of the two. This is very easy to do but you should think of the one score as a "0" border to calculate the strip width of your trapezoids.

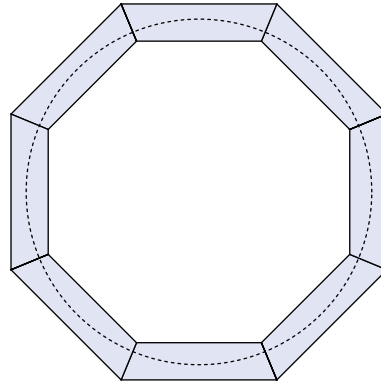
Example: This will be the same for inches & millimeters. If you wanted a 10 inch circle to be your "0" border you will first go to the inch chart and get the red number for 10 inches (**111 mm**) and then get the green number for 10 inches (**94 mm**). Once you have the 2 numbers you will calculate the same as for any border to get the strip width for a 8 trapezoid ring.

$$111 \text{ mm} - 94 \text{ mm} = 17 \div 2 = 8.5$$

$$8.5 \times 2.414 = 20.519 \text{ mm}$$

round to 21 mm strip width

Make 8 trapezoids from 21 mm strips using a 67.5° degree angle setting and a 111 mm base length.



The "0" border option will give you another way to create unique glass art.

