

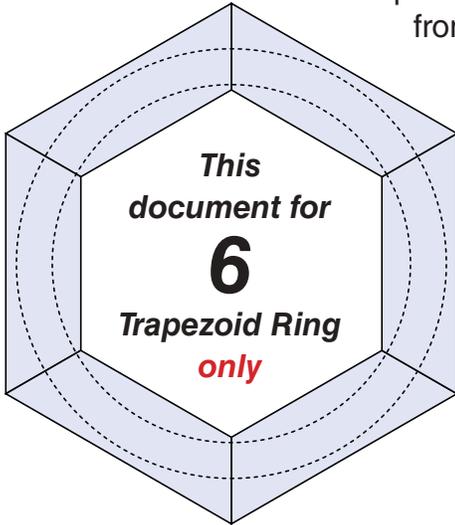
Planning your 6 Trapezoid Circle and Border project

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.

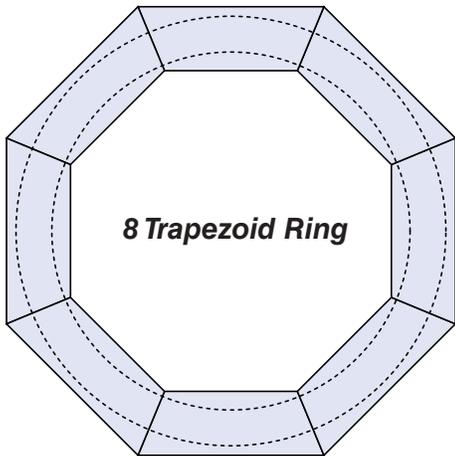
Available Spreadsheet: If you have Excel or Numbers on your Windows or Mac computer you can download a spreadsheet file called "Trapezoid Strip Width" from mortonglass.com. Tables from this PDF needed for spreadsheet.



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.

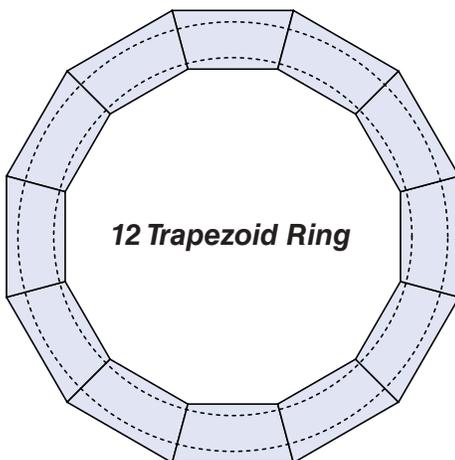
The inch and millimeter charts in this PDF are to be used only for the 6 Trapezoid Ring option.

Spadsheet 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.

This PDF is for the 8 Trapezoid Ring. Use the PDF named "8 Trapezoid Ring" for this option. Spadsheet 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. Spadsheet 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 6 elements will be needed to make the border and that will lead you to the 6 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, 6 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 6 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 will be 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 **140 mm**.

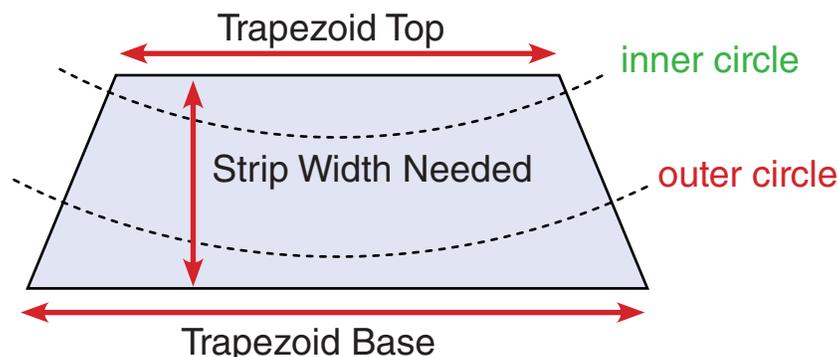
If you were planning in millimeters the plate size from above is 228 mm and the information we need is found on page 5. For a 228 mm diameter the base length is **140 mm**.

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 **72 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 **72 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 59 mm in both the inch and millimeter project above.

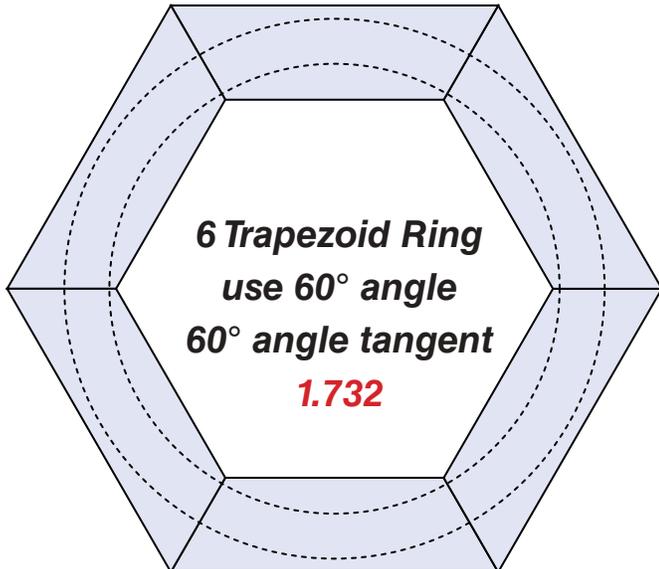


The 6 Trapezoid Ring

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.

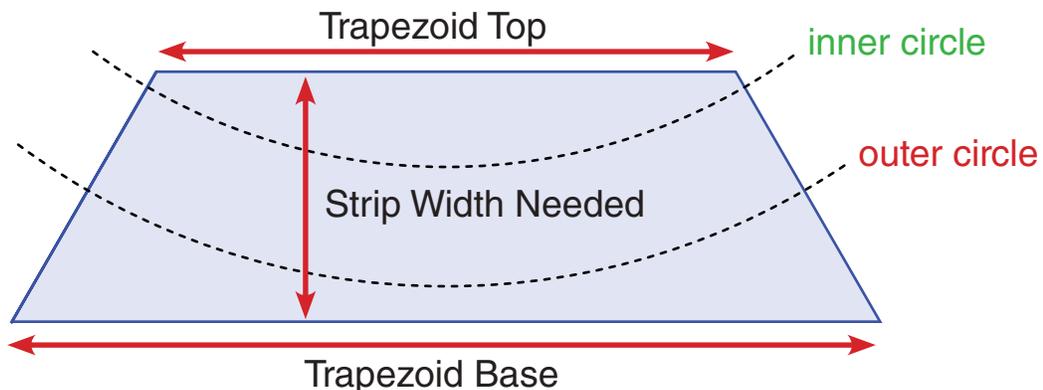
The inch and millimeter examples should help you understand the charts. The 10 inch plate is 2 mm larger than the 252 mm plate. The strip width ends up being the 1 mm larger on the millimeter example because the border is slightly larger. A .3 mm rounding rule in the strip width formula will result in both examples being the same.



6 Trapezoid Strip Width Formula

$$(base\ length - top\ length) \div 2 \times 1.732 = strip\ width$$

round up strip width to next millimeter
if decimal greater than .3



Inch example - 6 Trapezoid Ring

10 inch plate... 8 inch center circle with a 1 inch border. Border made from 6 trapezoids.

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

$$base\ length\ found = 155\ mm$$

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

$$top\ length\ found = 98\ mm$$

3. Calculate trapezoid strip width.

$$155 - 98 = 57 \div 2 = 28.5 \times 1.732 = 49.362$$

round up to 50 mm strip width

4. Use 50 mm wide strips and a 60° angle to make 6 trapezoids with a base length of 155 mm.

Millimeter example - 6 Trapezoid Ring

252 mm plate... 200 mm center circle with a 26 mm border. Border made from 6 trapezoids.

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

$$base\ length\ found = 154\ mm$$

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

$$top\ length\ found = 96\ mm$$

3. Calculate trapezoid strip width.

$$154 - 96 = 58 \div 2 = 29 \times 1.732 = 50.228$$

round to 50 mm strip width

4. Use 50 mm wide strips and a 60° angle to make 6 trapezoids with a base length of 154 mm.

Inch Circle Sizes 6 Trapezoid Ring

Although you have planned your project in inches you will be sizing trapezoids for the 6 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 6 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	6 Trapezoid base length	6 Trapezoid top length	Circle Diameter	Circle Radius
2 inch	37 mm	21 mm	2 inch	1 inch
2.25	41	25	2.25	1.125
2.5	45	28	2.5	1.25
2.75	48	31	2.75	1.375
3	52	34	3	1.5
3.25	56	37	3.25	1.625
3.5	59	40	3.5	1.75
3.75	63	44	3.75	1.875
4	67	47	4	2
4.25	70	50	4.25	2.125
4.5	74	53	4.5	2.25
4.75	78	56	4.75	2.375
5	81	59	5	2.5
5.25	85	63	5.25	2.625
5.5	89	66	5.5	2.75
5.75	92	69	5.75	2.875
6	96	72	6	3
6.25	100	75	6.25	3.125
6.5	103	78	6.5	3.25
6.75	107	82	6.75	3.375
7	111	85	7	3.5
7.25	114	88	7.25	3.625
7.5	118	91	7.5	3.75
7.75	122	94	7.75	3.875
8	125	98	8	4
8.25	129	101	8.25	4.125
8.5	133	104	8.5	4.25
8.75	136	107	8.75	4.375
9	140	110	9	4.5
9.25	144	113	9.25	4.625
9.5	147	117	9.5	4.75
9.75	151	120	9.75	4.875
10	155	123	10	5
10.25	158	126	10.25	5.125
10.5	162	129	10.5	5.25
10.75	166	132	10.75	5.375
11	169	136	11	5.5
11.25	173	139	11.25	5.625
11.5	177	142	11.5	5.75
11.75	180	145	11.75	5.875
12	184	148	12	6
12.25	188	152	12.25	6.125
12.5	191	155	12.5	6.25
12.75	195	158	12.75	6.375
13	199	161	13	6.5
13.25	202	164	13.25	6.625
13.5	206	167	13.5	6.75
13.75	210	171	13.75	6.875
14	213	174	14	7

6 Millimeter Circle Sizes 6 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 6 trapezoids on your Portable Glass Shop.

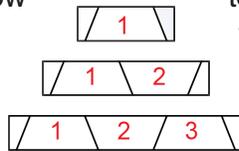
Circle Diameter	6 Base	6 Top	Circle Radius
50 mm	37 mm	21 mm	25 mm
52	38	22	26
56	40	24	28
60	43	26	30
64	45	28	32
68	47	30	34
72	50	32	36
76	52	34	38
80	54	36	40
84	57	38	42
88	59	40	44
92	61	42	46
96	64	44	48
100	66	46	50
104	68	48	52
108	70	50	54
112	73	52	56
116	75	54	58
120	77	56	60
124	80	58	62
128	82	60	64
132	84	62	66
136	87	64	68
140	89	66	70
144	91	68	72
148	94	70	74
152	96	72	76
156	98	74	78
160	100	76	80
164	103	78	82
168	105	80	84
172	107	82	86
176	110	84	88
180	112	86	90

Circle Diameter	6 Base	6 Top	Circle Radius
184	114	88	92
188	117	90	94
192	119	92	96
196	121	94	98
200	124	96	100
204	126	98	102
208	128	100	104
212	130	102	106
216	133	104	108
220	135	106	110
224	137	108	112
228	140	110	114
232	142	112	116
236	144	114	118
240	147	116	120
244	149	118	122
248	151	120	124
252	154	122	126
256	156	124	128
260	158	126	130
264	161	128	132
268	163	130	134
272	165	132	136
276	167	134	138
280	170	136	140
284	172	138	142
288	174	140	144
292	177	142	146
296	179	144	148
300	181	146	150
304	184	148	152
308	186	150	154
312	188	152	156
316	191	154	158
320	193	156	160
324	195	158	162
328	197	160	164
332	200	162	166
336	202	164	168
340	204	166	170
344	207	168	172
348	209	170	174
352	211	172	176
356	214	174	178
360	216	176	180

For 6 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.

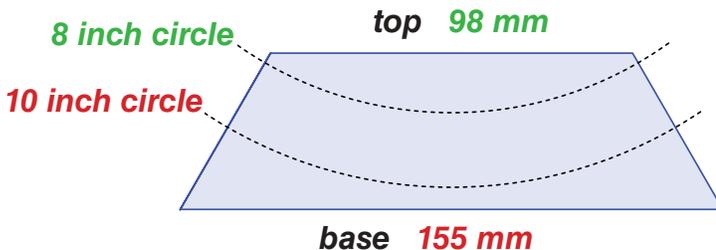
Using the spreadsheet file named "Trapezoid Strip Width" can make the trapezoid calculations easier for you. Using the charts, from this PDF, and the Excel or Numbers application on your computer, you can quickly find the strip width and the strip lengths required for multiple trapezoids.

Example for 6 Trapezoid Ring

From inch chart on page 4

10 inch outer circle - 155 mm base length

8 inch inner circle - 98 mm top length



1. Calculated trapezoid strip width.

$$155 - 98 = 57 \div 2 = 28.5 \times 1.732 = 49.362$$

round up to 50 mm strip width

2. 60° PG01B angle and base length of 155 mm.

3. Make 6 trapezoids using 50 mm wide strips.

4. Determine number of strips needed for 6 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 or $155 - 98 = 57 \div 2 = 28.5$ mm

5. Millimeter strip length to inches:

Divide the mm by 25.4

$$167 \text{ mm} \div 25.4 = 6.57 \text{ inch}$$

$$293.5 \text{ mm} \div 25.4 = 11.56 \text{ inch}$$

1. $12 + \text{base} = \text{length}$
 $12 + 155 = 167 \text{ mm}$

2. $12 + \text{base} + \text{top} + (\text{base} - \text{top} \div 2) = \text{length}$
 $12 + 155 + 98 + 28.5 = 293.5 \text{ mm}$

3. $12 + \text{base} + \text{top} + \text{base} = \text{length}$
 $12 + 155 + 98 + 155 = 420 \text{ mm}$

4. $12 + \text{base} + \text{top} + \text{base} + \text{top} + (\text{base} - \text{top} \div 2) = \text{length}$
 $12 + 155 + 98 + 155 + 98 + 28.5 = 546.5 \text{ mm}$

5. $12 + \text{base} + \text{top} + \text{base} + \text{top} + \text{base} = \text{length}$
 $12 + 155 + 98 + 155 + 98 + 155 = 673 \text{ mm}$

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 6 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.

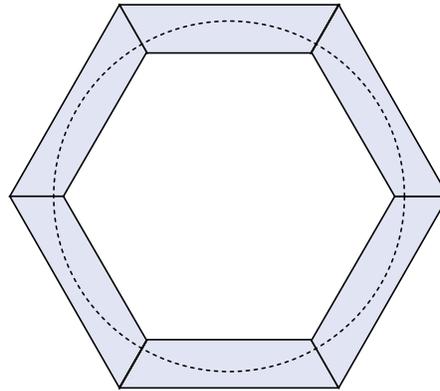
Example: This will be the same for inches & millimeters. If you wanted a 10 inch circle to be your "0" border you will first go to the inch chart and get the red number for 10 inches (**155 mm**) and then get the green number for 10 inches (**123 mm**). Once you have the 2 numbers you will calculate the same as for any border to get the strip width for a 6 trapezoid ring.

$$155 \text{ mm} - 123 \text{ mm} = 32 \div 2 = 16$$

$$16 \times 1.732 = 27.712 \text{ mm}$$

round to 28 mm strip width

Make 6 trapezoids from 28 mm strips using a 60° degree angle setting and a 155 mm base length.



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

