

How to Design a Geometric Stained Glass Lamp Shade

This technique requires no calculation tables, math, or angle computation. Instead you can use paper & pencil with basic tech drawing skills to design any size or shape spherical lamp with any number of panel sides and any number of layers or tiers.

Gather the following supplies:

1. 11 x 17 or A3 size paper
2. Sharp, hard lead pencils
3. A standard ruler (a set of parallel rules is also helpful)
4. A T-square
5. A 45° triangle
6. Protractor
7. Compass

Set Your Scale

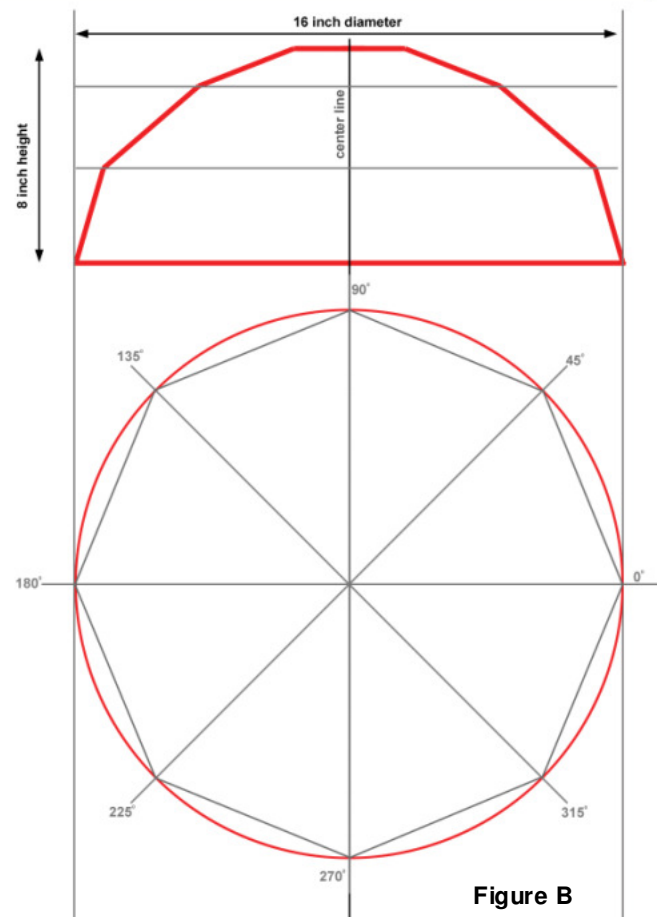
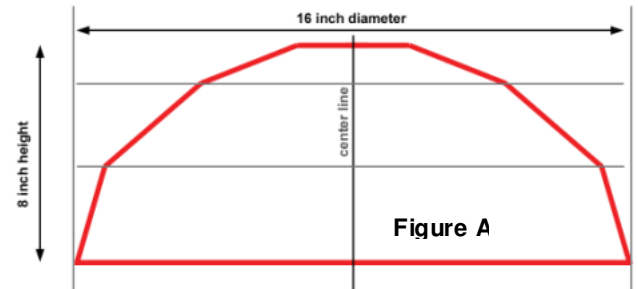
Using one centimeter on the drawing = one inch on the finished shade works well. This way you get a drawing of decent size on the paper that easily converts to the finished size templates you will create to make the lamp.

Design Your Shade

1. Layout a clean sheet of paper oriented landscape (long edges horizontal) and tape onto a good square edge drawing or drafting surface.
2. In the upper left hand corner design the lampshade by drawing the profile you want as a side elevation. Decide the overall diameter and height along with number of sides and tiers. Your profile drawing should be to scale and look like Figure A.
3. Below this drawing, extend the center line of the profile drawing and draw a circle to scale with its center on this line.
4. Now choose the number of sides you want your lampshade to have. For this example it will be an 8 sided lamp but you can have any number of sides: 6, 9, 10, 12, 15, 18, etc. Just remember the measuring and math will be easier if your number of sides divides evenly into 360°
5. Now you need to draw in the radial lines that divide the circle into that many sections.

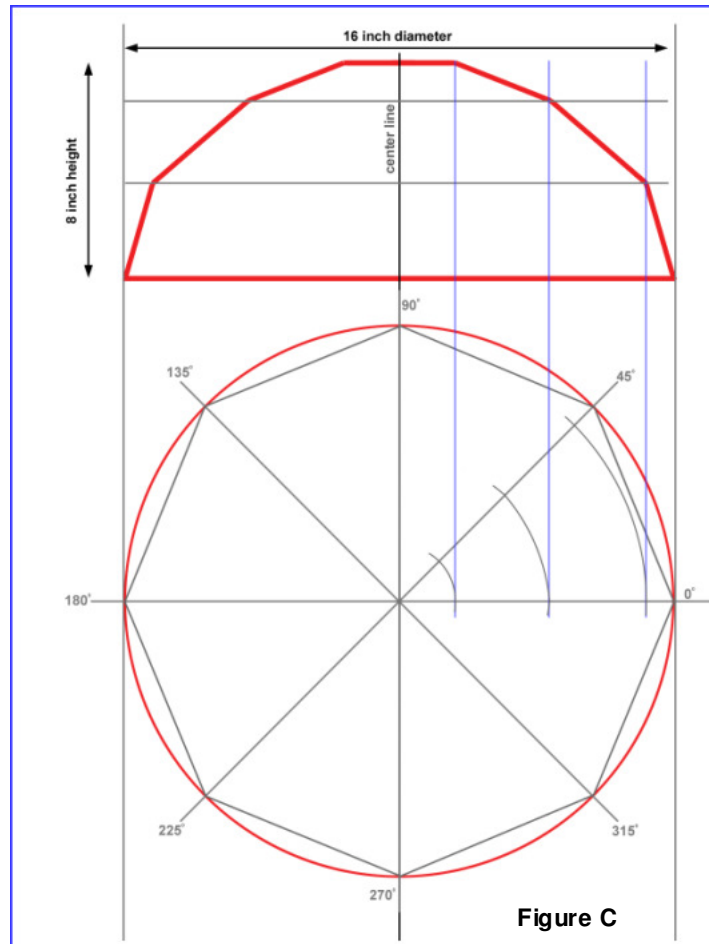
First divide 360° (degrees in a circle) by the number of sides (8) to determine the angles of the radial lines. For this example we have $360^\circ \div 8 = 45^\circ$

6. Use your protractor to mark out lines at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315°. Draw in your radial lines and then draw in the lines to connect the bottoms of each section where the radius line crosses the circle (chord lines). Your drawing should now look like Figure B.

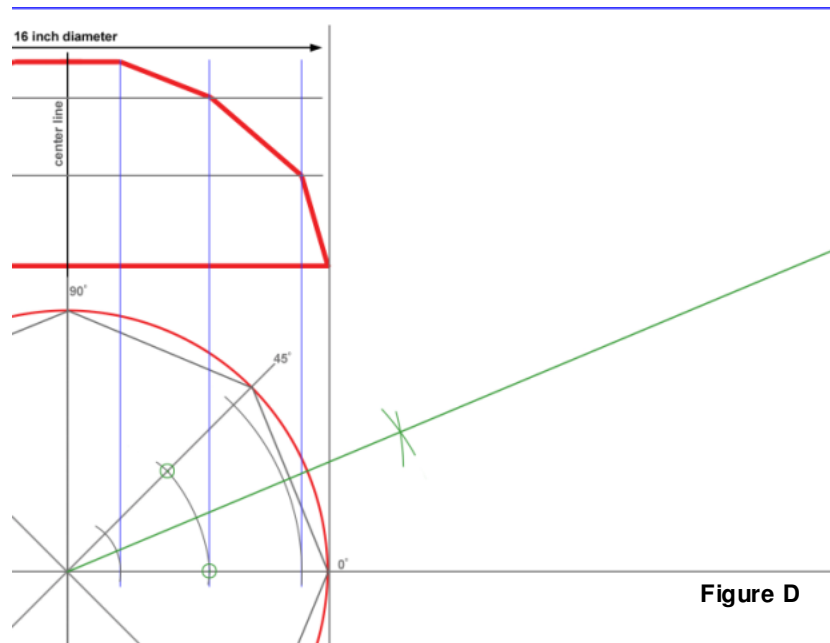


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7. Now draw vertical lines from the side elevation drawing from where each layer meets down to the horizontal line on the right side of the full circle drawing (blue lines on Figure C).
8. Each blue vertical line that passes through our horizontal (0°) line now defines the radius of an arc to draw that passes through the horizontal line and the radial section line just above it (the 45° line here). Use a compass with the point set at the circle center and draw in the arc for each vertical line. Leave the compass set the final arc's radius for the next step. This will become our working section. The drawing should now look Figure C.
9. Now you need to draw an angle bi-sect of the working section. This is a line that will divide the angle of our working section into two equal angles.

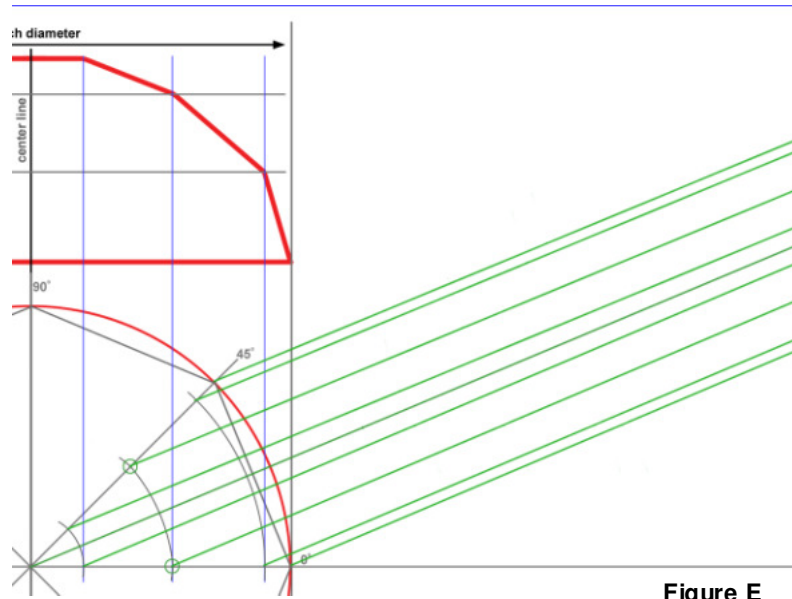


- a. Using the compass still set from the last arc created in step 8, put the compass point where the second arc meets our 0° line and draw a small arc out past the circle and near what looks like the middle of our section. (Green line in Figure D).
- b. Without changing the compass angle, put the point where that same second arc meets the 45° degree line and make a small arc that intersects the first one.
- c. Now draw a line that connects the center point of our circle and extends through this intersection point and extends way out into the empty right side of our paper. The drawing should now look like Figure D.

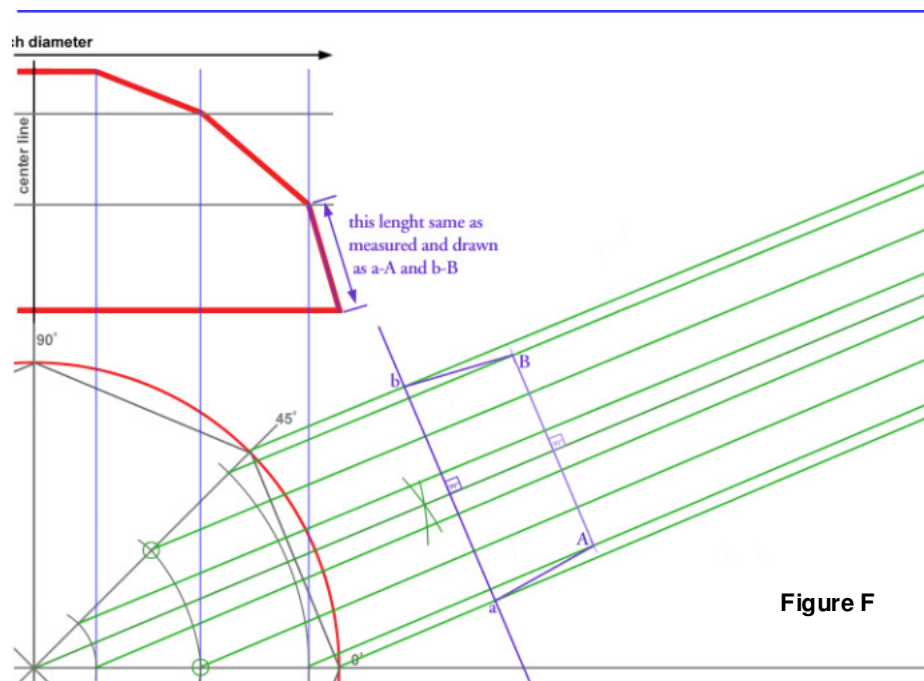


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10. Next draw lines parallel to the angle bisection line from each point where an arc and the lamp diameter circle line meets either angle line that defines the working section, here it is the 0 and 45 lines. (This is where a set of parallel rules can come in handy). These lines will create the widths for your templates. The drawing now looks like Figure E.

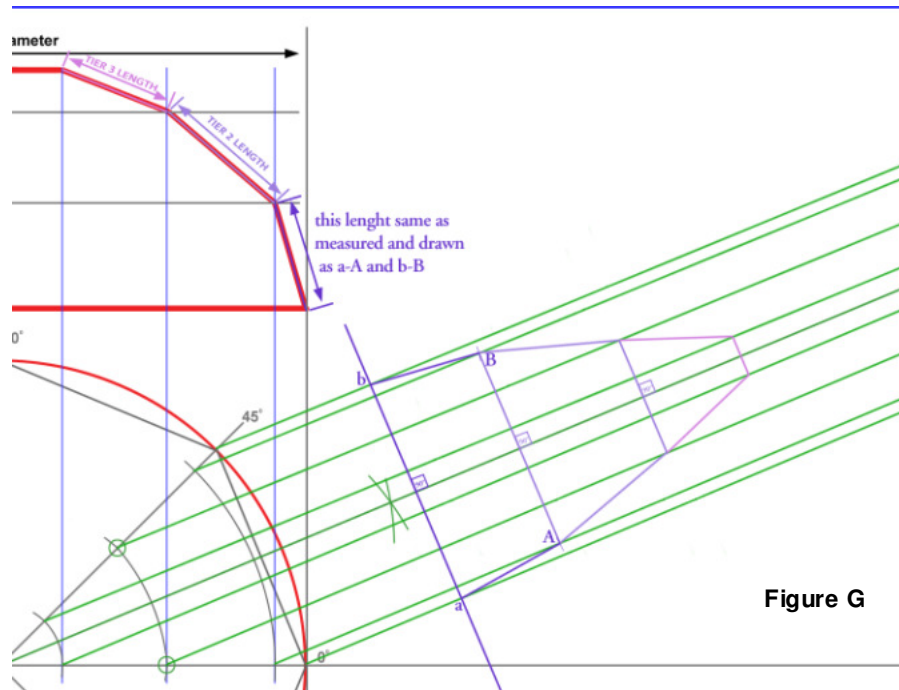


11. Next draw a line perpendicular to this group of parallel lines. With your compass measure the length of the profile line on the lowest tier. Without changing the compass, place the point where the perpendicular line meets the outer most parallel line (a) and then strike a small arc that crosses through the next parallel line just inside (b). Repeat from the opposite side, placing the point of the compass at A and striking the arc on line B. Draw lines (purple) to connect points a-A and b-B then complete the shape by drawing another perpendicular line connecting A to B. This is the shape, to scale that makes up the bottom tier of your lamp. See Figure F.

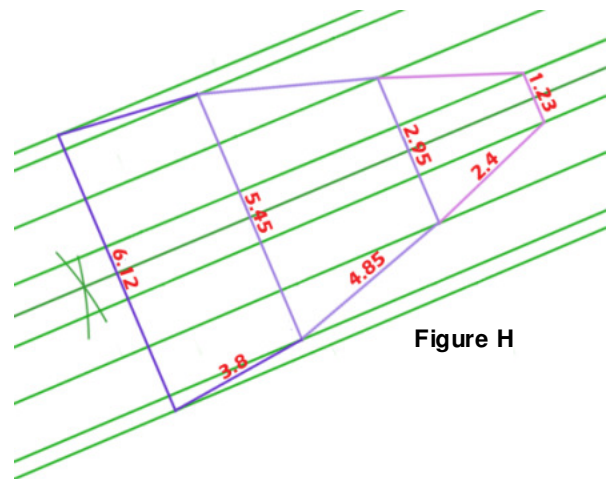


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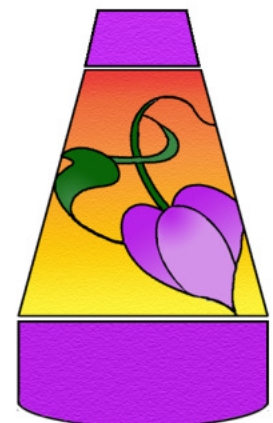
12. Duplicate the process in step 11 for each tier of your lamp until all shapes are drawn. Your drawing will now look like this:



13. The last step is to create true size templates for each tier. Measure accurately (in centimeters) the lengths and widths you have for each tier layer. Convert the measurement to inches (remember our scale 1 cm = 1 inch) and then precisely draw out these shapes. Using a gridded paper that has been glued to a light cardboard will make this easier and make nice final templates for cutting your glass



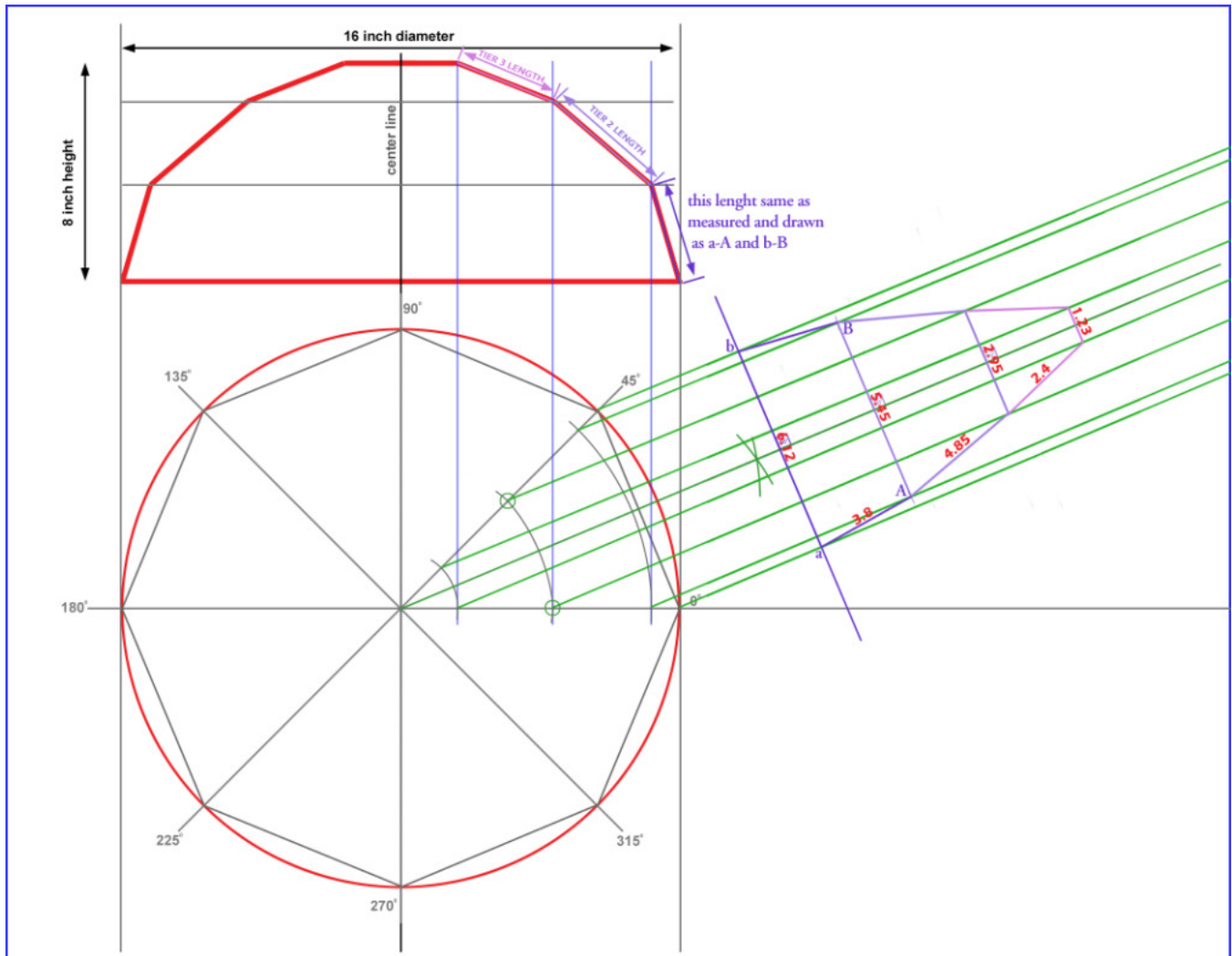
14. Each tier template can be used as a space to design additional detail into your lamp. For example let's say you want to put a flower design into each piece that makes up the middle tier. Using that template to define the space for your design. Create a pattern, cut, foil, and then assemble the design, making the same number of copies as the number of sections in your lamp (in our example this is 8). If you use layout blocks to define the template boundaries and assemble your design inside it will be easier to make sure your final sections stay consistent to each other and to the shape and size that makes up the tier. Keep in mind that the more complex the pattern, the more difficult it will be to maintain a uniform size. Other options include modifying the lower edge of the bottom tier giving it a scallop shape instead of straight across.



15. Now you can design any regular geometric style stained glass shade with the shape, size, and number of tiers you want!

16. And in case you're interested, the final drawing would look like this:

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This how to technique is based in the information found on the [Karat Studios website](#)