# DRAW-ON-THE-LINE 8-POINTED STAR TUTORIAL - Page 1

The 8-Pointed Star is often a challenge to draft. There is an easy way to draft it with a compass to any size but this will not always follow the lines on the graph paper and requires lots of erasing.

There is also a formula for drafting the block. If you know the finished size, divide it by 3.414. That will give you the size of the corner square. For example, if you want an 18" finished block: 18 ÷ 3.414 = 5.2724, rounded to 5.25. That will be your A measurement. Subtract that from half your finished block: 9 − 5.25 = 3.75. That will be your B measurement. Double this measurement for the width between the star points. This works for all blocks but there are some sizes that won't round to an even number that can be drawn on graph paper. You can also start with the A measurement and multiply it by 3.414 to get the finished block size. For example: 2 x 3.414 = 6.828. But that would be a difficult size block to make. Another example: 2.125 x 3.414 = 7.2548. Round that to 7.25 ÷ 2 = 3.625 which is half the block size. 3.625 − 2.125 = 1.5 which is your B measurement. You can draft this block easily on 8 per inch graph paper but it won't work with the 24 grid that we will be using in this tutorial. You would have to change the A measurement to 2.1 and use 10 per inch graph paper and the finished block size would be 7.2 which is also a difficult size. Either way your block would appear to be perfect. That .05 inch isn't going to make much difference. But using the 8/inch graph paper would make the block easier to assemble and subdivide.
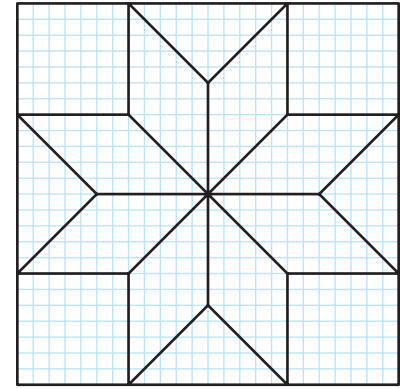
For this tutorial we are going to draft it in an even easier way. For the sizes on Drafting Chart 4 I've already done the math for you. If you want a size that's not listed and don't want to use the above formula, the easiest way would be to draft the closest size and increase or decrease on a copier for the desired size.

This tutorial is for a 4" finished size using 12 per inch graph paper. To find the best graph paper for a different size divide the finished block by **24**. That is the magic number for all block sizes but not all block sizes will follow the lines on the graph paper. For instance a 5" finished block, 5 ÷ 24 = .2083 which converted to a fraction is $^5/_{24}$". That number isn't on my decimal to fraction conversion list because my graph paper only goes to 16 per inch. Anything larger than that would be too difficult to work with, so this size block would be easier to draw as a 4$^1/_2$" or 6" block then increased or decreased on a copier to the desired size.

Now that you know a little background about drafting this block, let's get started.

First we need a sheet of 12 per inch graph paper, a mechanical pencil (my personal choice), and a drafting ruler. Don't use a rotary cutting ruler. They are too thick. I use my 6" Bias Edge™ Template for most of my drafting and a 2" x 18" drafting ruler for larger sizes. I'm using my 6" graph paper for the samples shown. It has dashed diagonal lines going through the center making it easy to center your block on the paper.

**1.** Draw a square the finished size of the block. In this case it's 4" x 4".
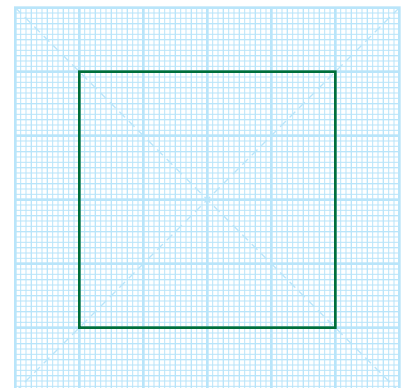
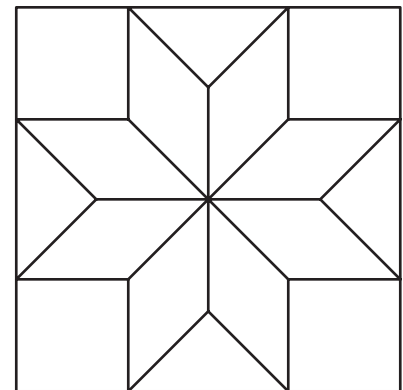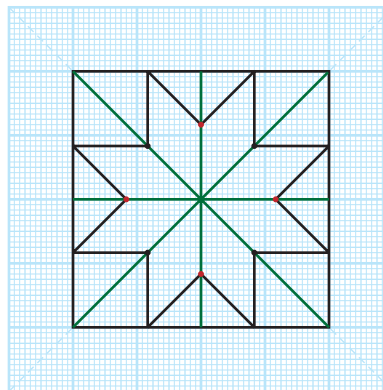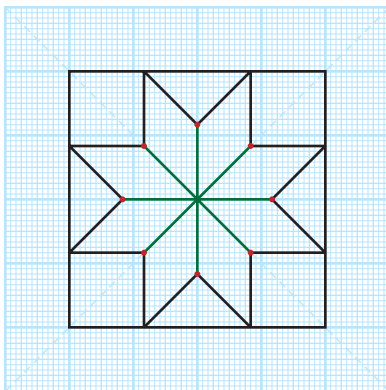**2.** Divide the finished block size by 24 to get the Unit Size. 4 ÷ 24 = .1667 which equals $^2/_{12}$ or $^1/_6$ inch. Multiply this number by **7** to get the size of the corner squares. This is the second magic number. $^1/_6$ x 7 = 1$^1/_6$ or .1667 x 7 = 1.1669 rounded to 1.1667. Draw a square 1$^1/_6$ x 1$^1/_6$ on each corner of the finished block. Remember $^1/_6$ is $^2/_{12}$ so we will be drawing a line 2 spaces past the 1" line on the block. Make a dot at each inside corner where the lines will meet to draw accurately the first time.
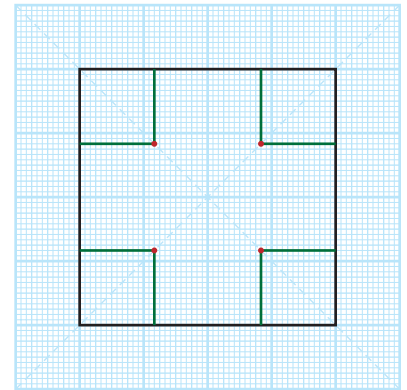


**3.** For the next measurement multiply the Unit Size from Step 2 by **5**. This is the third magic number. $^1/_6$ x 5 = $^5/_6$ or $^{10}/_{12}$. Count over 10 squares from the corner square which should be the center of the block side. Then count up 10 squares and make a dot on all 4 sides. It's easy to count to 10 when you know each $^1/_4$" space is 3 so three $^1/_4$" spaces equals 9 and one more space equals 10. Connect these dots with the bottom inside edge of the squares to make quarter-square triangles. Now you have the perimeter of the star.
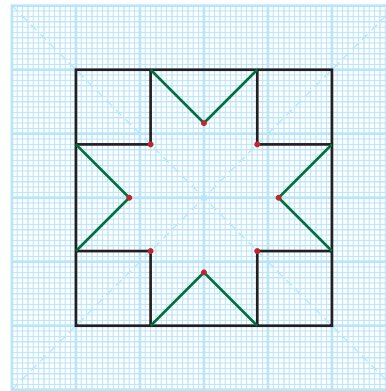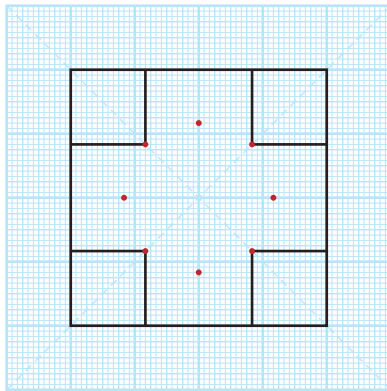


**4.** There are now only 4 more lines to draw. Connect the dots from Steps 2 and 3 horizontally, vertically, and diagonally in both directions through the center of the block. If you plan to foundation paper piece this block, continue these lines to the edge of the block.



In just 4 easy steps you have your block drawn, there are no lines to erase, and you can add additional lines as desired to make other block designs based on the 8-pointed star.

For the Octagon, all you need to know is the finished block size and the Unit Size multiplied by 7. For this example we are going to use a 6" finished size.

1. Draw a square the finished size of the block. In this case it is 6" x 6".

2. Divide the finished block size by 24 to get the Unit Size.
   6 ÷ 24 = .25 or $1/4$ inch. Multiply this number by 7 to get the size of the corner triangles. $1/4$ x 7 = $1^3/4$ or .25 x 7 = 1.75. Make a dot this distance in from all 8 corners of the square. Connect the dots diagonally. If you are using my 4/inch graph paper, trace on the lines that are already there. Now you have a perfect octagon with all 8 sides equal in size. This is a popular block used as a snowball which is often divided into thirds instead of drafted accurately as an octagon.
   Add additional lines as desired to make other block designs based on the octagon. To divide it into 8 equal sections, draw diagonal lines to connect the dots at opposite corners.
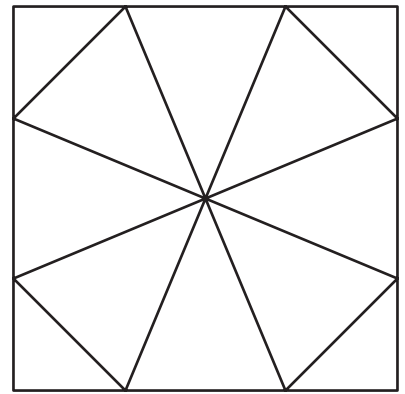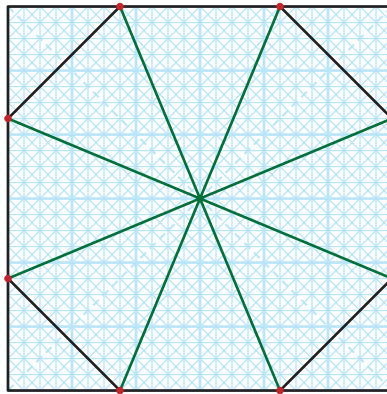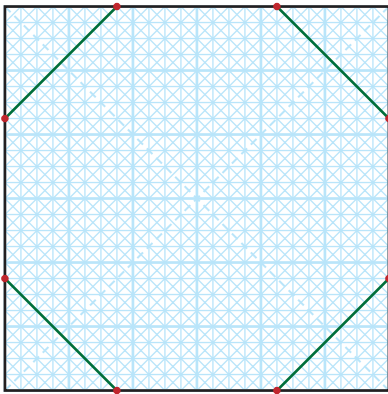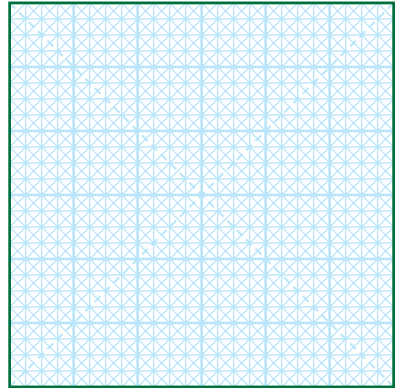
## For a quick summary:

The magic numbers are 24, 7, and 5.

The Unit Size is the finished block size divided by 24.

The width of the corner square (A) is 7 times the Unit Size.

The width of half of the space between the star points (B) is 5 times the Unit Size.

So for each side of the block you will have the following dimensions: 7, 5, 5, 7 which total 24. Another thing to note is the diagonal of the corner square is B x 2, the length of each side of the diamonds that make up the star is the same as A, and the distance from the center outside edge to the inside of the star point is the same as B. The diagonal lines of the diamonds cover the diagonal of 5 units.

5 Units

A

B x 2

B
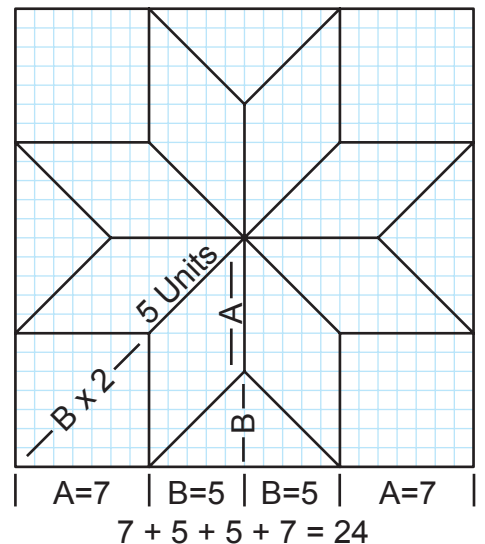
A=7  B=5  B=5  A=7
7 + 5 + 5 + 7 = 24

If you want a finished block that is larger than the graph paper, just draft ¼ of the block to get the dimensions needed for your templates. Remember to double the size of the corner triangles.
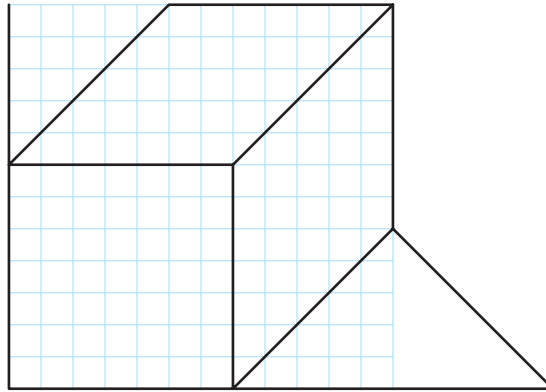
Some additional information for those who want to expand their drafting skills and subdivide the 8-pointed star into halves, thirds, or other measurements. The A width of the finished block would also need to be evenly divisible by this measurement. For instance:

The $^7/_8$" A width for a 3" block is divisible by 2 ($^7/_{16}$) but not by 3 ($^7/_{24}$). This block would need to be drawn on 16/inch paper.

The $1^5/_{16}$" A width for a $4^1/_2$" block is divisible by 3 ($^7/_{16}$) but not by 2 ($^{21}/_{32}$). This block would also need to be drawn on 16/inch paper.

The $1^3/_4$" A width for a 6" block is divisible by 2 ($^7/_8$) and 3 ($^7/_{12}$). This block would need to be drawn on 8/inch paper for 2 divisions and 12/inch paper for 3 divisions.

Remember, anything over 16 per inch is too challenging to draw. So again, choose the block size closest to what you want and increase or decrease on a copier to get the correct size.

Also when dividing the blocks, remember that 7 horizontal or vertical measurements are equal to 5 diagonal measurements of the same square.