

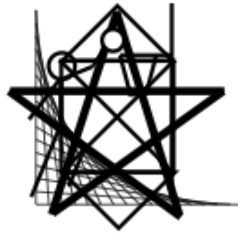


Drawing stars

Math Circle
American University



I'm a doodler – are you?





Drawing a 5-sided star (pentagram)





Drawing a 6-sided star (hexagram)

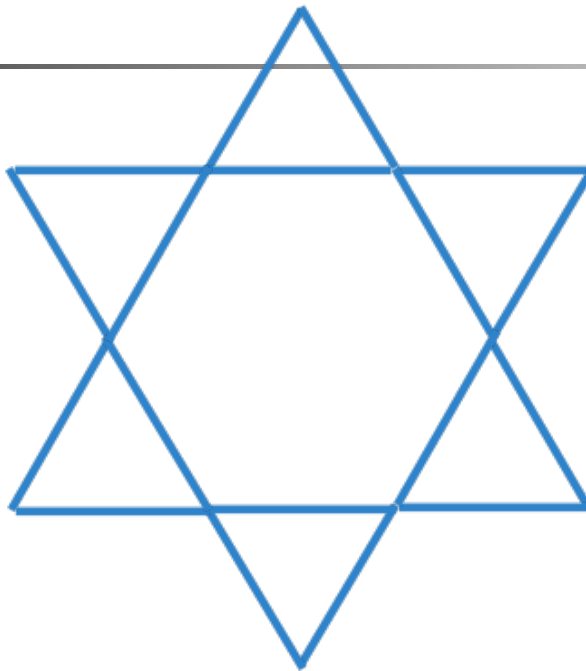
Lift pencil



Do you have to draw a hexagram without lifting your pencil (or retracing)?



Yes you can...



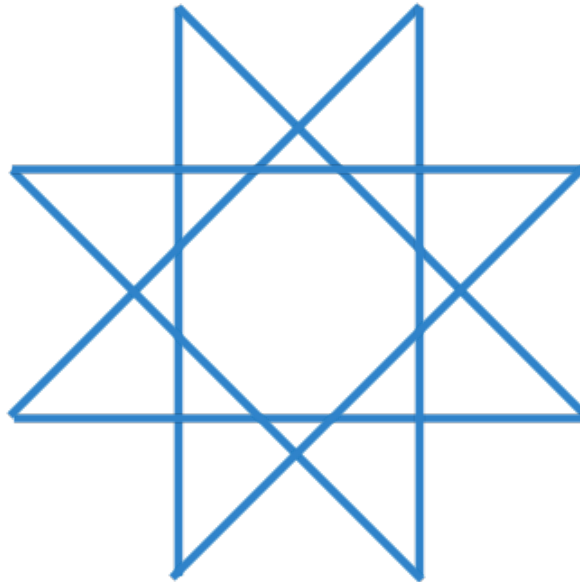
...but that's cheating!

My doodling awakening: Field trip to the Minnesota State Capitol





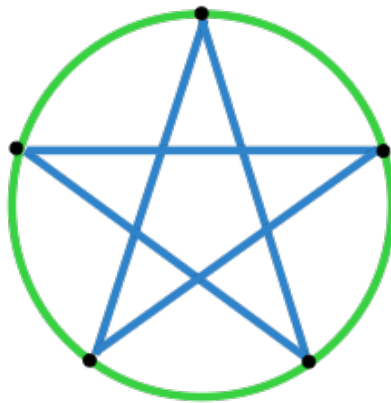
The new 8 sided star...





What is an

$\left\{ \begin{matrix} 5 \\ 2 \end{matrix} \right\}$ star?

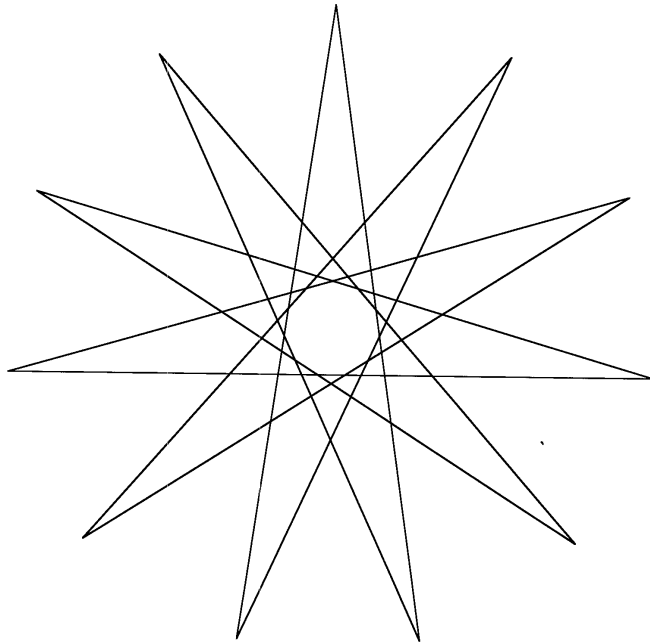


- Draw a circle.
- Draw 5 points equally spaced on the circle.
- Draw a line from one point to the other skipping 2 points.
- Keep doing the previous step until you get back to the original point.

We can use this way to name stars to find others...



What star is this?





What you need to do now

- Practice drawing these stars!
- You can use the whiteboards, but it's tough because it's hard to draw freehand. We have papers with perfectly spaced dots on circles and straightedges.
- While you're doing this:
 1. Figure out which stars you can draw without lifting your pencil or retracing.
 2. Come up with as many conjectures as you can!



What you need to do next

- Get in your group by numbers.
- Answer which stars you can draw with lifting your pencil or retracing, but drawing lines between the points. I want to know ALL of them.
- Let me know what other conjectures your group came up with. Let's see which group gets the most!!



Greatest Common Divisors and Relatively Prime Numbers

- $\text{GCD}(a,b)$ = Greatest Common Divisor of numbers a and b .

$$\text{GCD}(15,6)= 3 \quad \text{GCD}(81,45)= 9 \quad \text{GCD}(1000,77)= 1$$

- If two numbers a and b are relatively prime, then $\text{GCD}(a,b) = 1$
- Examples of relatively prime numbers?