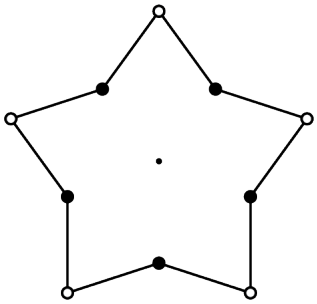
Application Activity

Instructions for Parents:

You should encourage your child to play with the application activity as long as they are happily engaged and making progress, but not every problem needs to be solved completely. Many problems have extensions that encourage open-ended exploration. Feel free to read the instructions with your child and make sure they understand. However, all answers given below should be the sole work of the applicant. If your child has questions regarding the instructions below, or would like clarification on what sort of response to submit, please contact us at camplemma@proofschool.org.

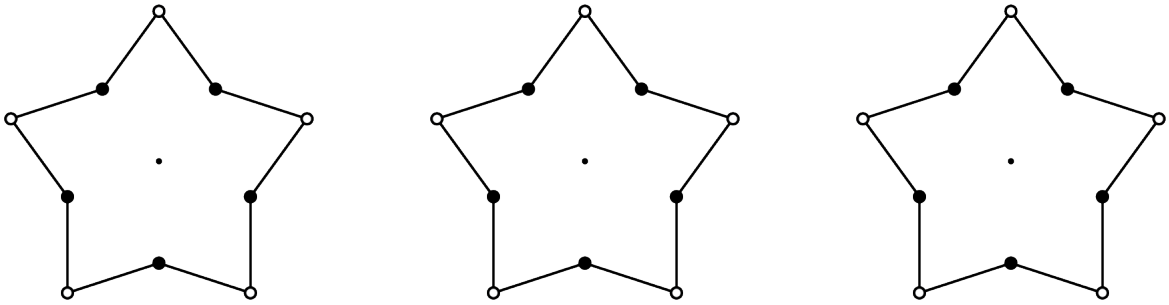
Star Power!

Shown below is a diagram of a star. All edges in the diagram are the same length L. The distance between each black point and the center of the star is also L. Record your answer to each challenge in the space below, using a separate piece of paper to address extensions and explain your reasoning. A full page of stars has been provided for experimentation and scratch work.



Challenge 1:

Find at least two ways of breaking the star into five congruent pieces. If you can, find a third!

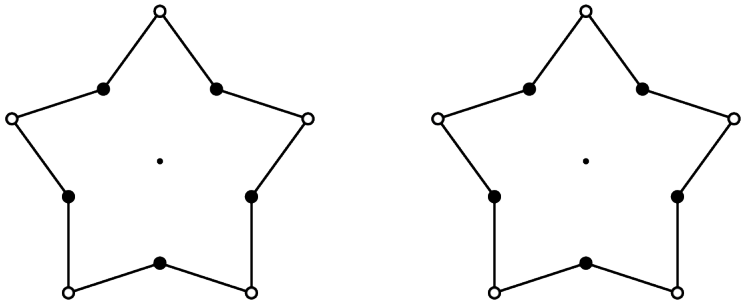


Extension 1:

On a separate sheet of paper, describe a process you could use to create many different divisions into five congruent pieces.

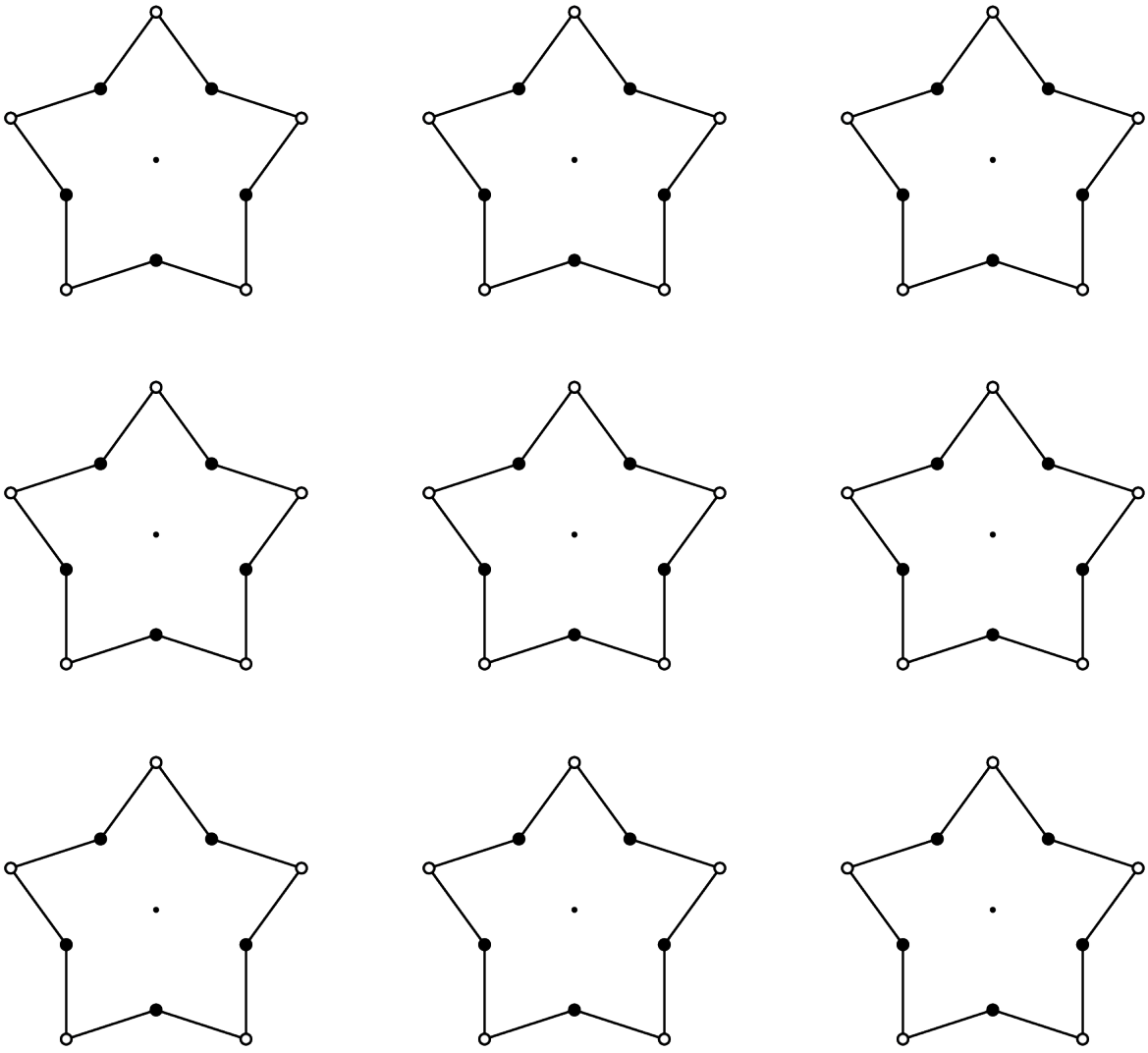
Challenge 2:

Find a way to break the star into five pieces which are not all congruent, but which all have the same area. If you can, find a way to break the star into four equal-area pieces.

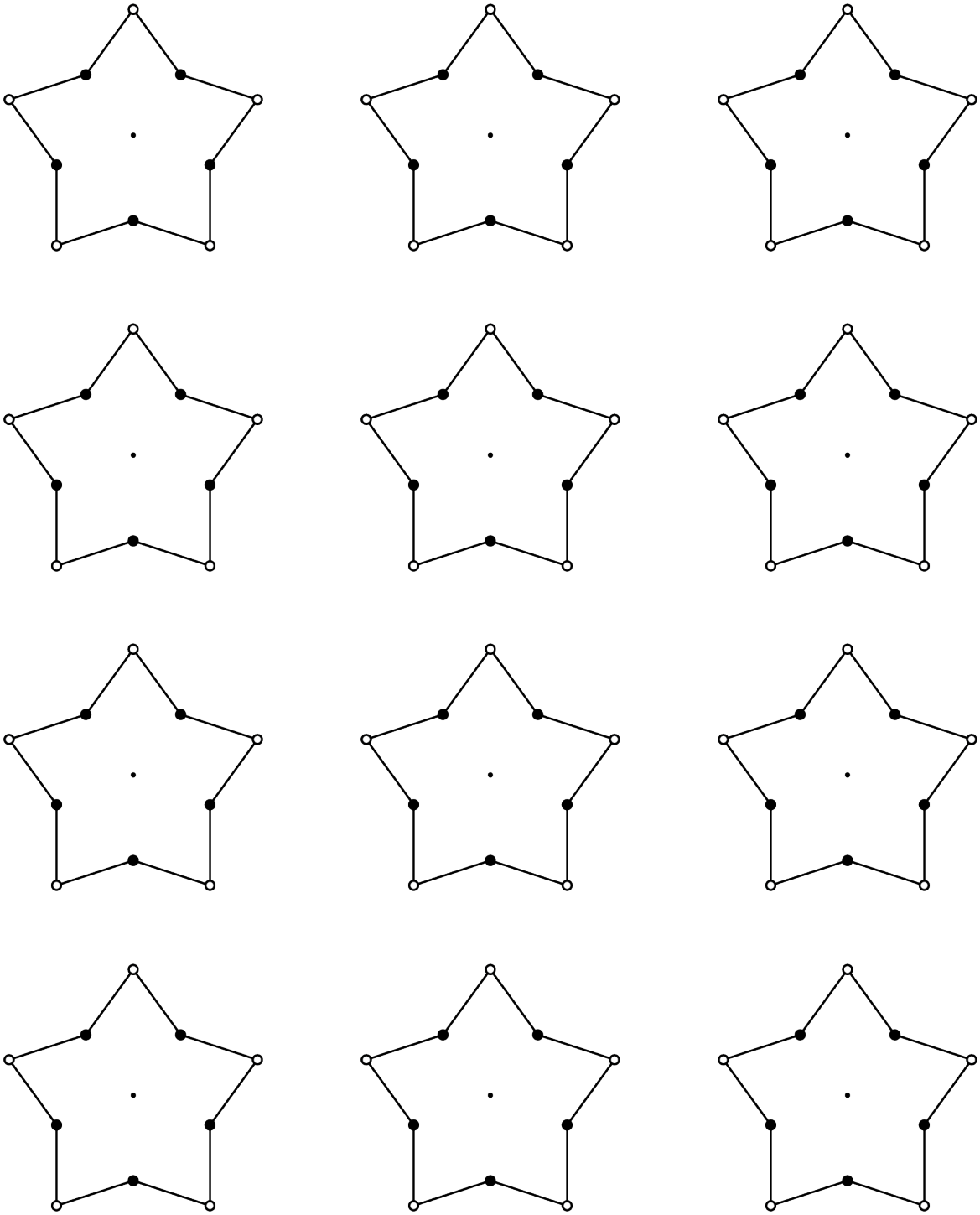


Extension 2:

See if you can find ways to break the star into N equal-area pieces for other values of N.



Extra Stars for Scratch Work:



Ducks in a Row

You are in charge of creating a window display for Rubber Ducky Emporium. The display will consist of a row of ducks, some of which are yellow and some of which are blue.

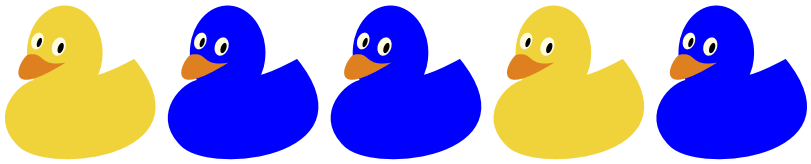


Figure 1: All our ducks in a row.

Challenge 3:

The owner of Rubber Ducky Emporium tells you that blue ducks **must** be next to yellow ducks. You aren't allowed to put two blue ducks together. So for instance, the row of ducks above would be illegal, because two blue ducks are next to each other.

How many different rows of four ducks are allowed? Can you figure out how many rows of five ducks are allowed? Show your thought process, and explain why you are confident that your answer is correct. (Use another sheet if necessary.)

Extension 3A:

Describe a general rule for figuring out how many different rows of N ducks are allowed for any number N. Use your rule to find out how many ten-duck rows there are.

Extension 3B: (*Can be done with our without Extension 3A*)

How would the answers to the previous problems be different if you were allowed to have two blue ducks next to each other, but were never allowed to have three in a row?