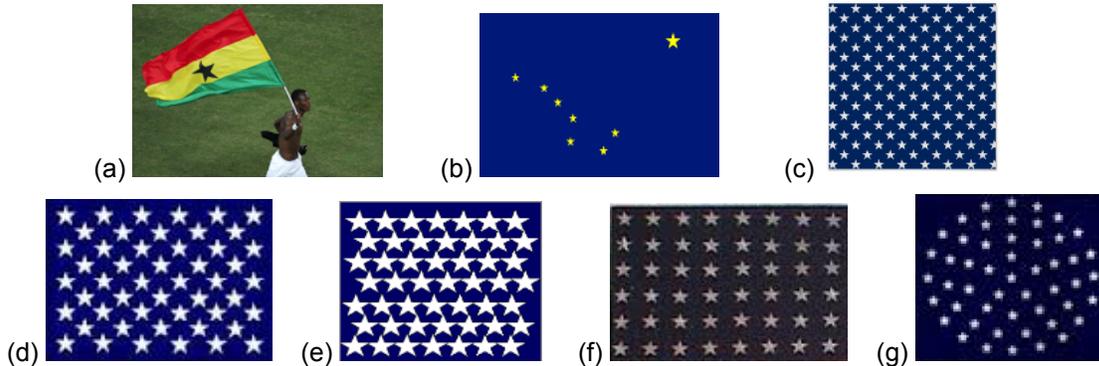


College Bound Math Problem Set #9

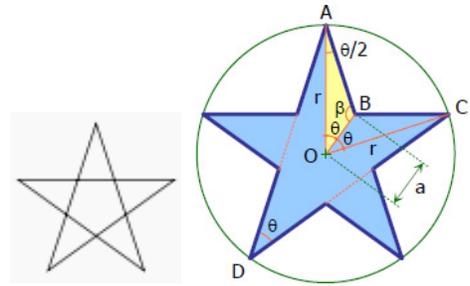
week of December 15, 2014

1. Some of these images are in real flags. Find the number of stars in each. Do not count. It takes too long and it's hard to keep track. Use short-cuts. Use math!!

Hints: Since (f) is a 6 by 8 rectangle, multiply. Since (e) has the same number of stars in each row, multiply. In (d), the odd-numbered rows and columns form a rectangle of stars and so do the even-numbered rows and columns.



For Problems #2 and #3, think about just one star, in particular a 5-pointed star consisting of 5 line segments drawn without lifting your pencil, as in the first diagram. Assume that the 5 points lie at equal distances around a circle, as in the second diagram, and that all the sides are equal.



2. Look at the little yellow triangle, $\triangle AOB$, in the second figure.
- How many copies of this little triangle would it take to fill the star (including the one mentioned, that is already in place)?
 - What would you have to do in part (a), to make them fit? For example, how many would have to be turned over at some point in the process?
3. One can compute the area of the star in terms of its radius. We will not do that but we will pave the way by getting the number of degrees in some of the angles.
- How many degrees are there in arc AC ? (Remember that the 5 points lie at equal distances around a circle.)
 - How many degrees are there in $\angle AOC$?
 - How many degrees are there in $\angle AOB$?
 - How many degrees are there in $\angle A$? (The number of degree in an angle like this is always half the number of degrees in the arc that it intercepts.)

To complete the job of finding the area, see:

<http://www.mathalino.com/reviewer/plane-geometry/area-of-regular-five-pointed-star>