Gerrymandering and Compactness, Part 2

After completing this section, students should be able to;

- Explain how to calculate compactness using the Polsby-Popper, Schwartzberg, Reock, and Convex Hull methods.
- Calculate various measures of compactness on simple "toy" regions.

Measures of Compactness

1. Polsby-Popper method:

2. Schwarzberg method:

3. Reock method:

4. Convex Hull method:

For each of these measures (Polsby-Popper, Schwarzberg, Reock, Convex Hull):

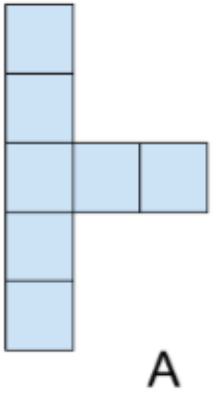
- Does a high score or a low compactness score mean that the district is gerrymandered?

- What is the maximum possible compactness score and what is the minimum?

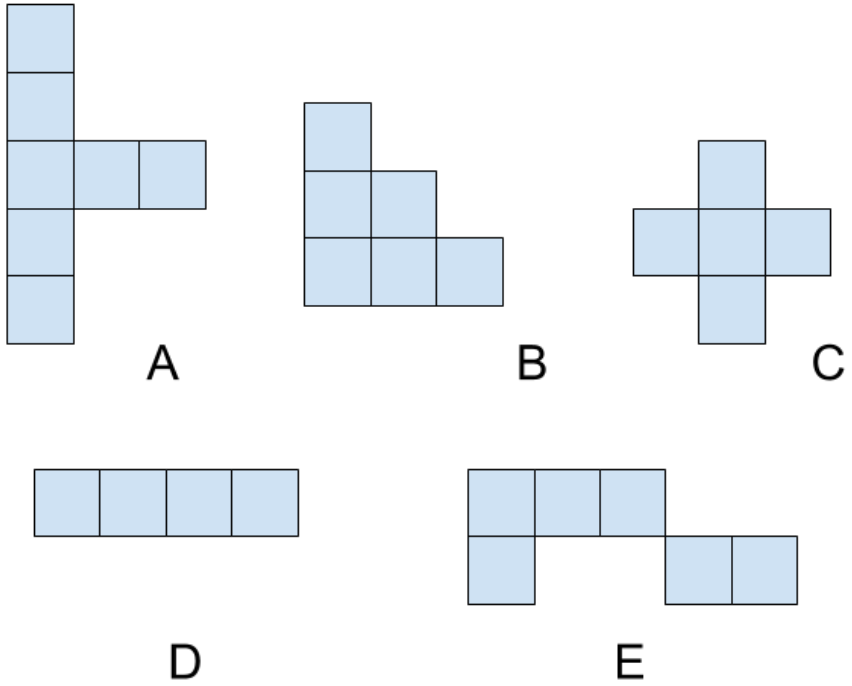
- Does the measure scale with size?

Computing Compactness

Compute the Polsby-Popper, Schwarzberg, Reock, and Convex Hull scores for shape A below.



Pick one shape and compute its compactness using each of the four methods: Polsby-Popper, Schwarzberg, Reock, and Convex Hull.



- Do these measures all rank the shapes in the same order?

- Do they rank them in the same order as your intuition?

Algebraic formulas for compactness

- Work out an algebraic formula for the Polsby-Popper score in terms of A_d (the area of the district) and P_d, the perimeter of the district.

- Work out an algebraic formula for the Schwartzberg score in terms of A_d (the area of the district) and P_d, the perimeter of the district.

- How are these formulas related?