

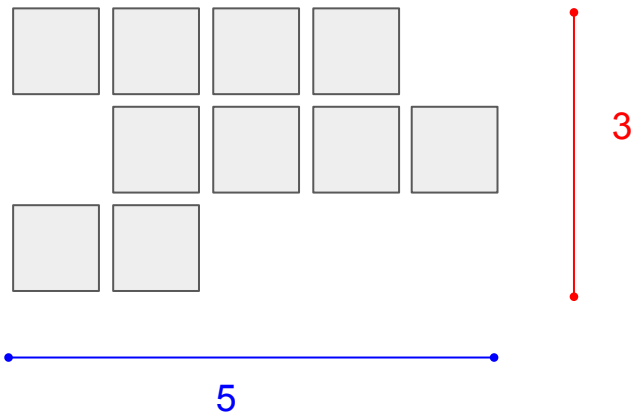
Gerrymandering and Geometry

Compactness Metrics

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Skew

W / L , where W = shorter dimension, L = longer dimension



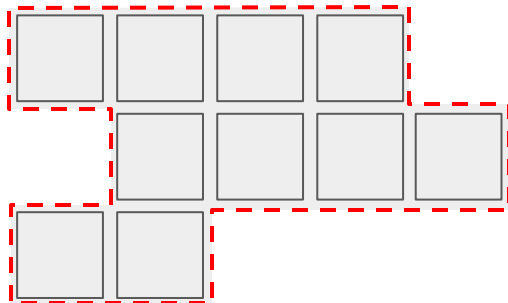
$$W = 3$$

$$L = 5$$

$$W / L = 3 / 5 = .6$$

Isoperimetric

$16A / P^2$, where A = area, P = perimeter



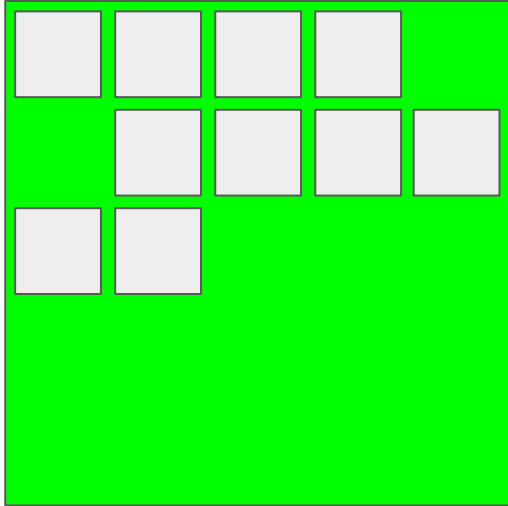
$$A = 10$$

$$P = 18$$

$$16A / P^2 \approx 0.49$$

Square Reock

A / S , where A = area, S = area of smallest square containing district



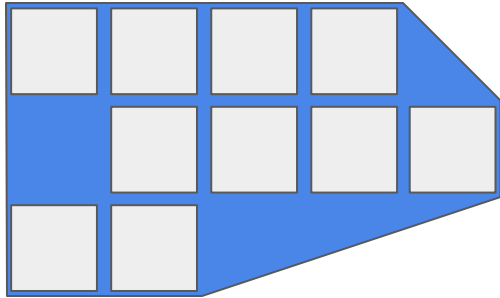
$$A = 10$$

$$S = 25$$

$$A / S = 10 / 25 = 0.4$$

Convex Hull Ratio

A / H , where A = area, H = area of convex hull



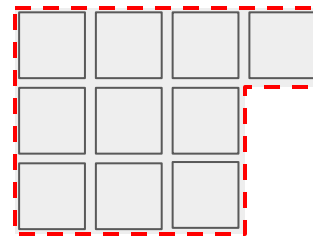
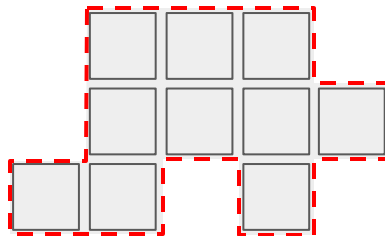
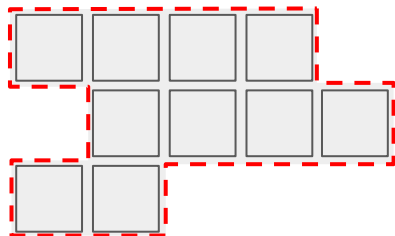
$$A = 10$$

$$H = 13$$

$$A / H = 10 / 13 \approx .77$$

Sum of perimeters

$$P_1 + P_2 + \dots + P_n$$



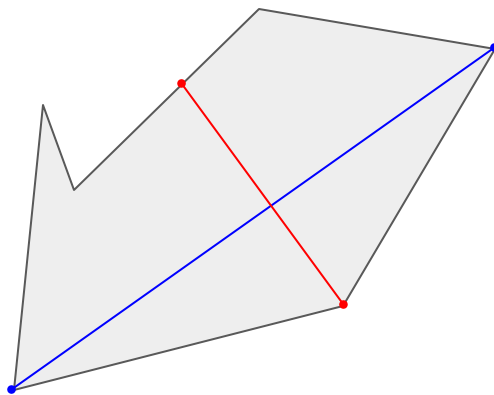
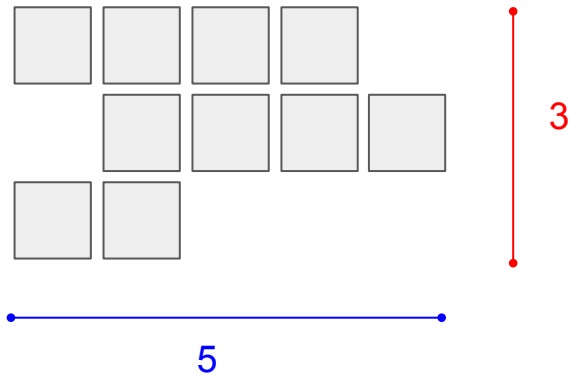
Note: applies to a map, not to a single district!

Real-world versions

Some of these metrics have been simplified for Squaretopia. Here are the real metrics they correspond to.

Skew becomes Harris

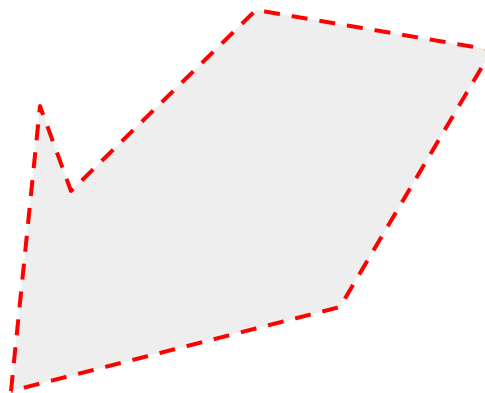
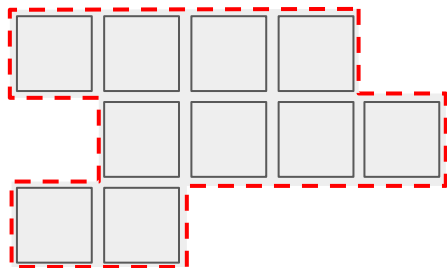
W / L , where L = longest axis, W = greatest width perpendicular to that axis



Harris

Isoperimetric becomes Polsby-Popper

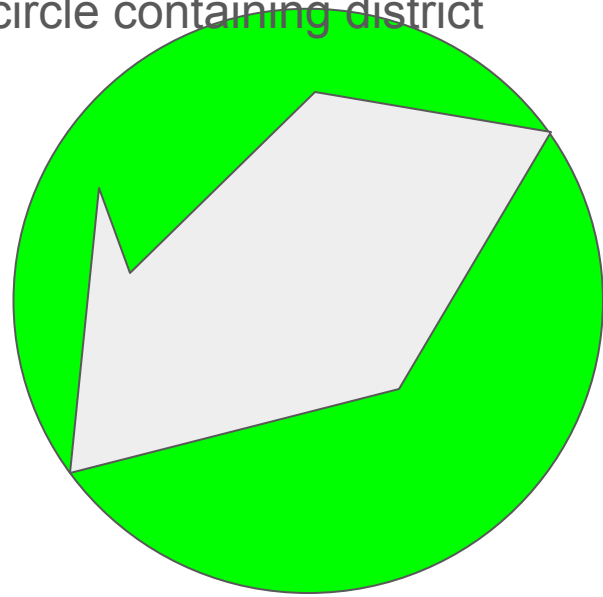
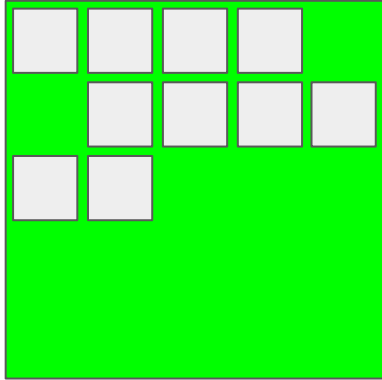
$4\pi A / P^2$, where A = area, P = perimeter



Polsby-Popper

Square Reock becomes Reock

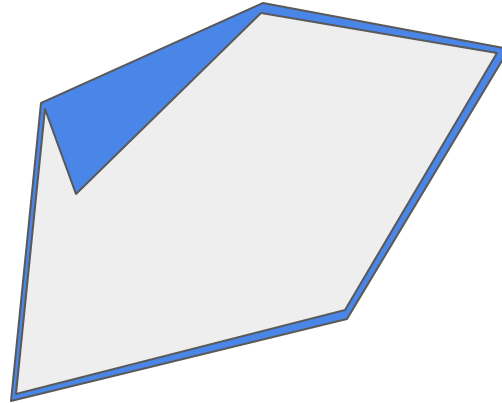
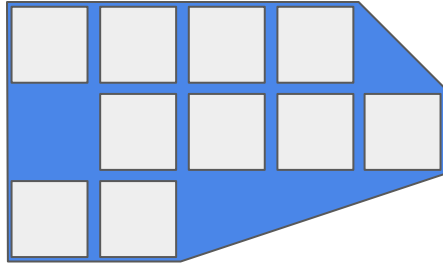
A / C , where A = area, C = area of smallest circle containing district



Reock

Convex Hull Ratio becomes... Convex Hull Ratio

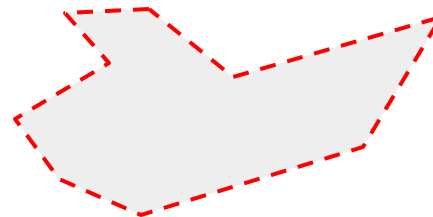
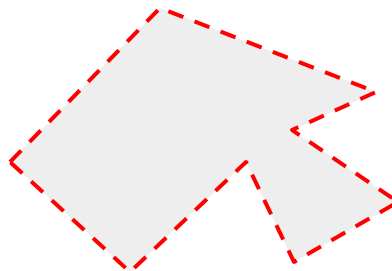
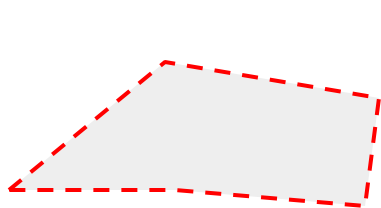
A / H , where A = area, H = area of convex hull



Convex Hull

Sum of perimeters becomes... sum of perimeters

$$P_1 + P_2 + \dots + P_n$$



Applies to an entire map.