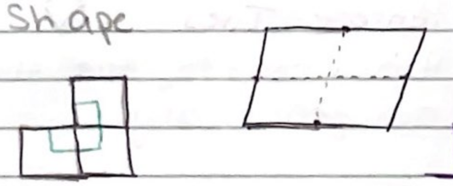
Penrose's Kites & Darts tilings
(with a side of reptiles)

- Mostly drawn from a column of Martin Gardner's in Scientific American in 1977 (Expanded in Penrose Tiles to Trapdoor Ciphers Published by the Mathematical Association of America, 1977)

inflation: grow, make larger
deflation: Shrink, make Smaller

Kite & Dart tile Specifications:
- Start with a finite Kites & Darts pattern
- Apply **deflation** to chop into smaller Kites and darts
- rescale to make the small ones be the original size — S - not identical
- repeat...

Aside: A reptile is a shape that can be dissected into congruent (to each other) Smaller copies of the Shape



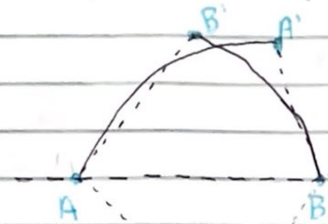
5-fold symmetry:
- A point around which rotations of multiples of 72° don't change the tiling
- A point around which there are five lines each of which has reflection symmetry for the tiling

Theorem (Barlow): Any pattern in the plane with five-fold symmetry has an unique centre for that symmetry

(proof on following page)

Proof:

Suppose A is a point of symmetry for some pattern.



Assume by way of contradiction, that there is at least one other point of five-fold symmetry for the pattern.
Let B be one of these other points of symmetry that is as close to A as possible
(In general, pick two symmetry points that are as close as possible) → counterclockwise
Rotate B 72° about A to get B', & rotate A 72° clockwise about B to get A'

This puts A', B' closer together than A, B
$\otimes$ to (AB) being the minimum distance...

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