

EINSTEIN REDISCOVERED ?

TESSELATIONS AND TILINGS

- A tessellation or tiling is a covering of the plane by geometric shapes called tiles
- Tiles must not overlap or leave gaps
- Only a finite number of tiles must be found in the vicinity of any point

WHAT IS AN EINSTEIN ?

- An einstein (from the German *ein stein*, "one stone") is a geometric shape that can tile the plane all by itself in an aperiodic way
- No convex polygone can be an einstein
- An einstein is known in euclidian spaces of sufficiently high dimension

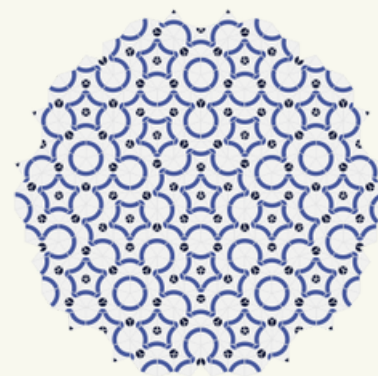
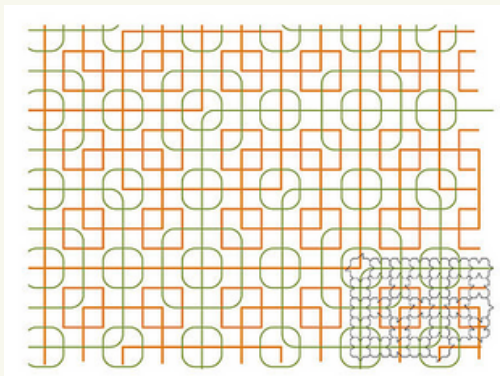
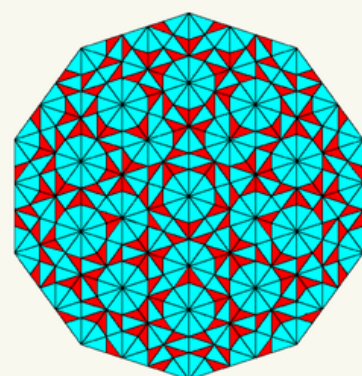
PAST ATTEMPTS

- The first discovered aperiodic tiling was a set with 20,426 tiles
- The Penrose tiles (depitcted below), discovered in 1974, tile the plane aperiodically with only two shapes

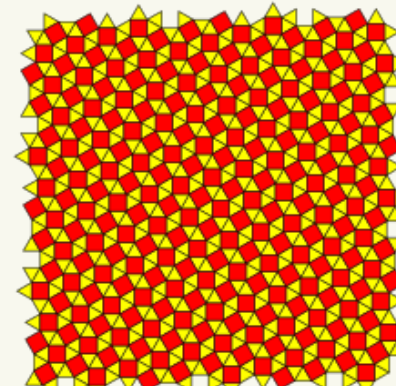
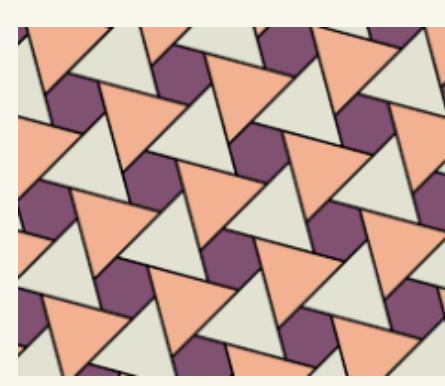
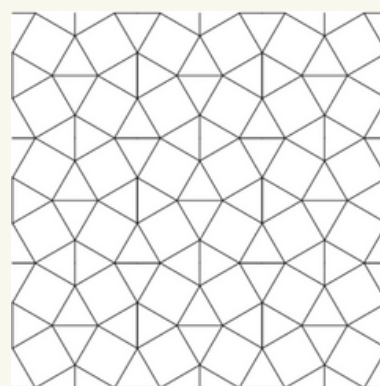
WHAT IS PERIODIC / APERIODIC TILING ?

- Periodic tiling is a tiling that exhibits a repetitive pattern
- Aperiodic tiling is a tiling that doesn't contain arbitrarily large periodic regions

Examples of aperiodic tilings



Examples of periodic tilings



THE DISCOVERY

- David Smith, Craig Kaplan, Joseph Samuel and Chaim Goodman-Strauss have found in march a shape the called "the hat" that can shape the plane aperiodically by itself
- The "hat" has 13 sides and is extracted from a hexagonal tiling of the plane
- The researchers think the most likely application is in the arts
- The "hat" is a polykite, which means it is made of kites, eight to be precise
- The proof of aperiodicity relies on a computer assisted exhaustion of patterns

