

ClassroomAdventures-1408 Post Mortem

August-06-14 9:11 AM

1. Do not name a handout file "Handout".
2. Find a clearer GG and perhaps a clearer MG. Perhaps do the gluing at MG rather than at GG.
3. Add Drax's labeling in red.
4. Improve some of the 18 icons.



The 17 Worlds of Planar Ants

Goal. Get you hooked!

Video, handout, links at ω /

Abstract. Back in early 2000, I got my first digital camera and set out to take pictures of my kids and of symmetric patterns in the plane (ω /Tilings). There are exactly 17 of those, no more, no less. It is an addicting challenge to walk around looking at buildings, brick walls, people's ties, fabrics, what's not, and to try figure out which of the 17 is each one.



Lou Kauffman's Tie



Books.

- J. H. Conway, H. Burgiel, and C. Goodman-Strauss, *The Symmetries of Things*, CRC Press, 2008.
- J. M. Montesinos, *Classical Tessellations and Three-Manifolds*, Springer-Verlag, 1987.

The Renaissance Story

ω /Longtin



The Venus Story



ω /DW

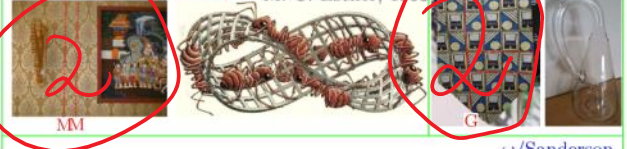
The Lake Merritt Story



The Racha Cafe Story

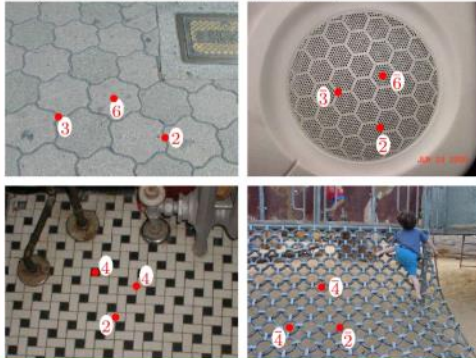
M. C. Escher, 1963

Tic@Fry



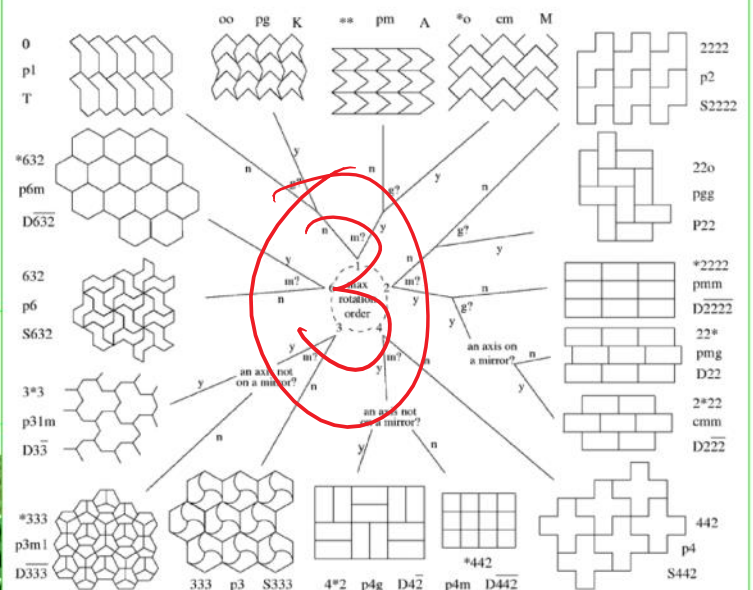
ω /Sanderson

Claim. Exactly 10 "features" are possible. They are **M**, **G**, **2**, **3**, **4**, **6**, **2**, **3**, **4**, and **6**.

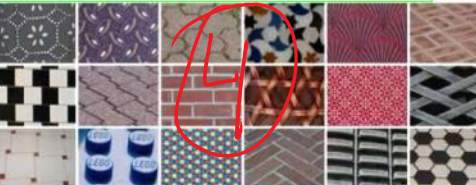


Brian Sanderson's Pattern Recognition Algorithm

Is the maximum rotation order 1,2,3,4 or 6? Is there a mirror (m)? Is there an indecomposable glide reflection (g)? Is there a rotation axis on a mirror? Is there a rotation axis not on a mirror?



Theorem. There are exactly 17 "tilings" of the plane: $\emptyset=0$, $MM=*$, $MG=*\circ$, $GG=\circ\circ$, $2222=2222$, $333=333$, $442=442$, $632=632$, $2222=2222$, $333=333$, $442=442$, $632=632$, $42=4*2$, $33=3*3$, $222=2*22$, $22M=22*$, $22G=22\circ$. 18??



The 230 Worlds of Spatial Monkeys (The 219 worlds of Monkeys that Can't Tell their Left from their Right) ω /Crys, ω /CFHT



Note: Every pattern is identified according to three systems of notation, as in the example below:



442: The Conway-Thurston notation, as used in my [tilings page](#).

p4: The International Union of Crystallography notation.

S442: The Montesinos notation, as in his book *Classical Tessellations and Three Manifolds*

Add a picture of a cone somewhere? A vietnamese hat?