Solving Rubik's UFO

Pensieve Header: Solving Rubik's UFO.

TheGenerators

```
n = 12;
g1 = Cycles[{{1, 9}, {2, 8}, {3, 7}}];
g2 = Cycles[{{1, 2, 3, 4, 5, 6}}];
g3 = Cycles[{{1, 2, 3, 4, 5, 6}, {7, 8, 9, 10, 11, 12}}];
```

TheProgram

```
σ_ ∘ τ_ := PermutationProduct[τ, σ];
Feed[Cycles[{}]] := Null;
Feed[τ_] := Module[{i, j, k, l},
   i = Min[PermutationSupport[τ]];
   j = PermutationReplace[i, τ];
   If[Head[σi,j] === Cycles,
    Feed[InversePermutation[σi,j] ∘ τ],
    (*Else*) σi,j = τ;
    For[k = 1, k < n, ++k,
     For[l = k + 1, l ≤ n, ++l,
      If[Head[σk,l] === Cycles,
       Feed[σi,j ∘ σk,l]; Feed[σk,l ∘ σi,j]]
      ]]
   ];
$RecursionLimit = ∞;
```

TheRun

```
Table[Feed[gα]; ∏_{i=1}^{n} (1 + Count[Range[n], j_ /; Head[σi,j] == Cycles]), {α, 3}]
```

TheRun

```
{2, 362 880, 479 001 600}
```

```
12 !
```

```
479 001 600
```

```
12 ! / 362 880
```

```
1320
```

```
1320 / 24
```

```
55
```

```
12 × 11 × 10
```

```
1320
```

```
9 !
```

```
362 880
```

```
ImageCrop[
 Rasterize[Graphics[{
    EdgeForm[Thin],
    Table[
     If[Head[σ_{i,j}] === Cycles || i == j,
      {Red, Rectangle[{i - 1, n - j}, {i, n - j + 1}]},
      {Yellow, Rectangle[{i - 1, n - j}, {i, n - j + 1}]}
     ], {i, n}, {j, i, n}
    ]
   }, AspectRatio → 1 / GoldenRatio, ImageSize → 720], RasterSize → 720]
]
```