Space

An Alternate Elective after Algebra II

Henri Picciotto

MathEducation.page

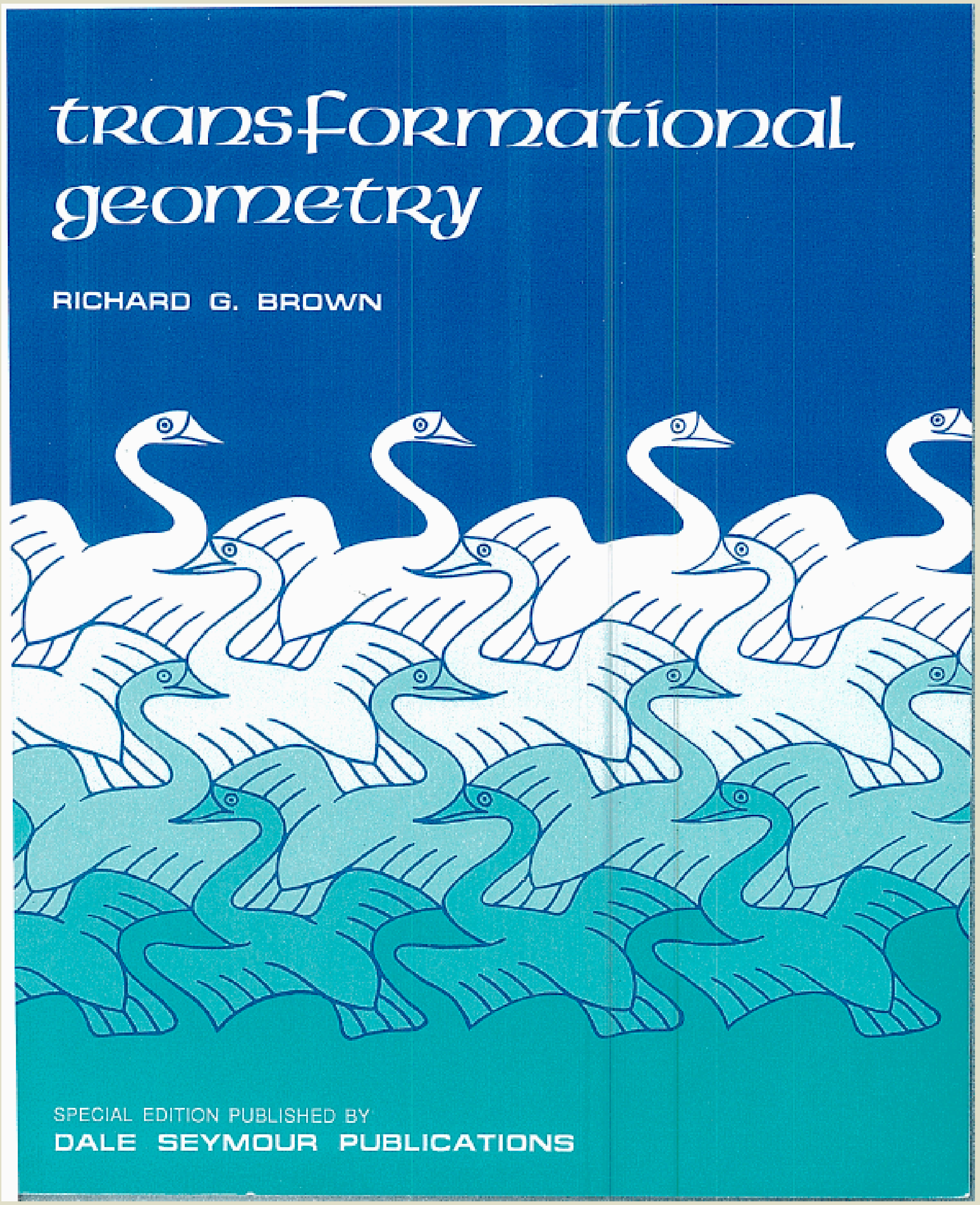
Space: topics

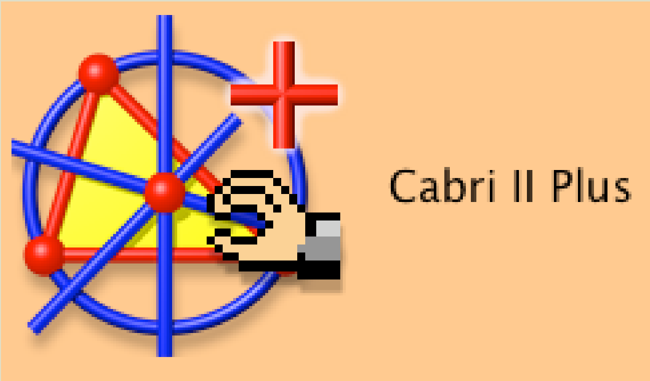
- ◊ Transformational geometry
  - Abstract algebra
- ◊ Symmetry
  - Tiling
- ◊ Dimension
  - 3D: polyhedra
  - 4D: introduction

Transformations

Symmetry

Dimension





Fundamental Theorem of Isometries: every isometry of the plane is a reflection, a rotation, a translation, or a glide reflection.

Computing transformations

using complex numbers:

- ◊ Translation: add a+bi
- ◊ Rotation around the origin: multiply by $\cos\theta + i \sin\theta$
- ◊ Rotation around (a,b): subtract a+bi, rotate around the origin, add a+bi

Cabri II Plus

Computing transformations

using matrices

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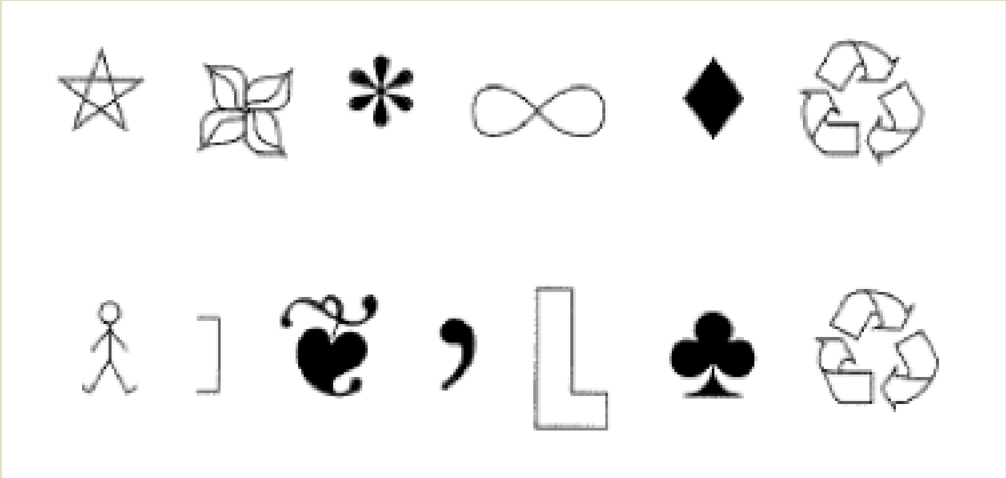


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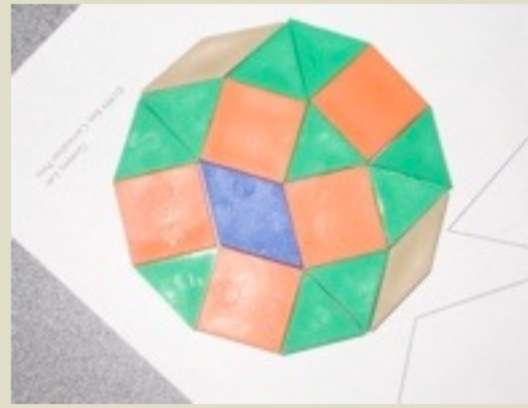
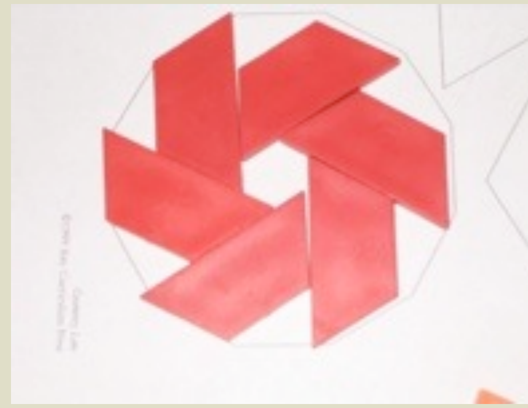
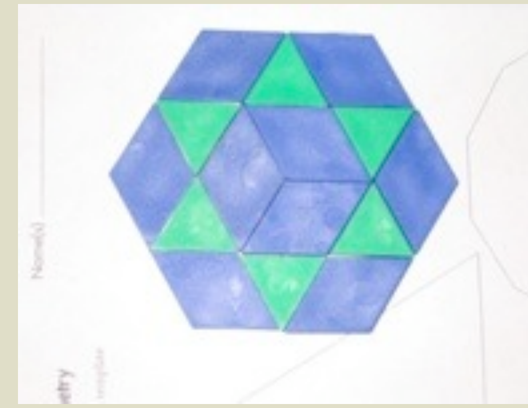
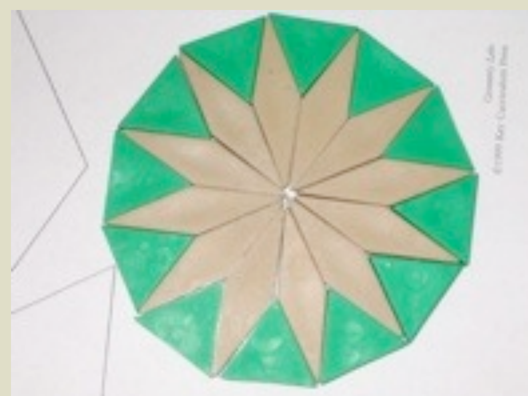
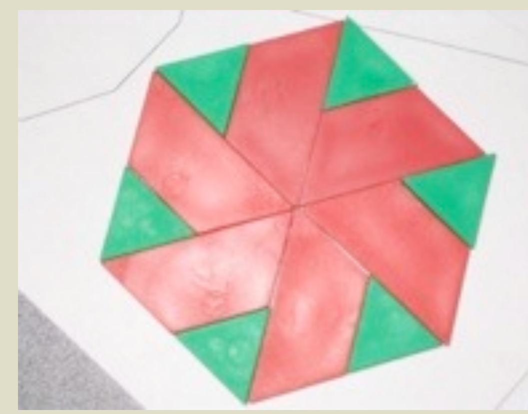
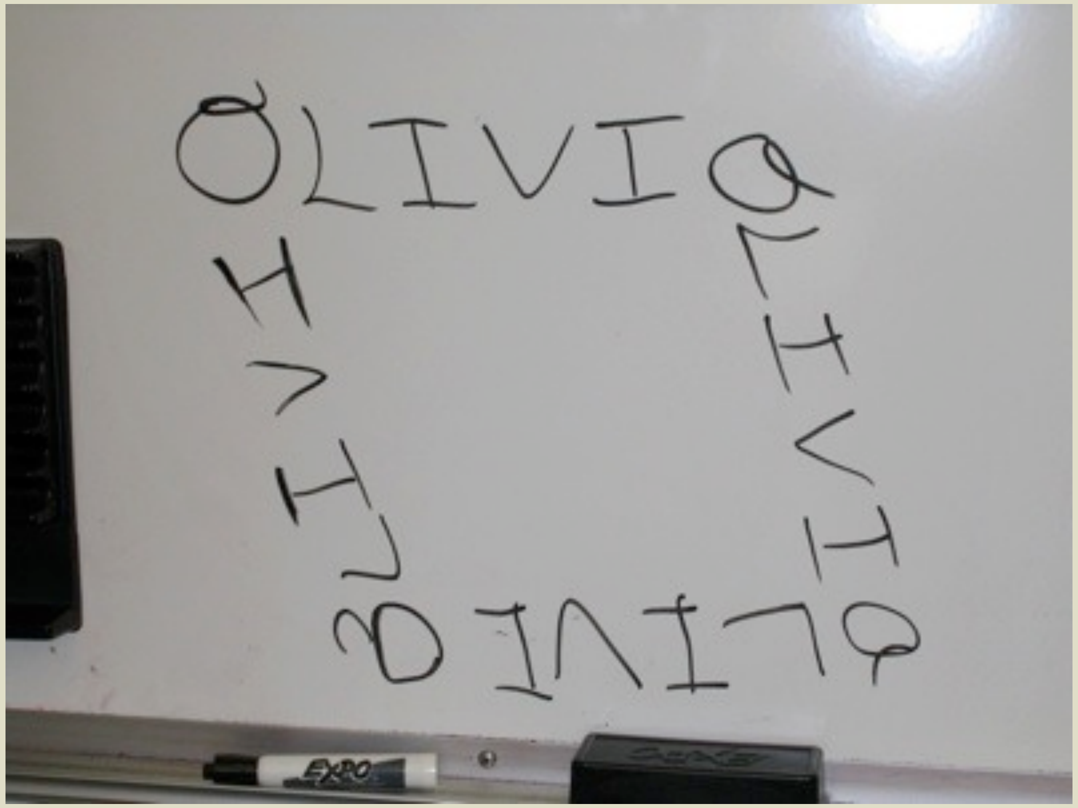
Transformations
Symmetry
Dimension

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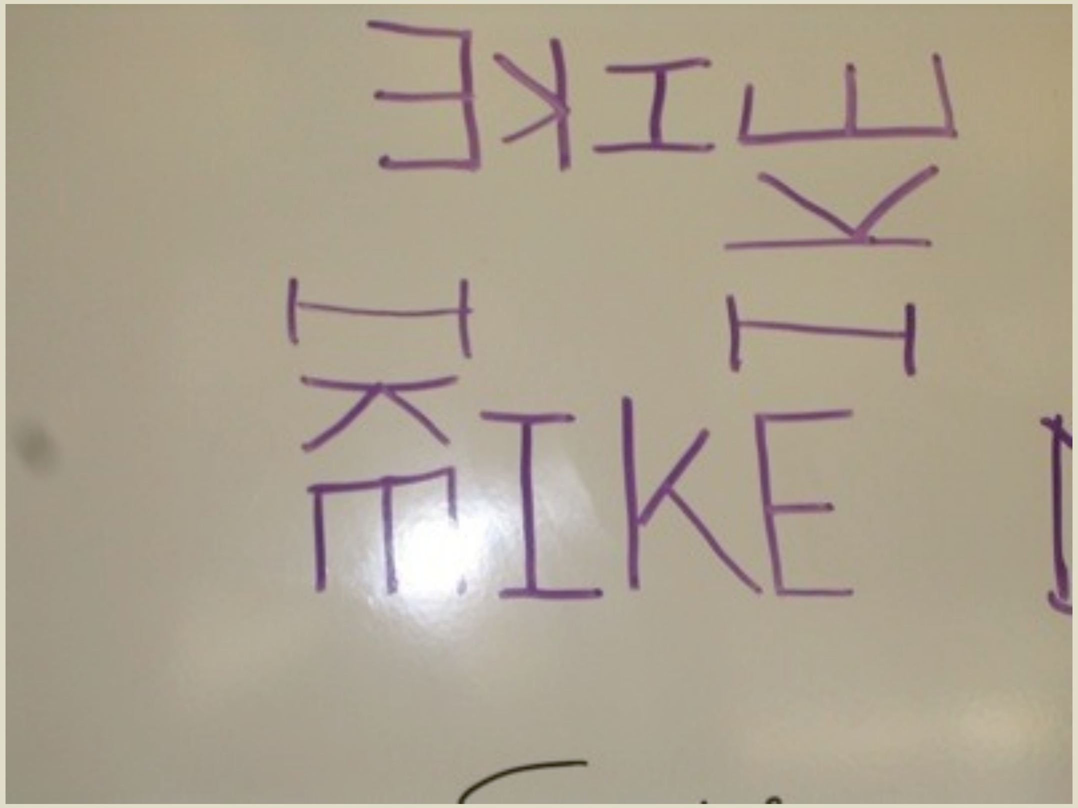
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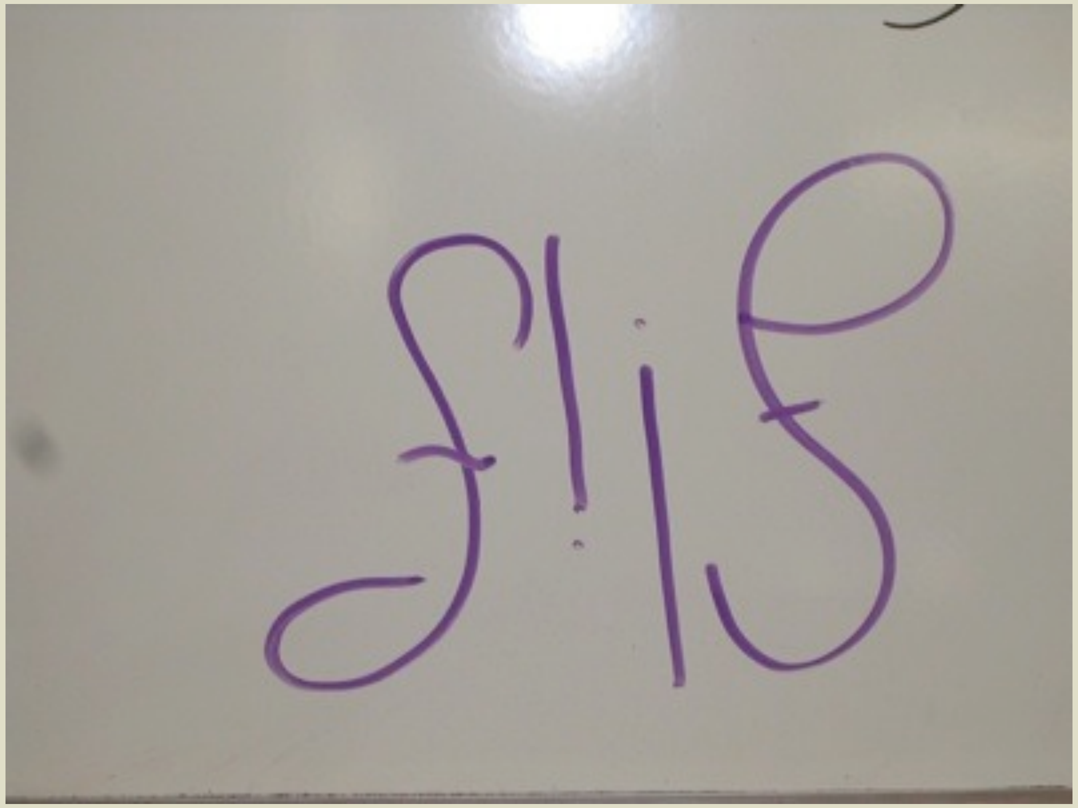
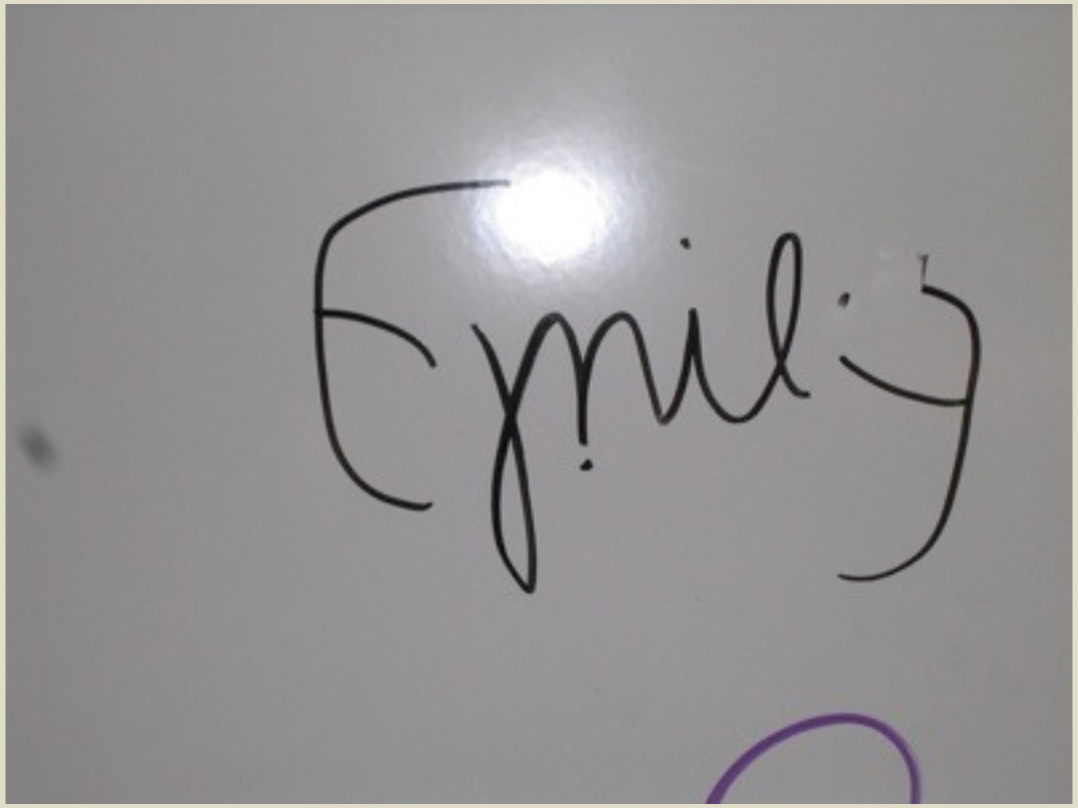
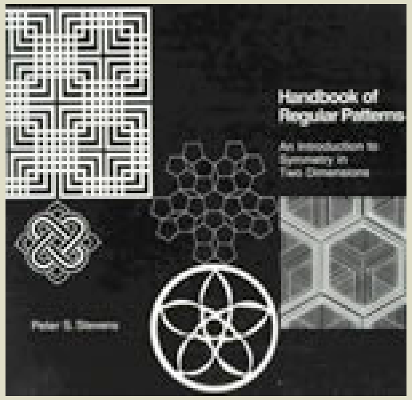
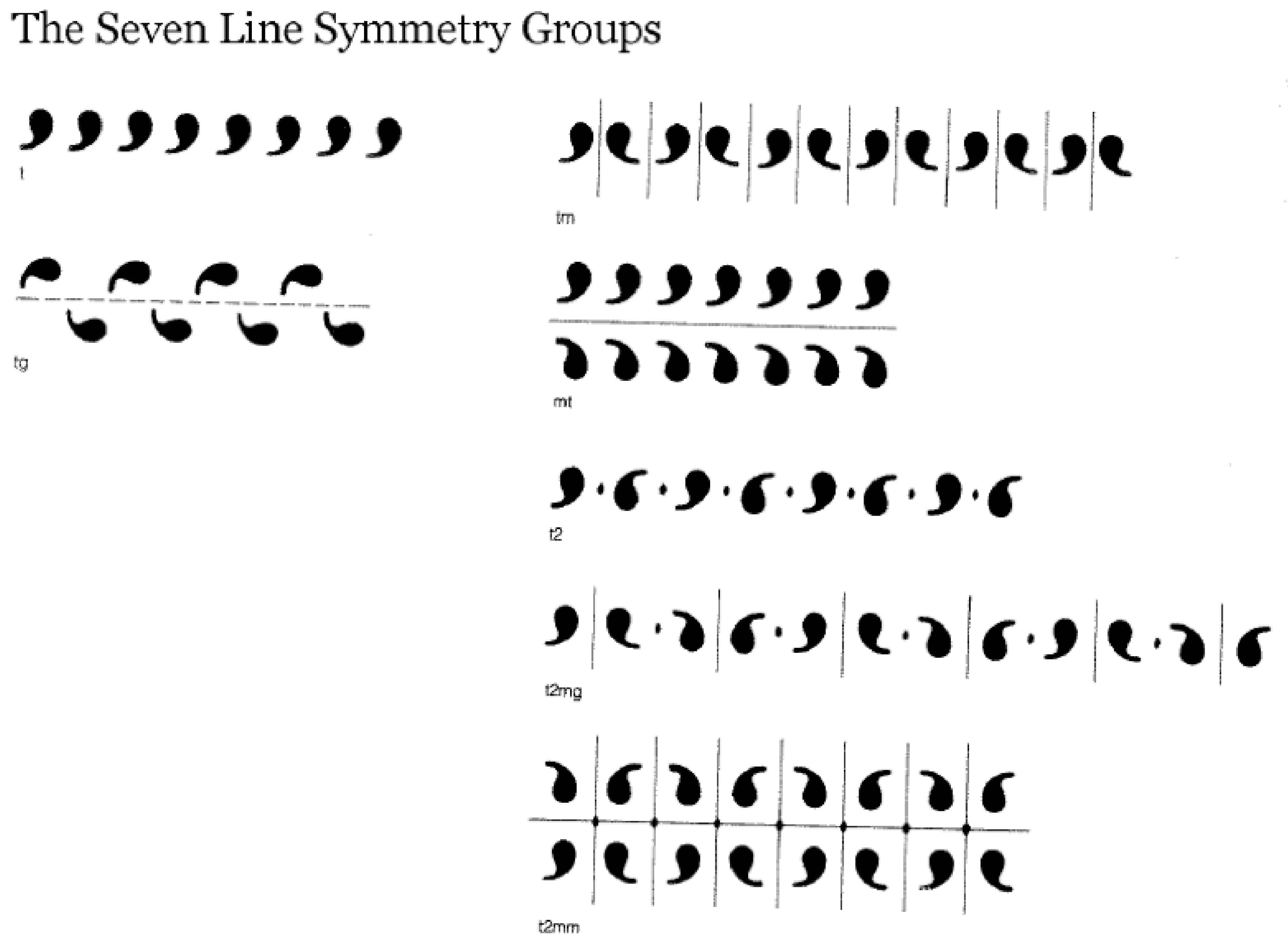



Emily



Handbook of Regular Patterns
by Peter Stevens



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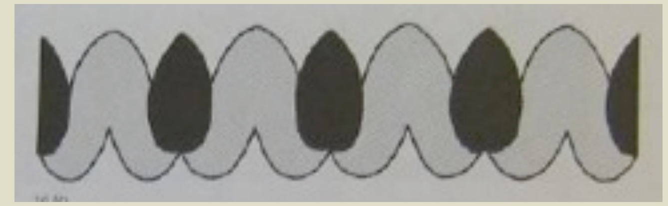

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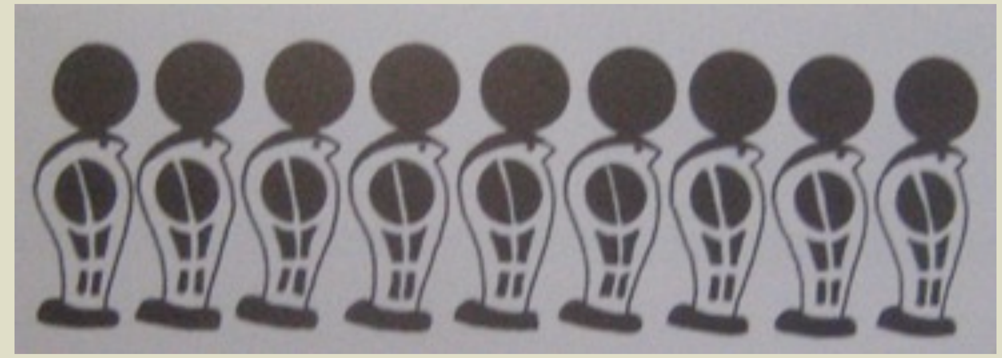

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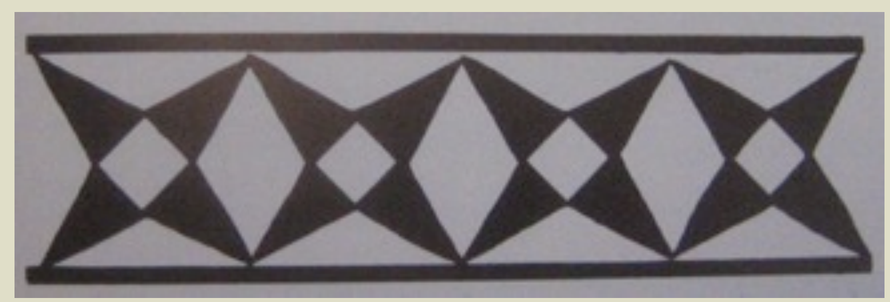

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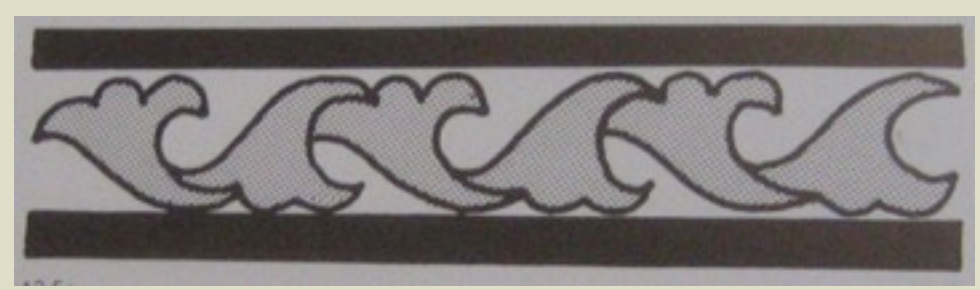
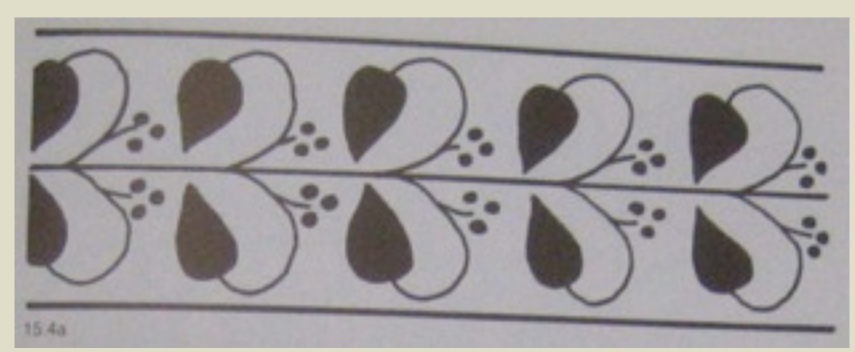
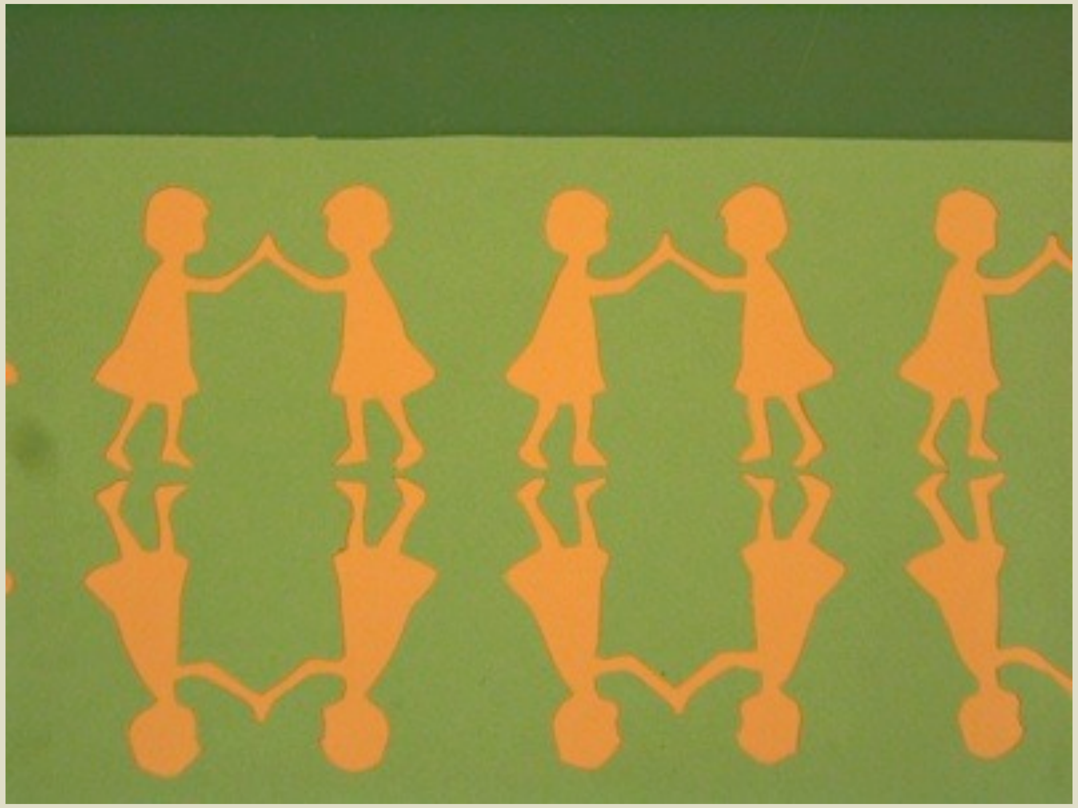
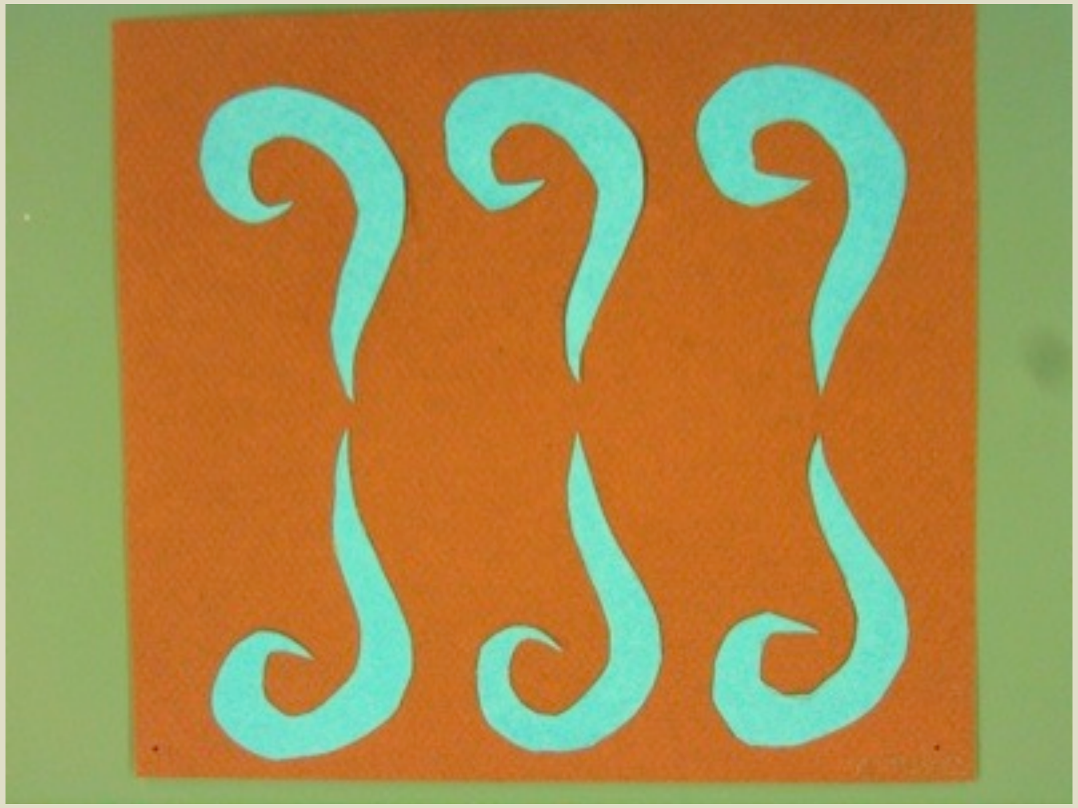
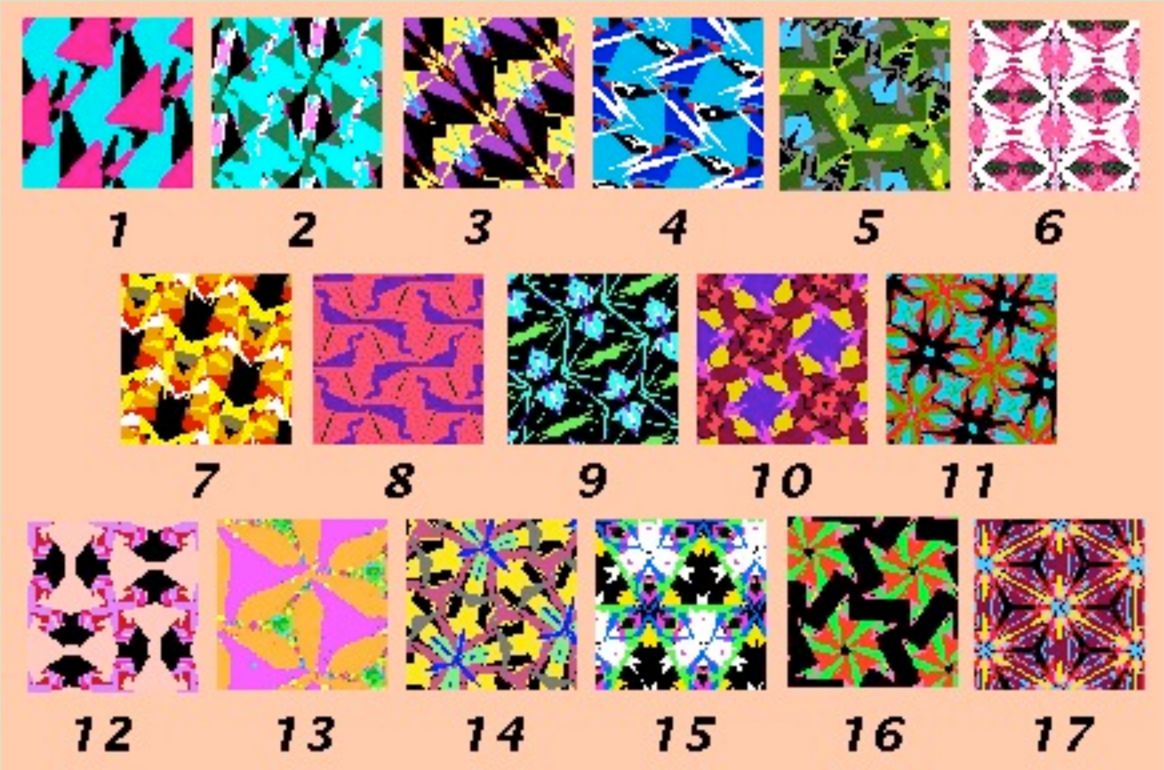


g.





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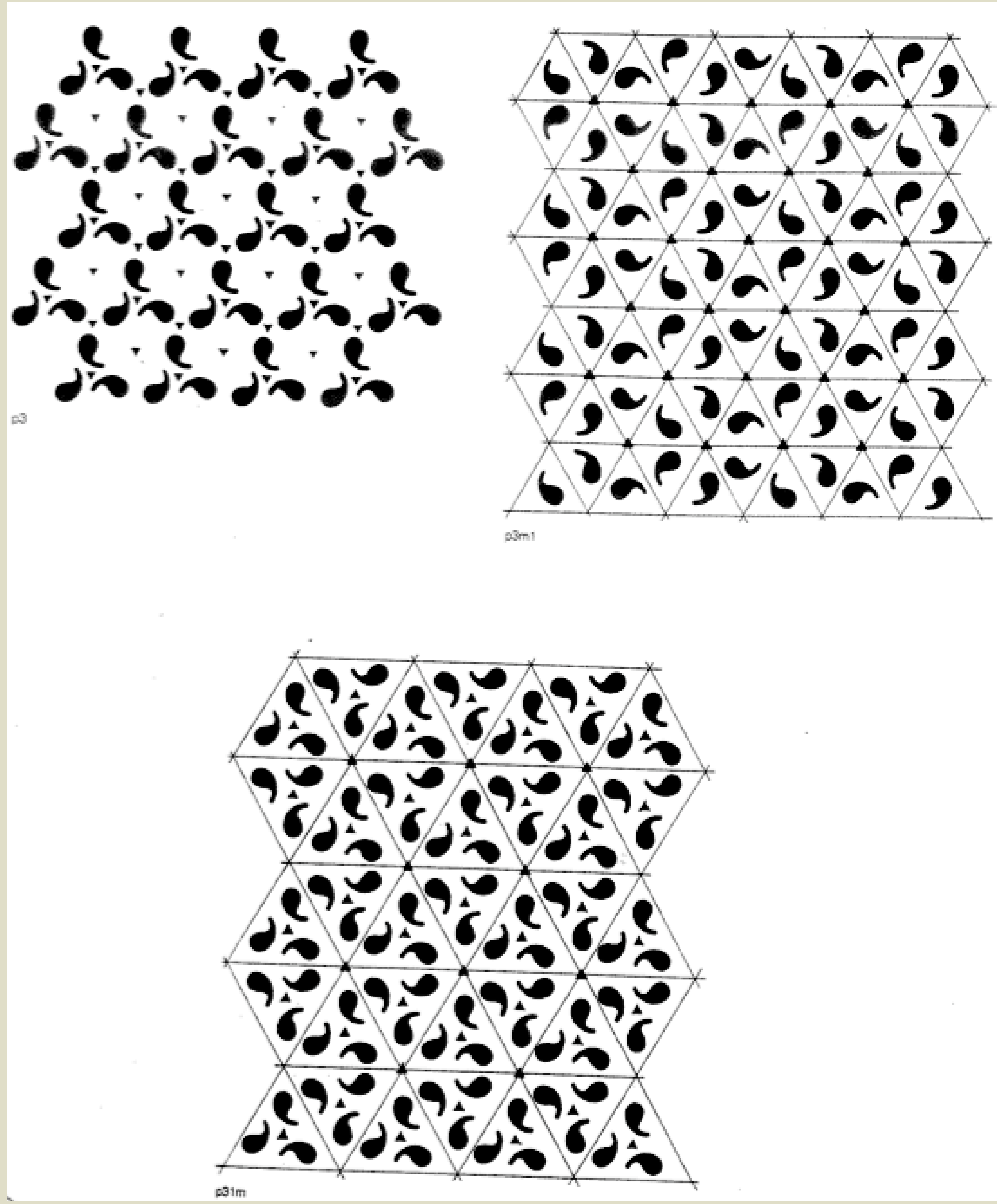
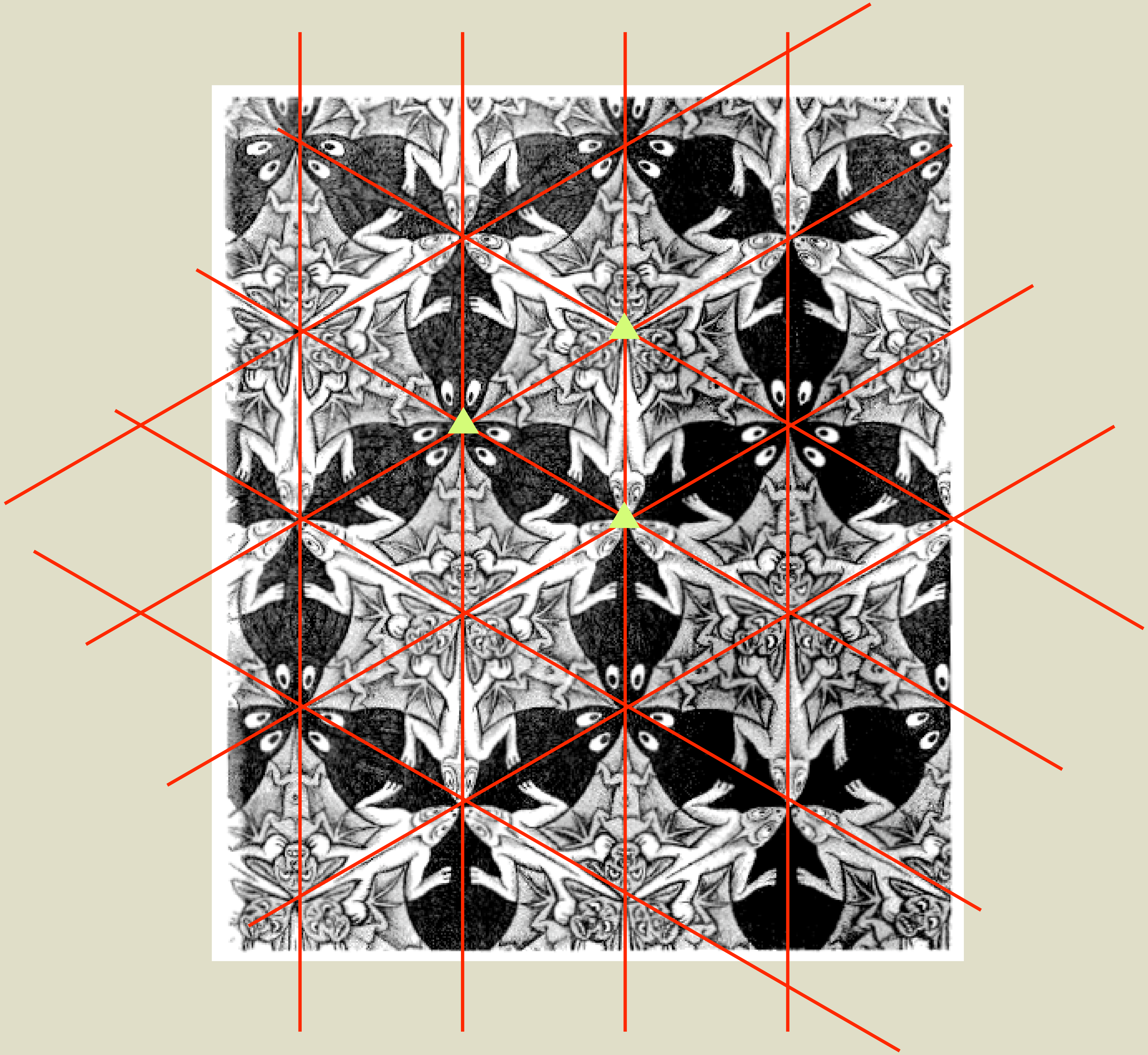
Transformations

Symmetry

Dimension





Transformations
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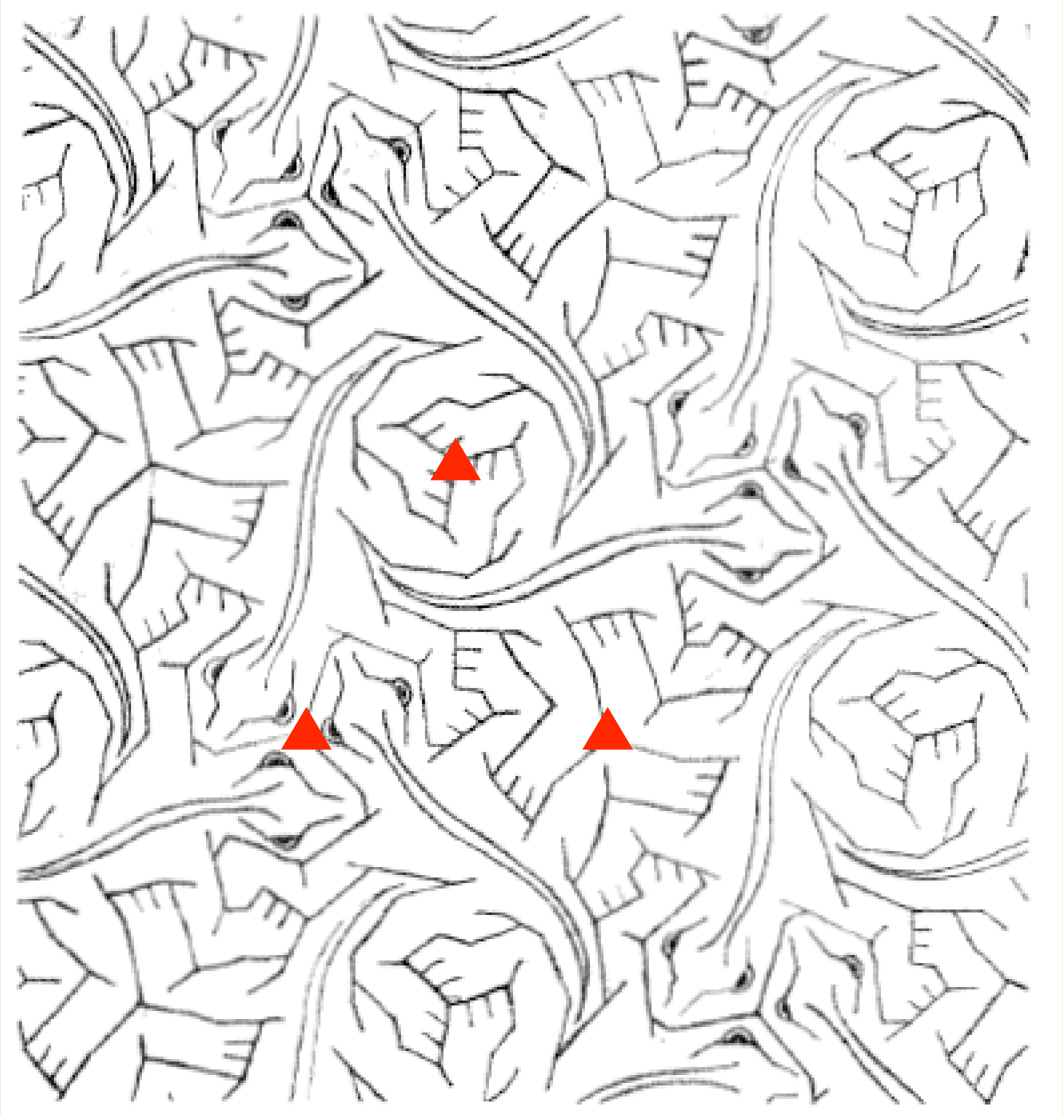

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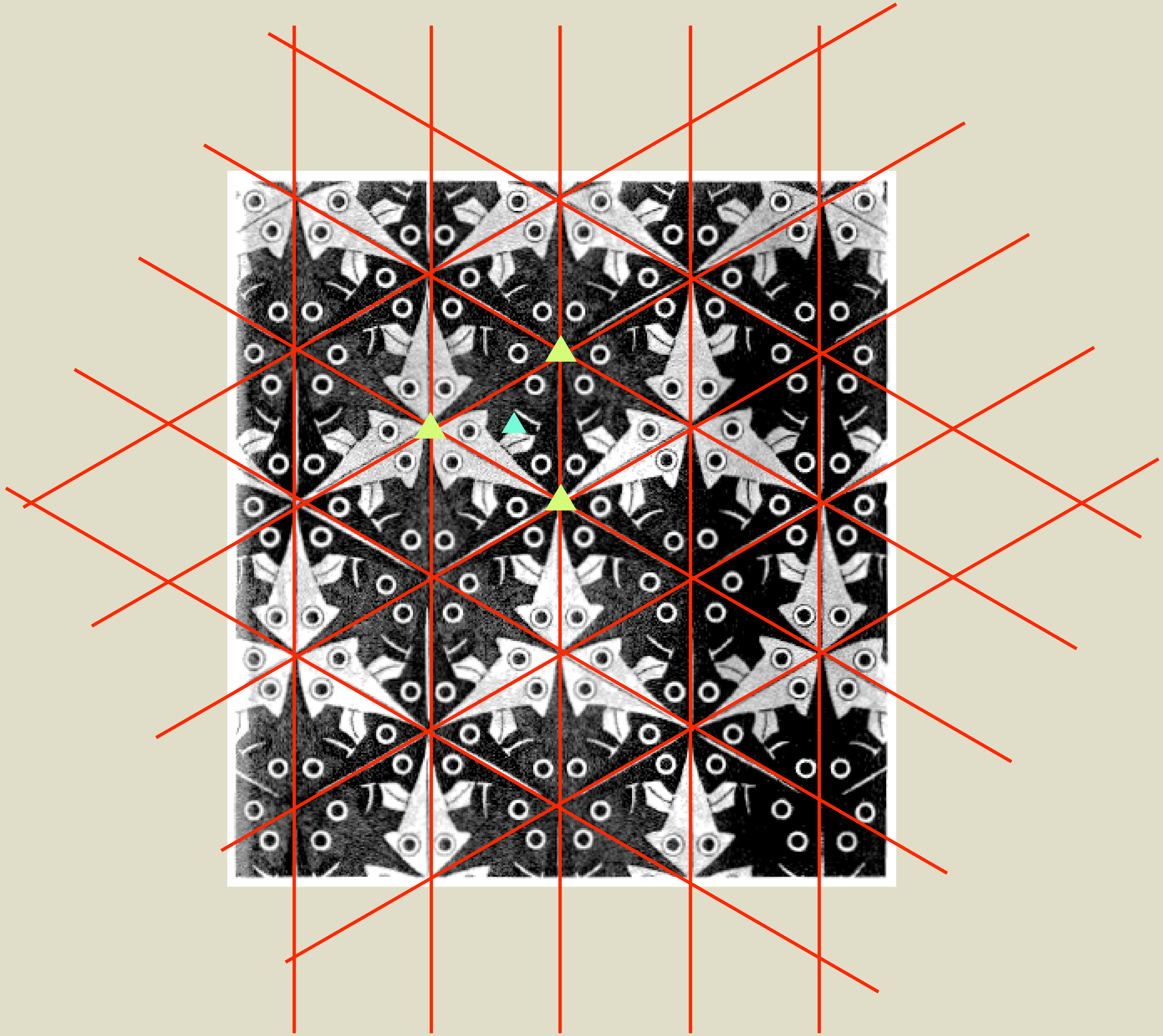

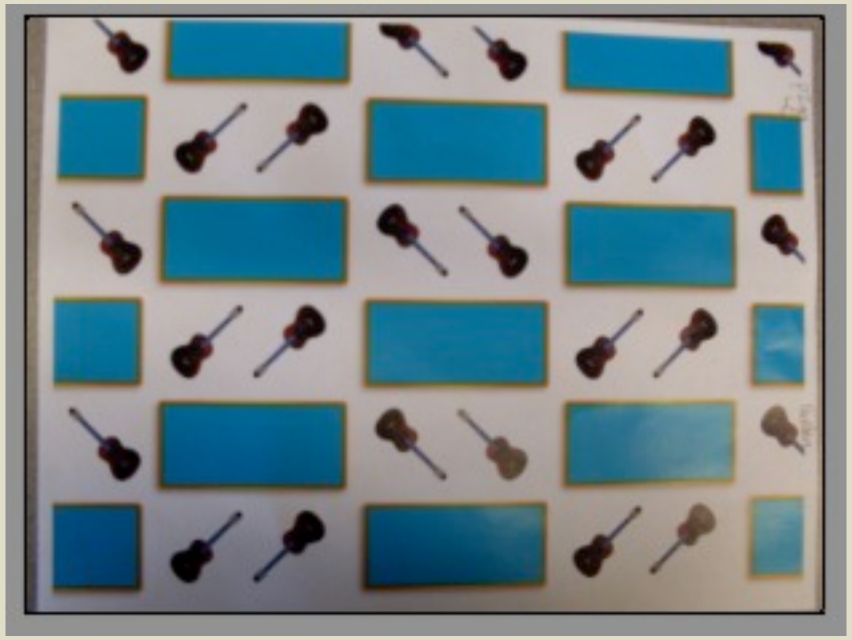

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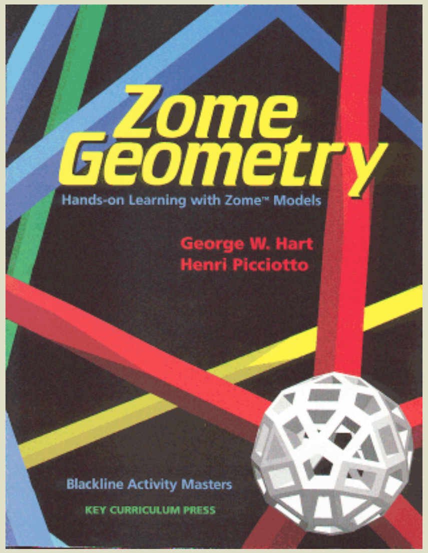


◊ Platonic and Archimedean polyhedra

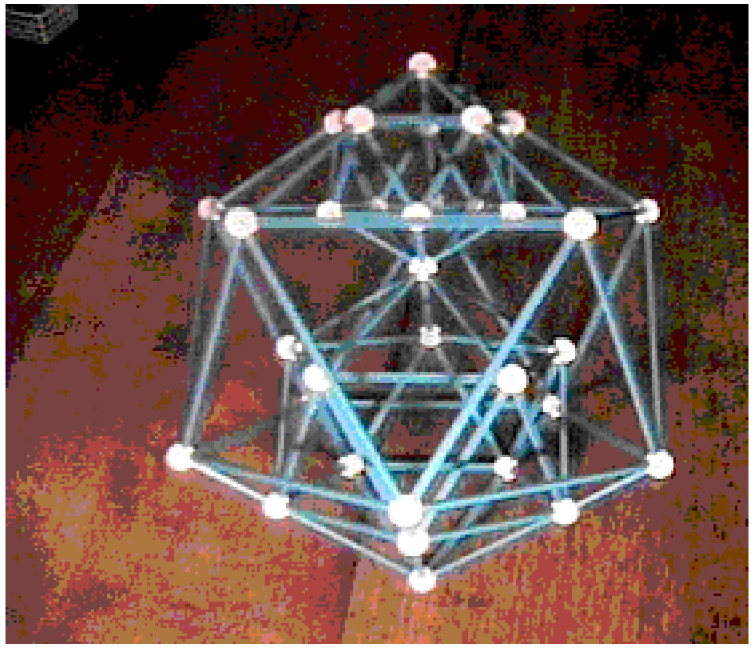
◊ Duality

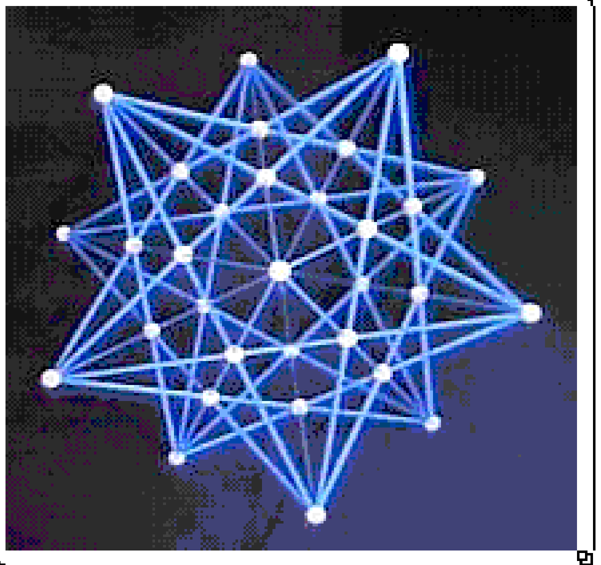
◊ Euler’s and Descartes’ theorems

◊ Review of geometry and trigonometry

Dimension: 3D

The chief reason for studying regular polyhedra is still the same as in the time of the Pythagoreans, namely, that their symmetrical shapes appeal to one's artistic sense. ---H.S.M. Coxeter

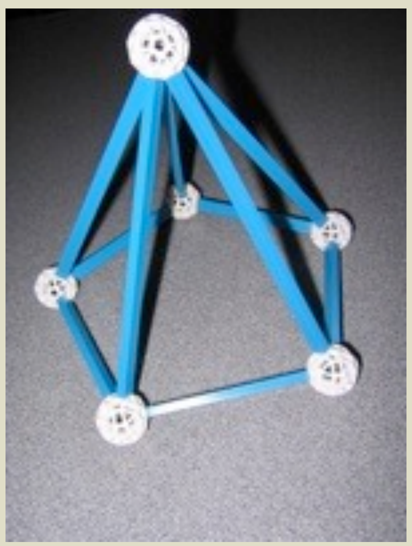


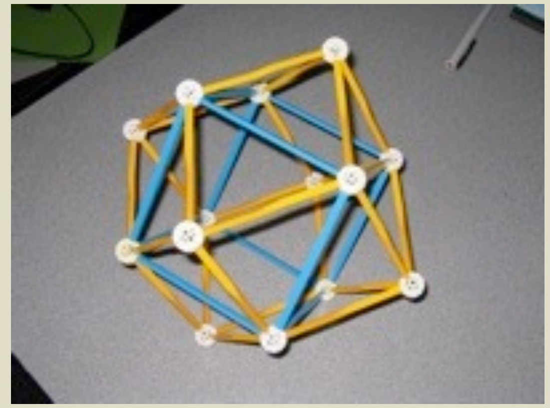


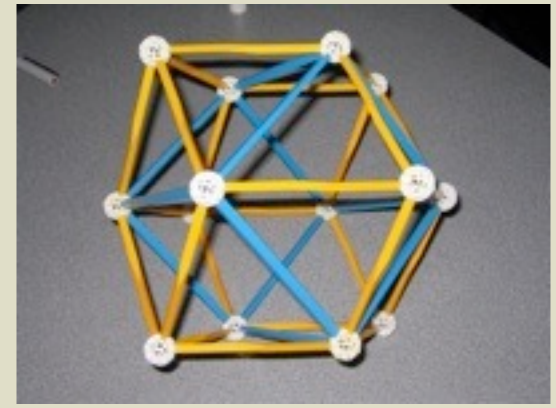
Transformations

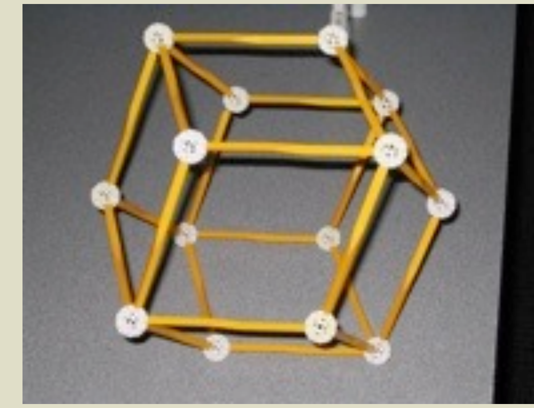
Symmetry

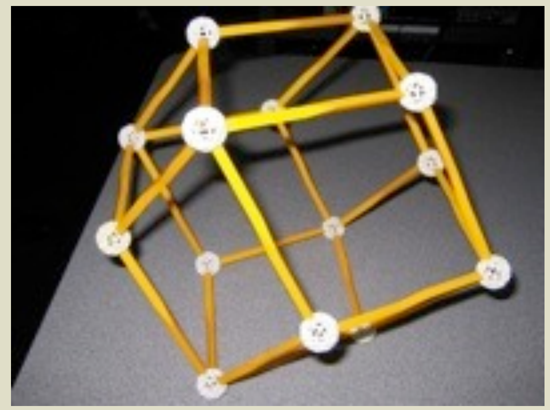
Dimension: 3D

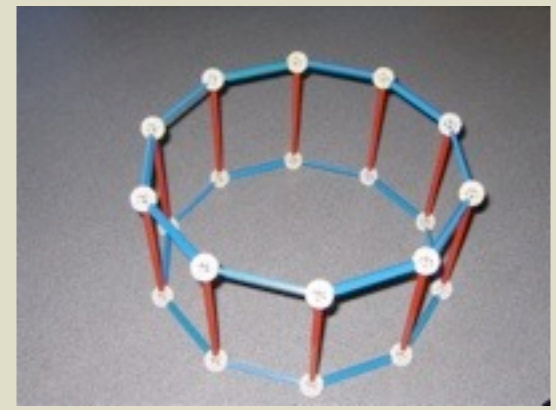


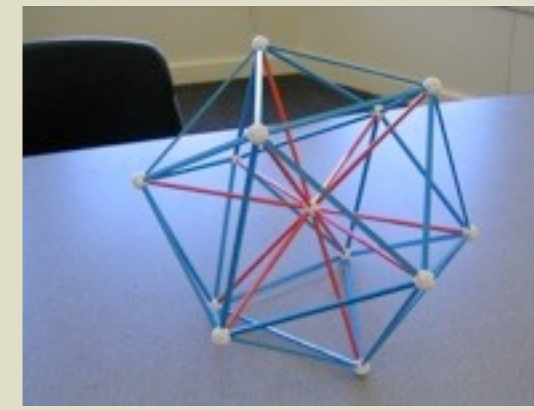


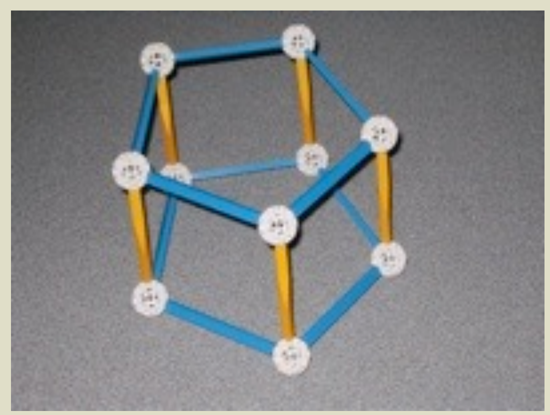


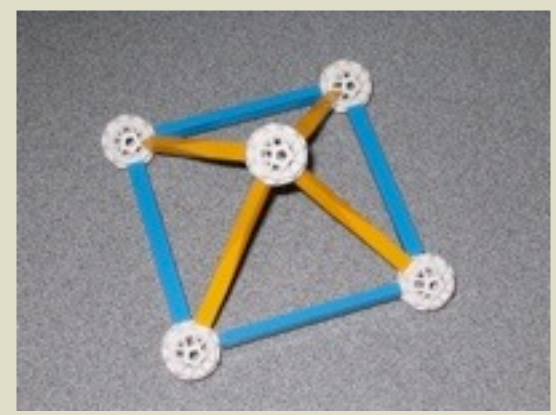


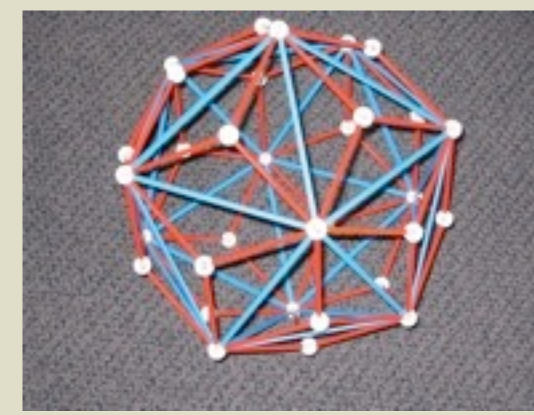


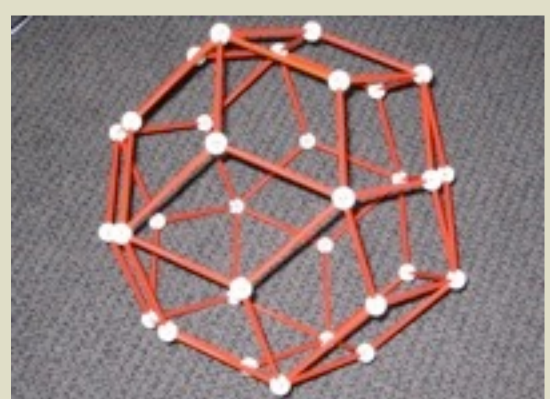


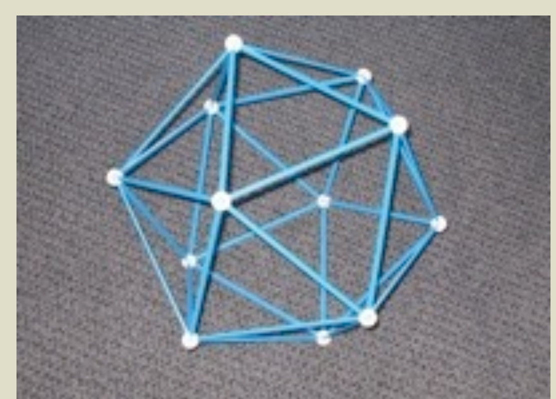


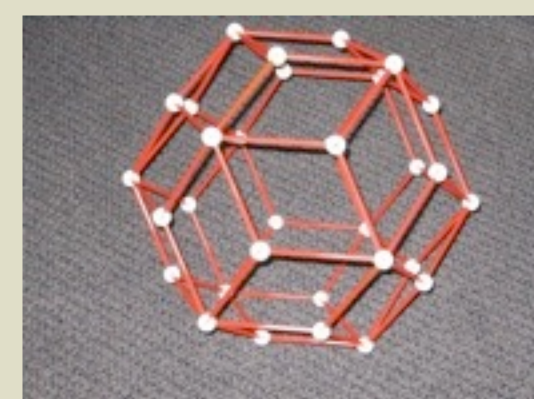




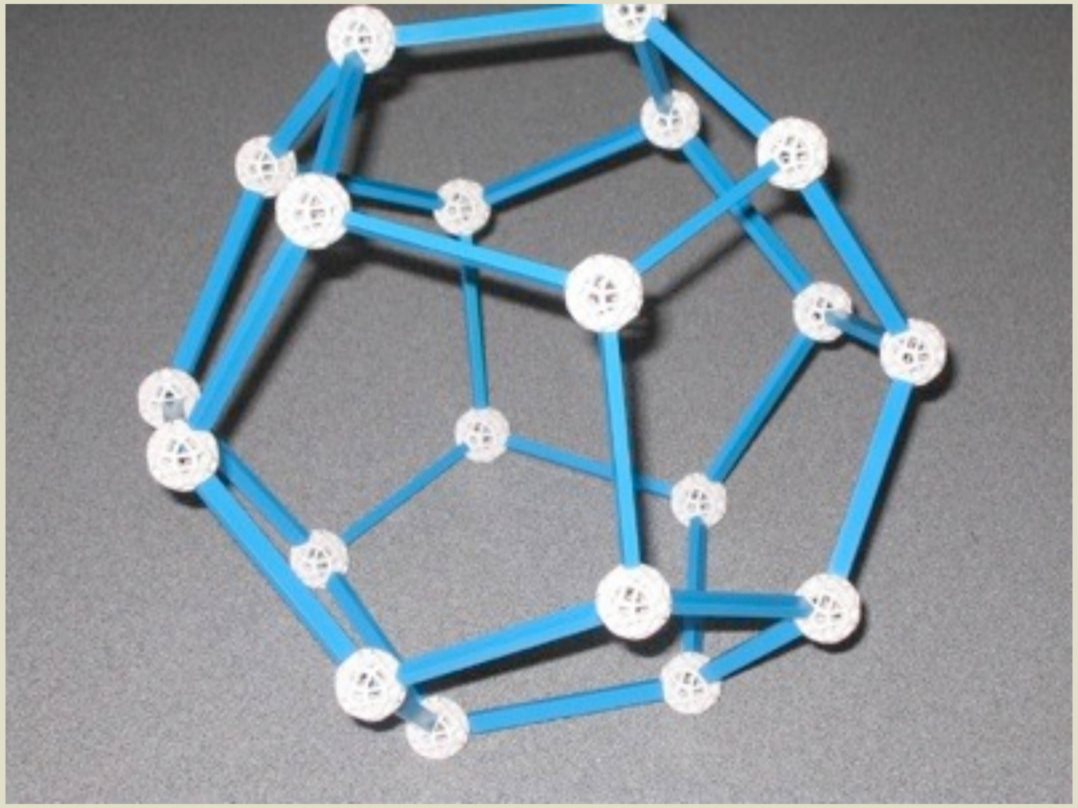


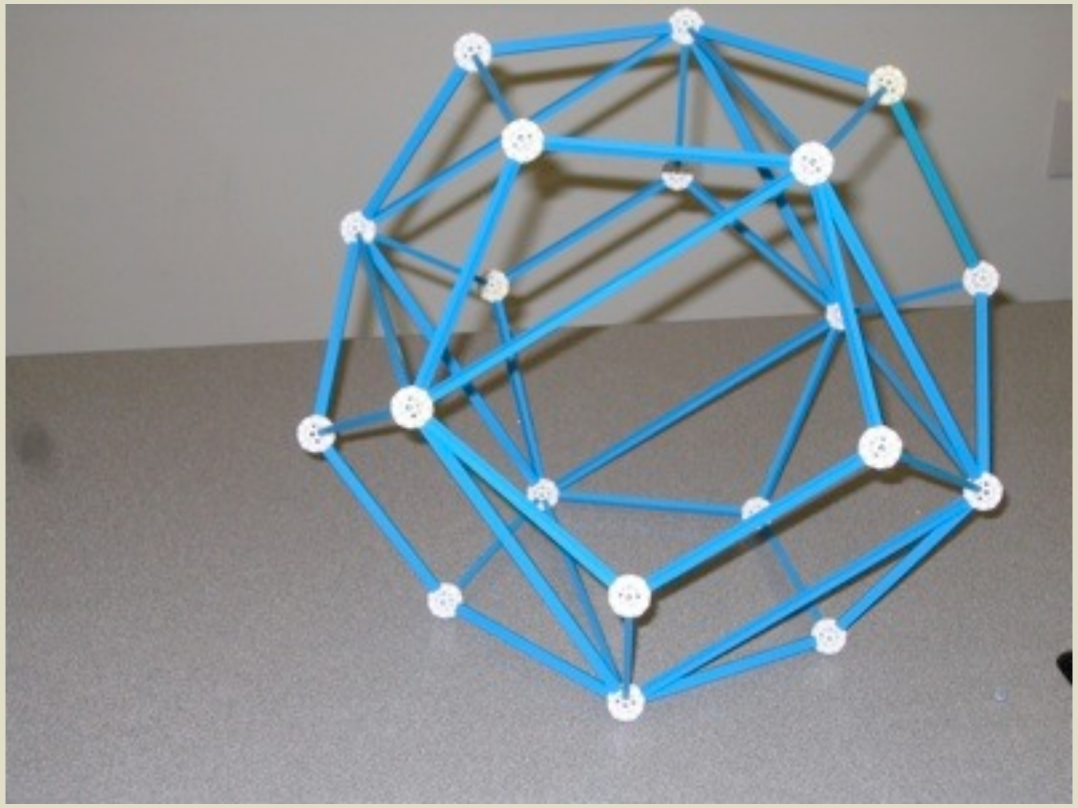


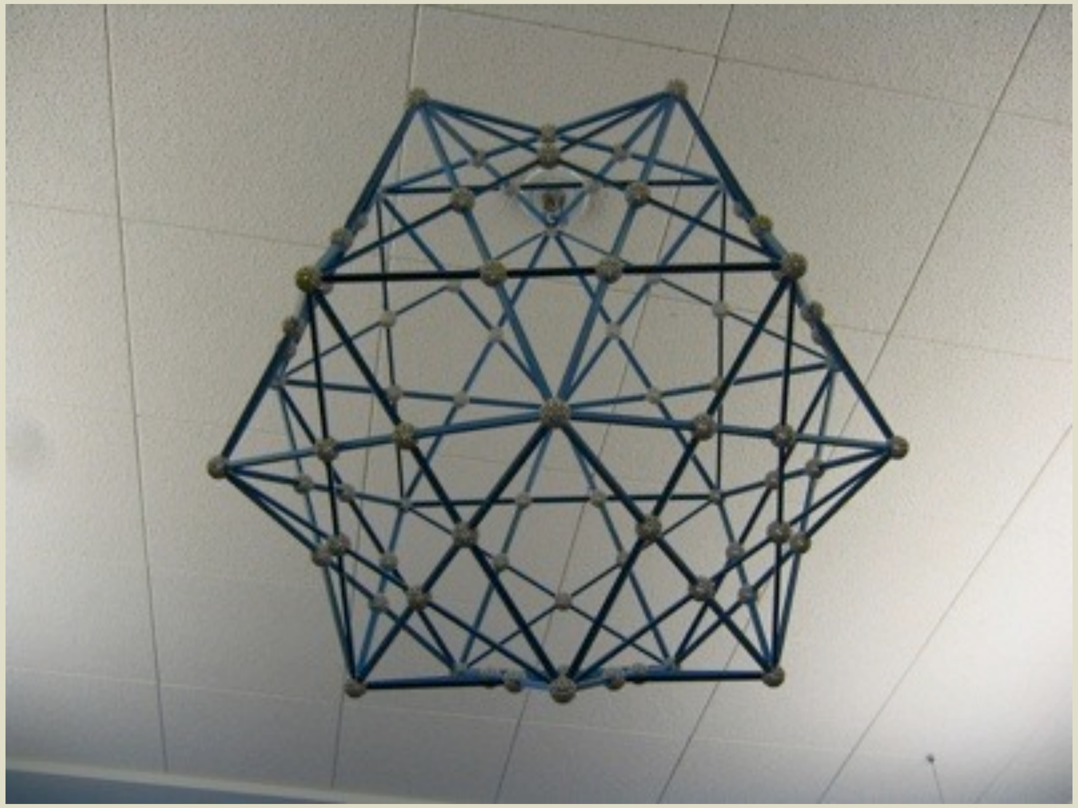




Transformations
Symmetry
Dimension: 3D







Transformations

Symmetry

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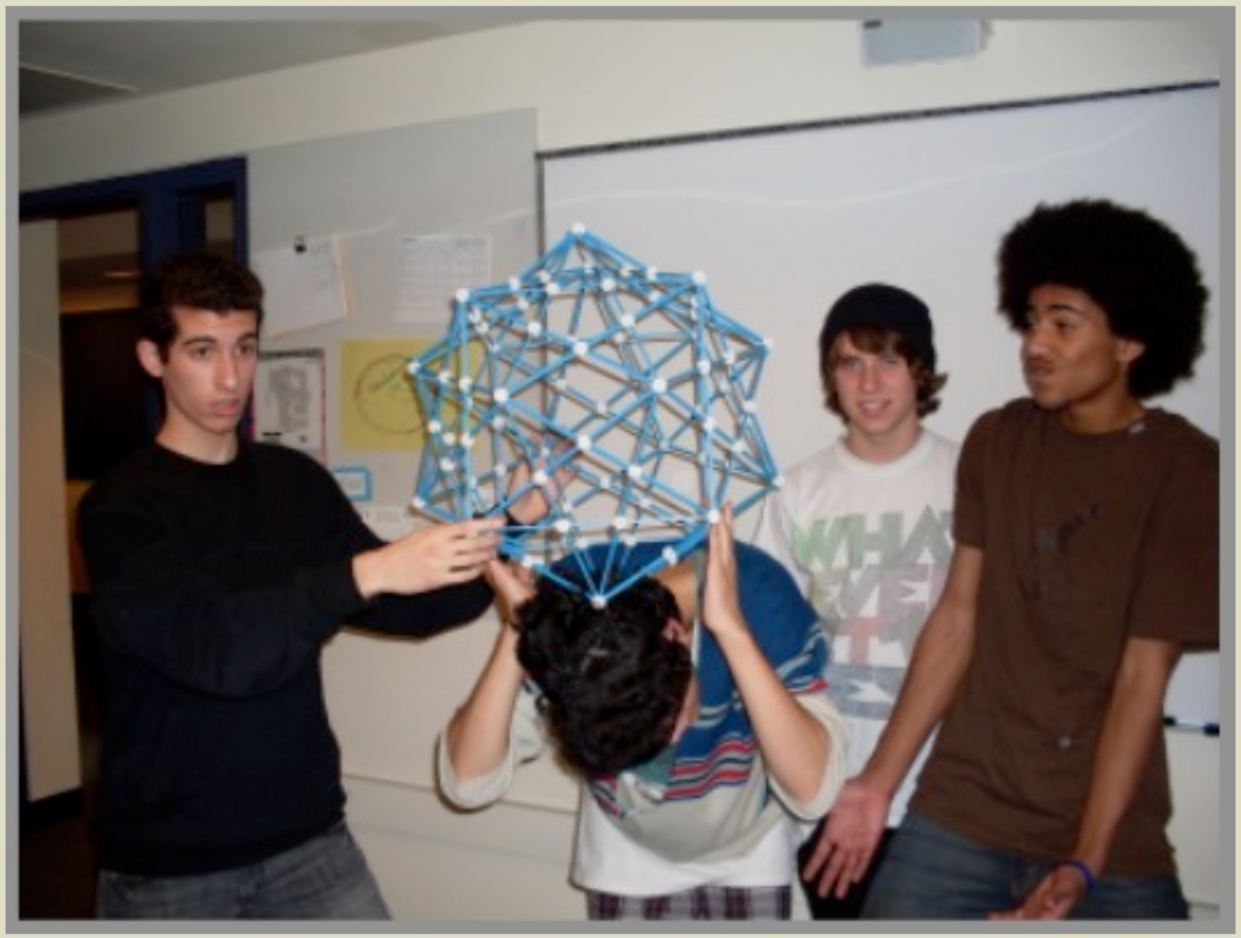
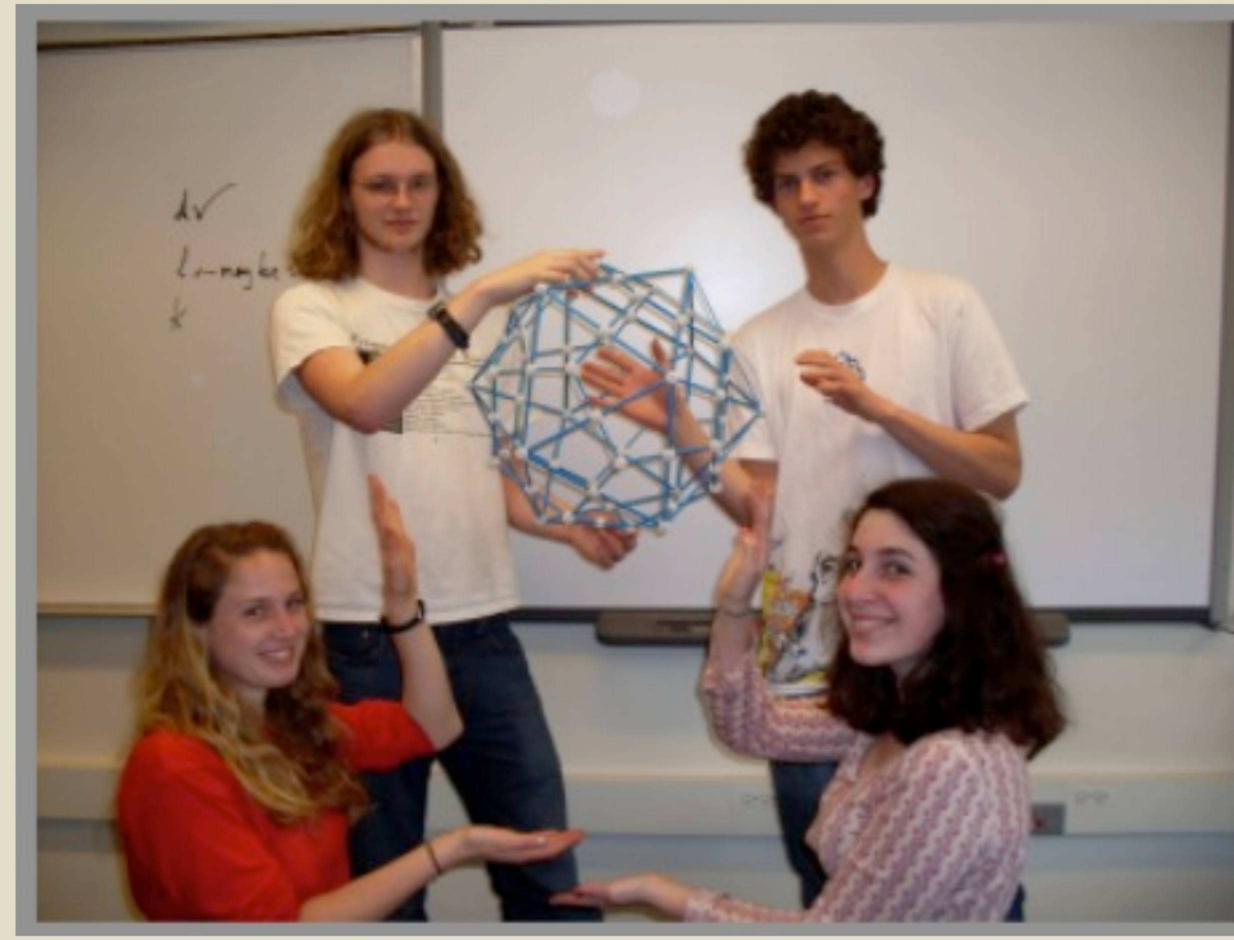




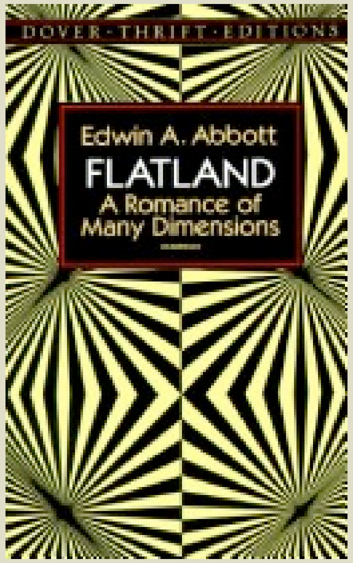
Transformations

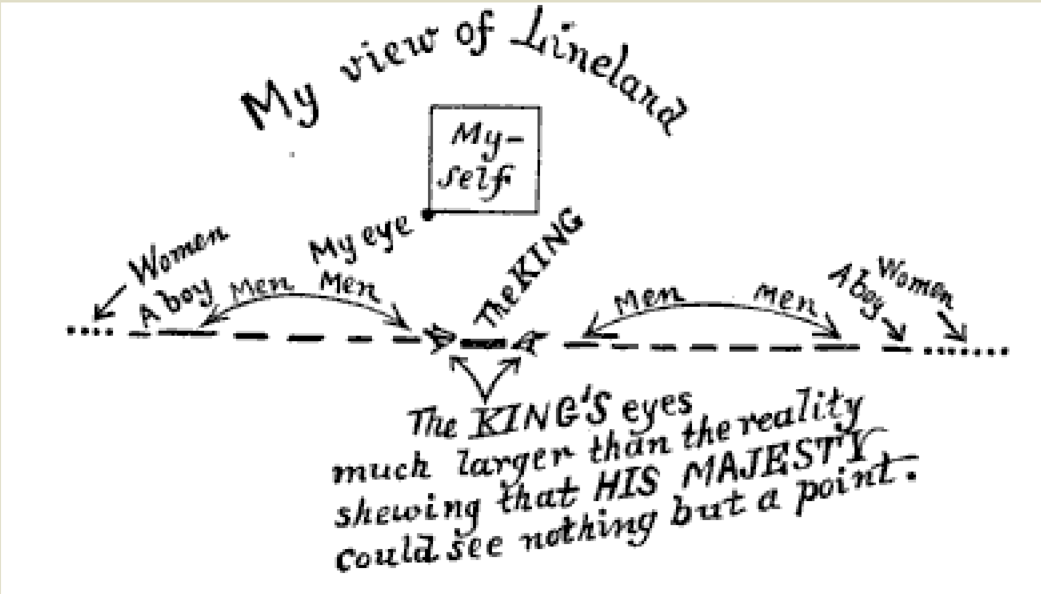
Symmetry

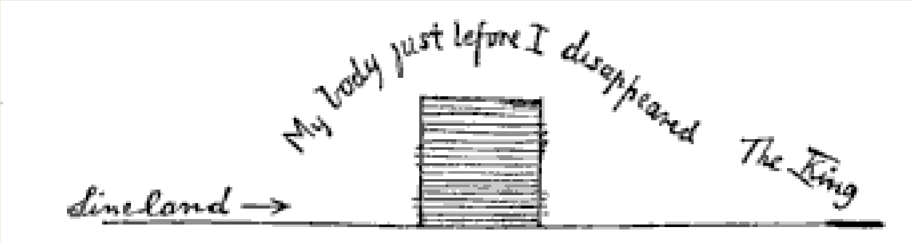
Dimension: 3D

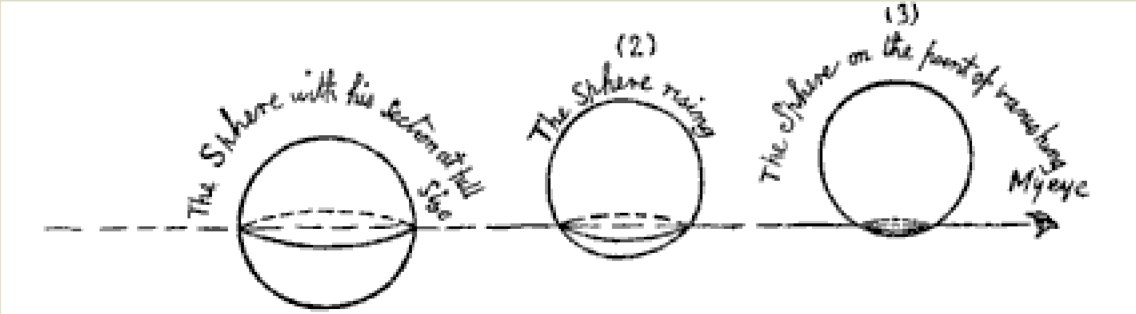
CABRI® 3D v2

Dimension: 4D





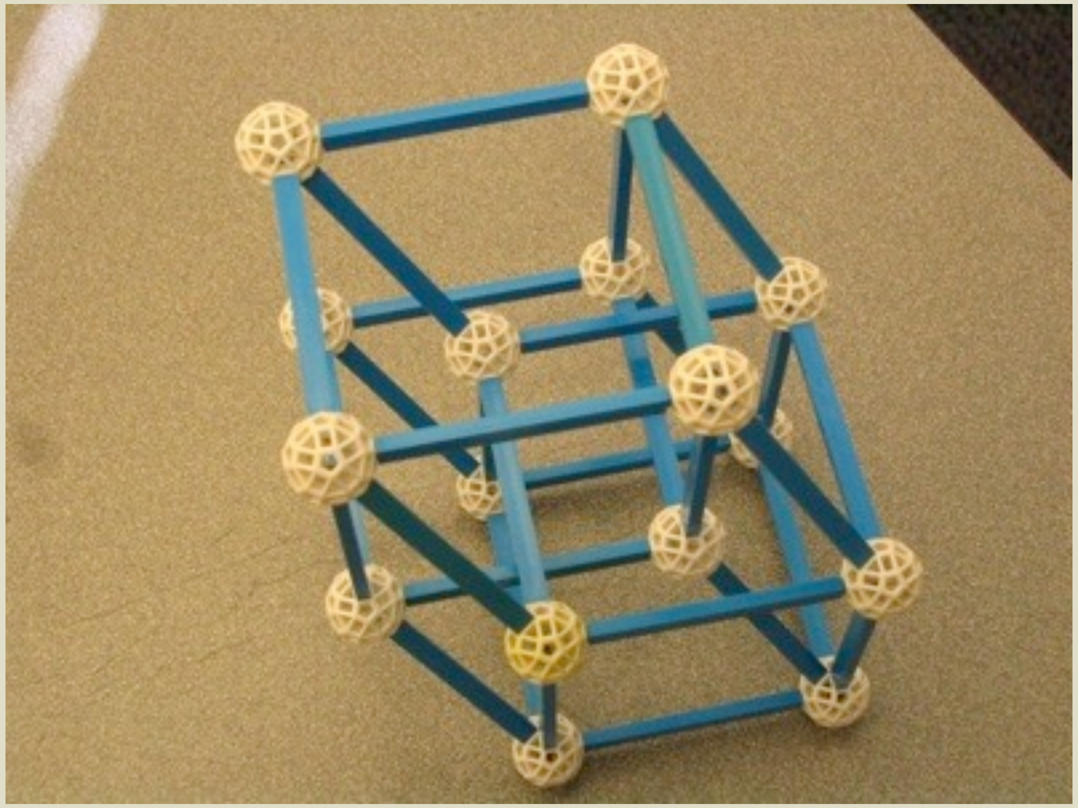


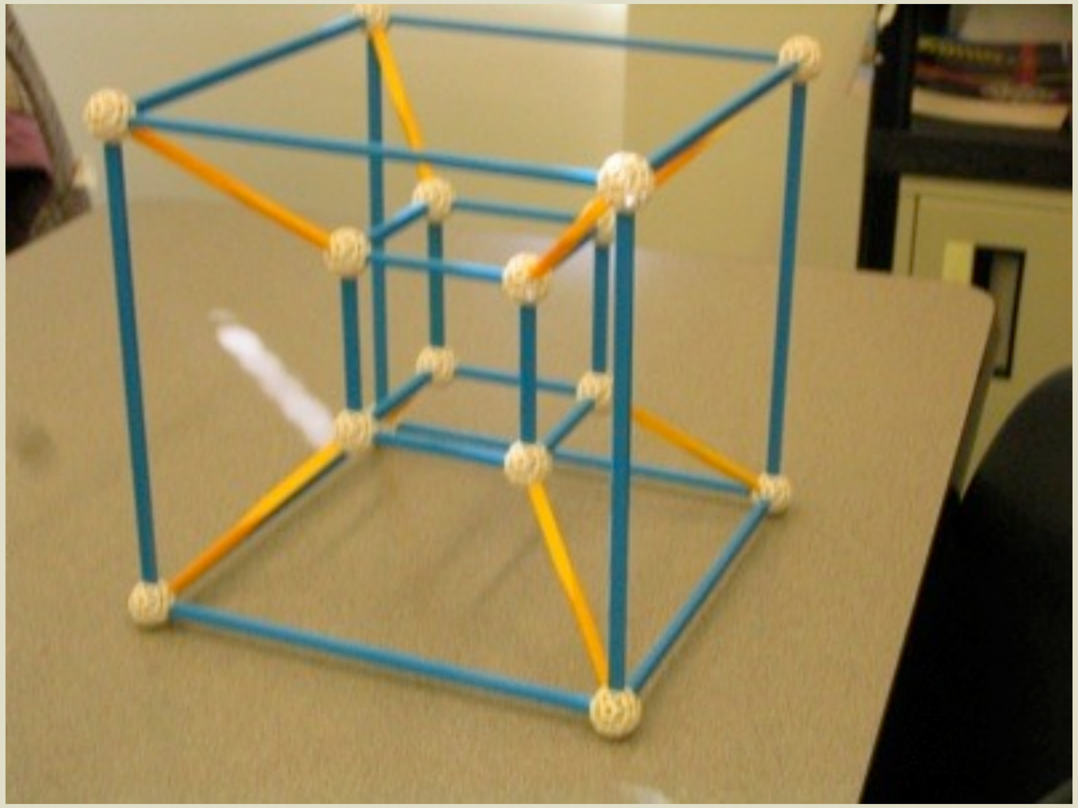


Transformations

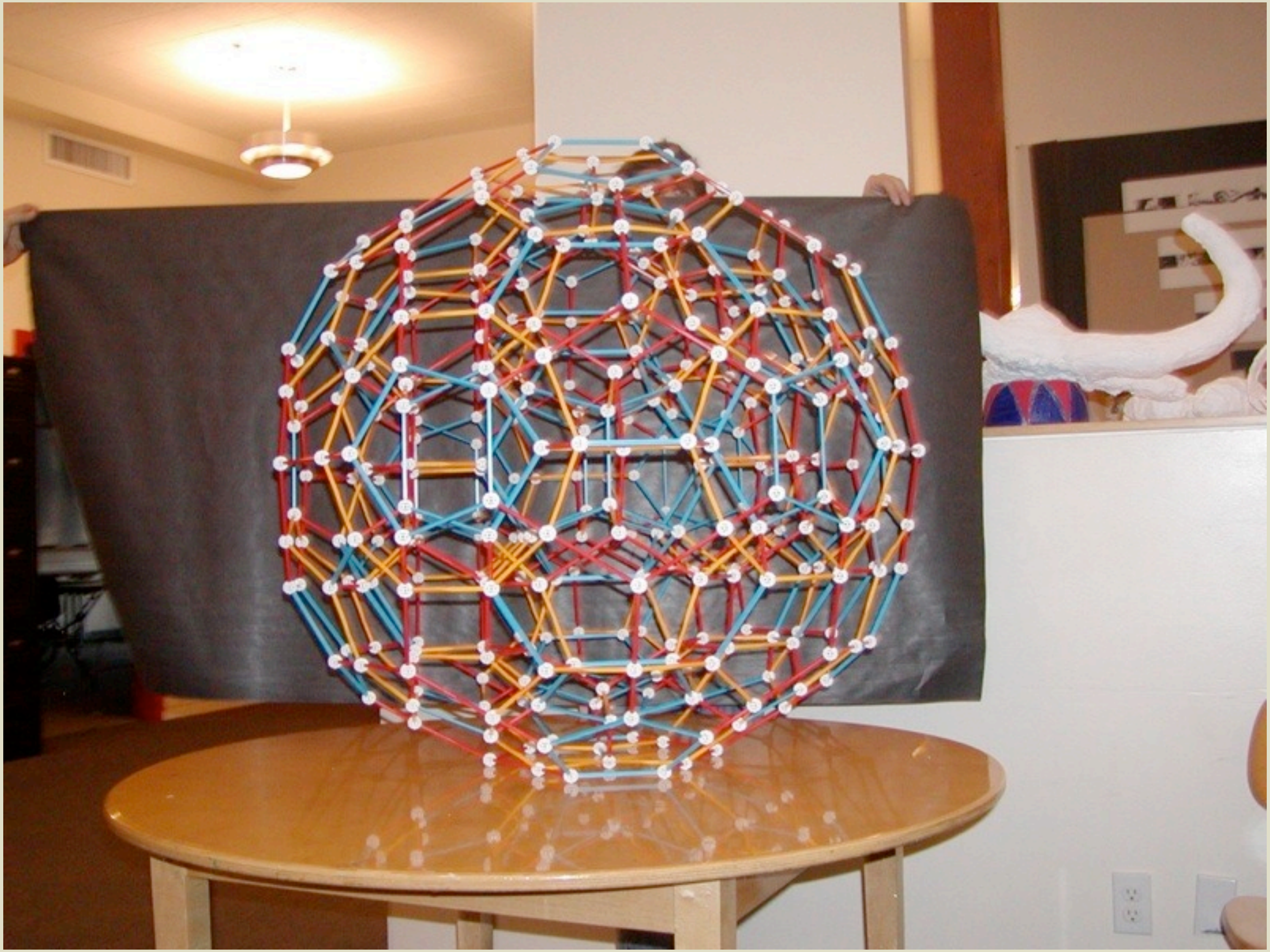
Symmetry

Dimension: 4D





Transformations
Symmetry
Dimension: 4D



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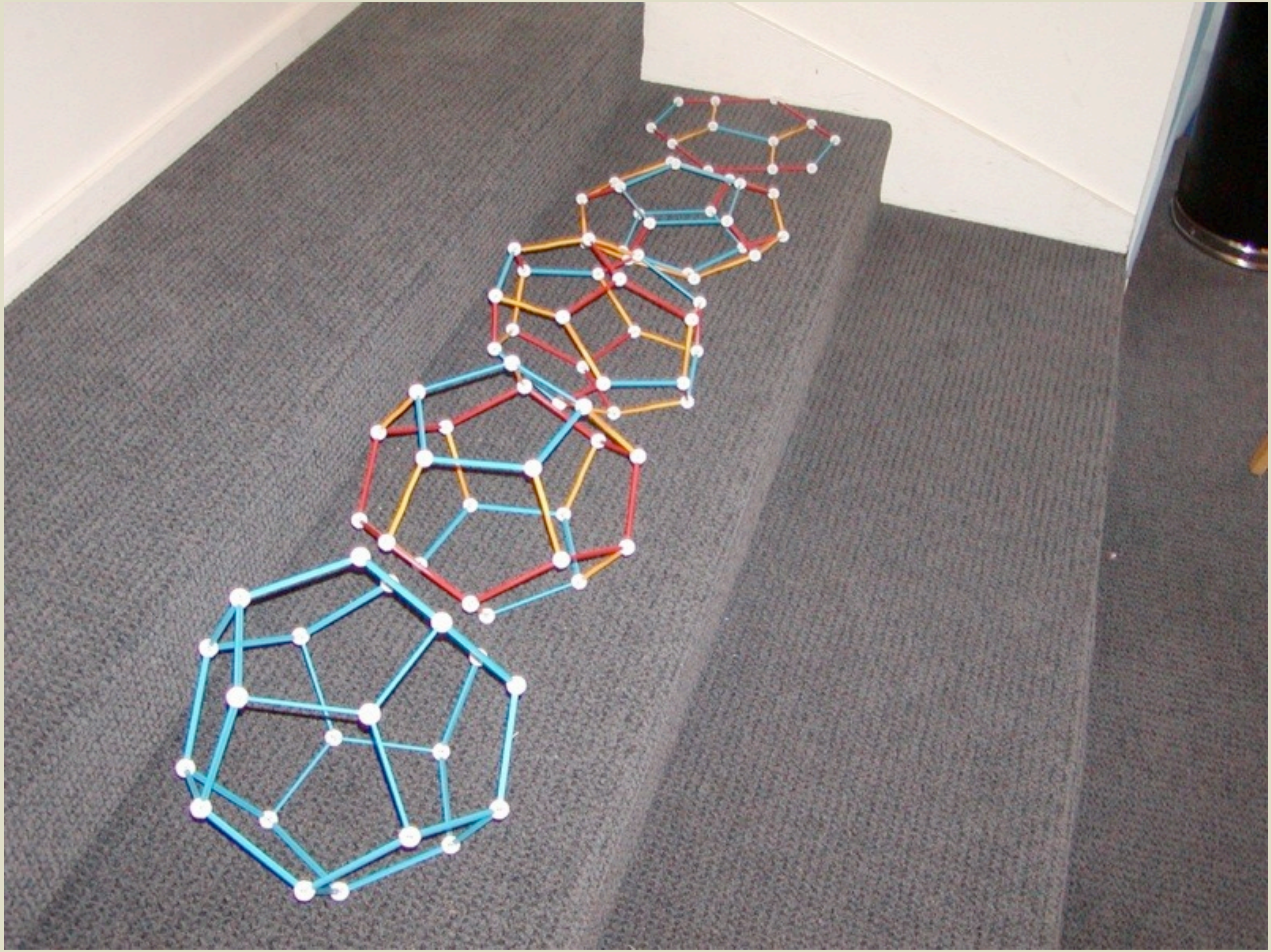
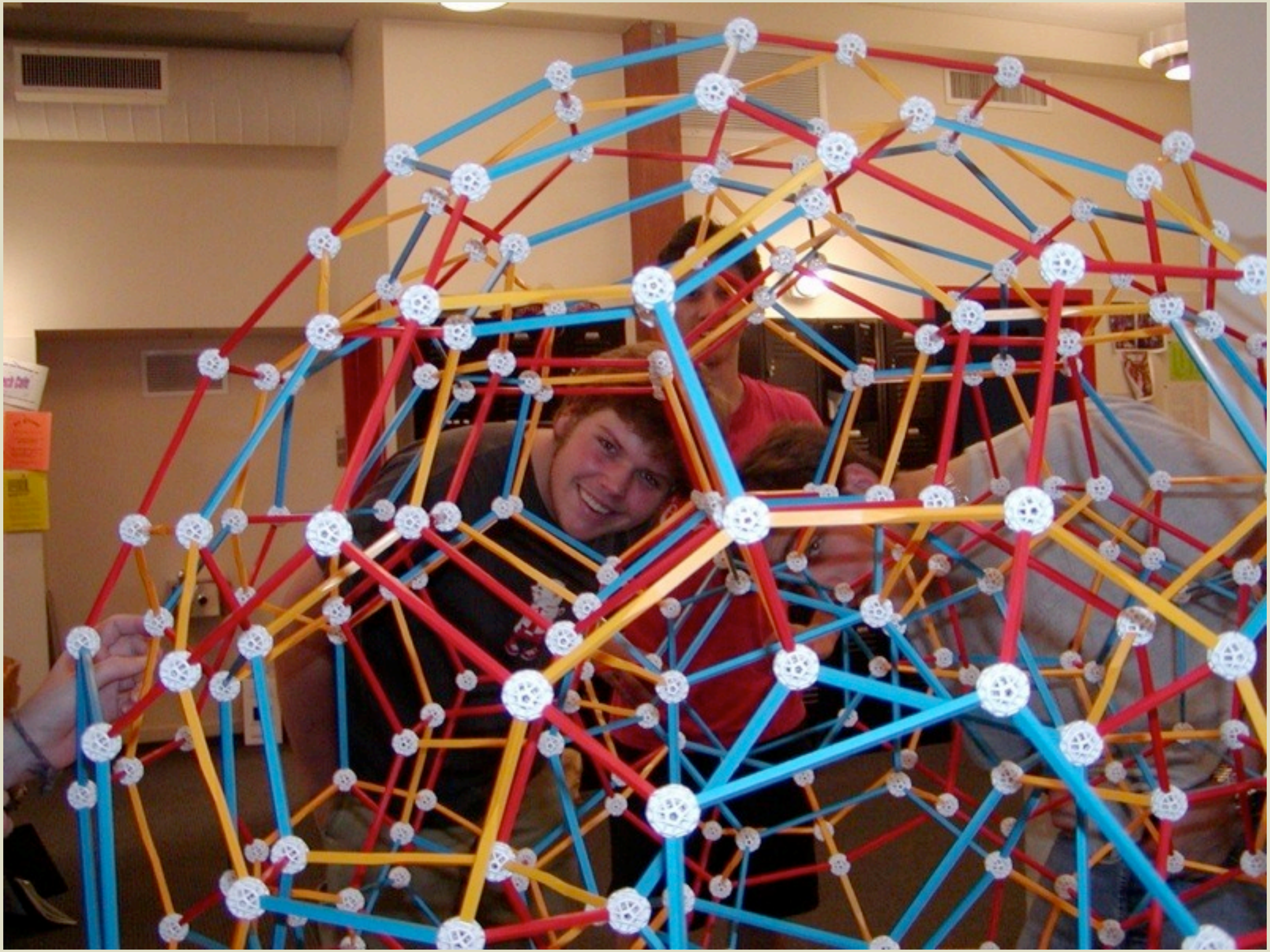


Transformations
Symmetry
Dimension: 4D



Space

An Alternate Elective after Algebra II

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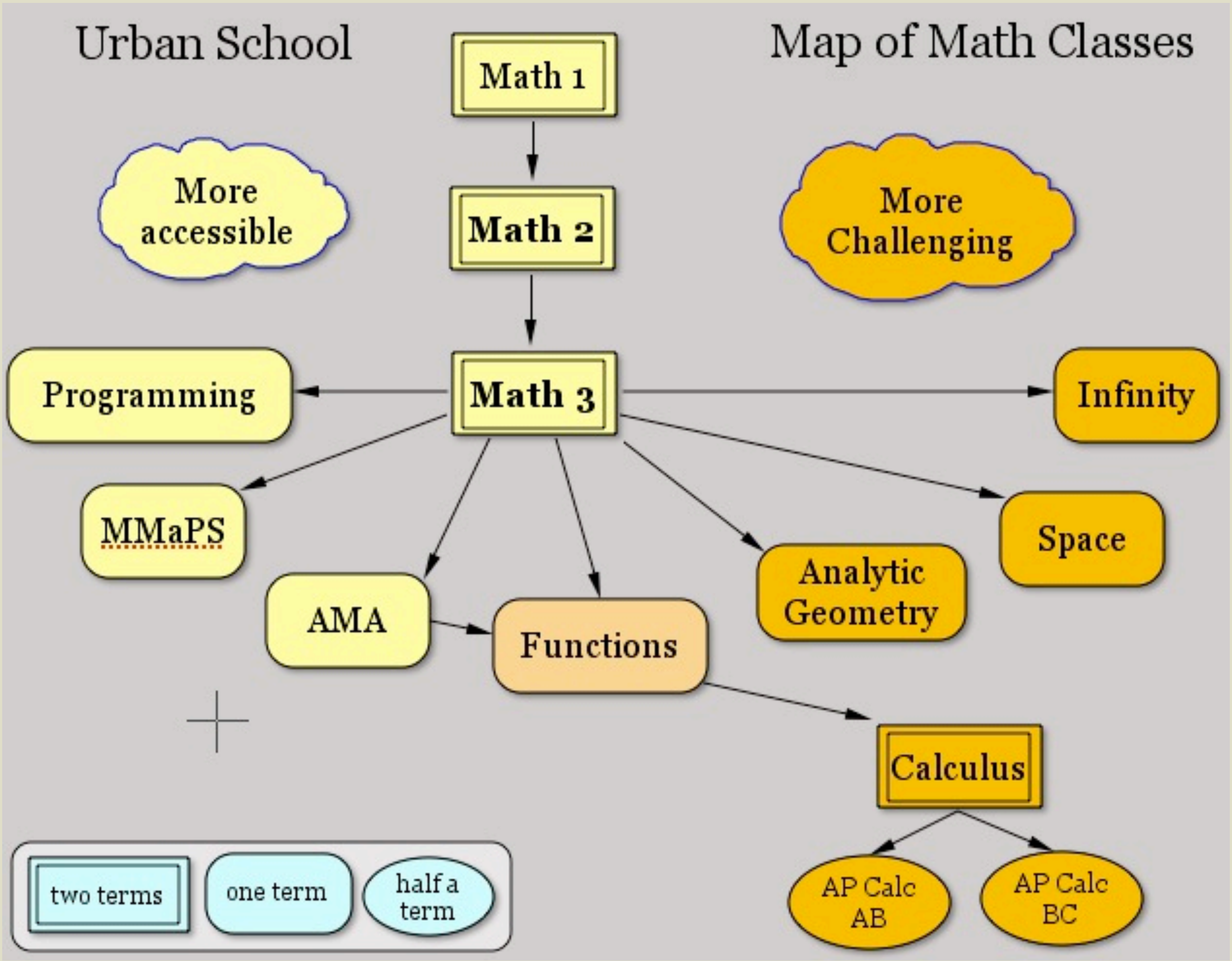
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Map of Math Classes
Math 1
Math 2
Math 3
More accessible
More Challenging
Programming
Infinity
MMaPS
Space
AMA
Functions
Analytic Geometry
Calculus
AP Calc AB
AP Calc BC
two terms
one term
half a term

Space overview

Who takes the class

Topics

Review

Resources

Electronic tools

Juniors, before Calculus

Seniors, instead of or in addition to Calculus

Space overview

Who takes the class

Topics

Review

Resources

Electronic tools

Abstract algebra

Transformations

Symmetry

Dimension (3D, 4D)

Space overview

Who takes the class

Topics

Review

Resources

Electronic tools

Algebra

Geometry

Trigonometry

Space overview

Who takes the class

Topics

Review

Resources

Electronic tools

Transformational Geometry
by Richard Brown

Algebra: Themes, Tools, Concepts
by Anita Wah and Henri Picciotto

Geometry Labs by Henri Picciotto

Handbook of Regular Patterns
by Peter Stevens

Zome Geometry
by George Hart and Henri Picciotto

Flatland by Edwin Abbott

Space overview

Who takes the class

Topics

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Resources

Electronic tools

Cabri II+

TI-89

Cabri 3D

Space

An Alternate Elective after Algebra II

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