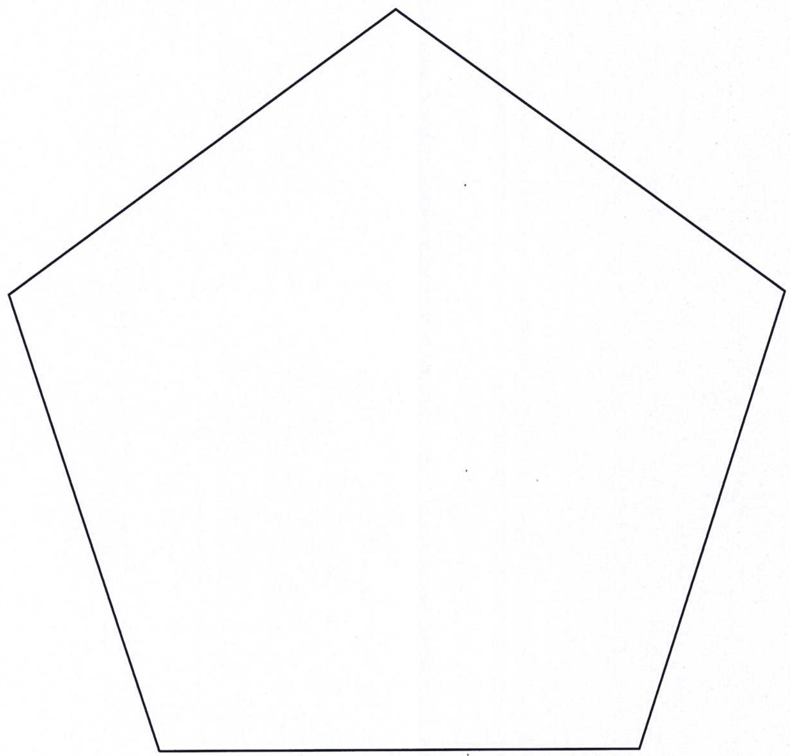
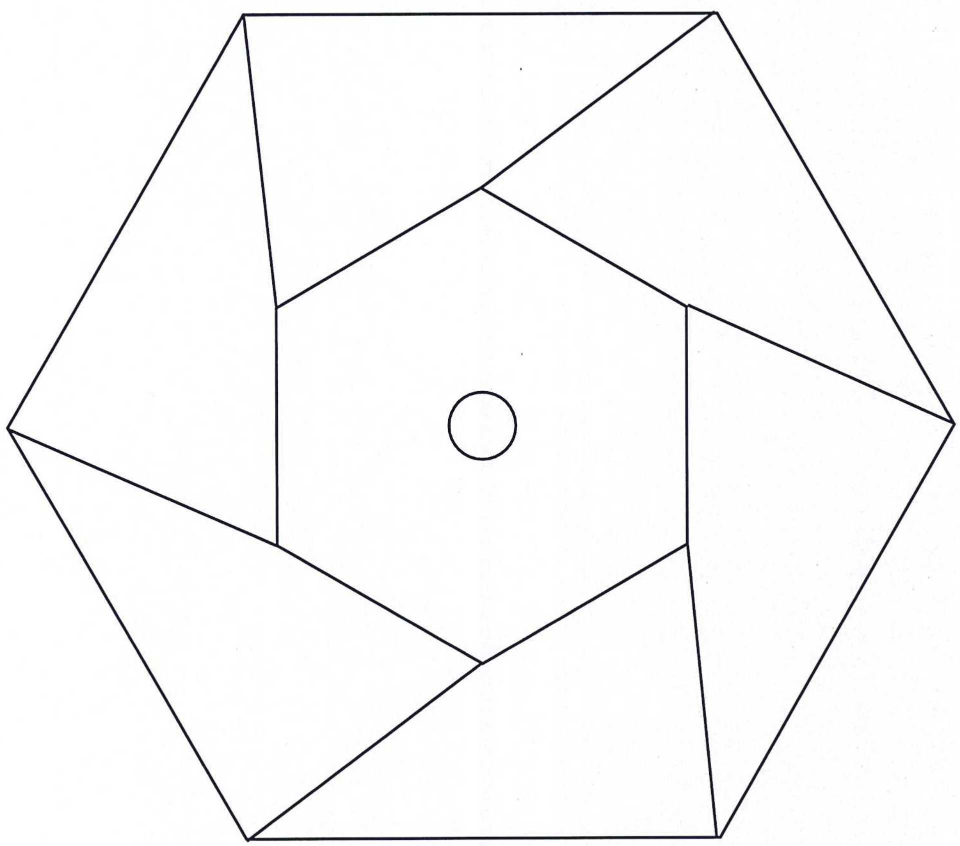
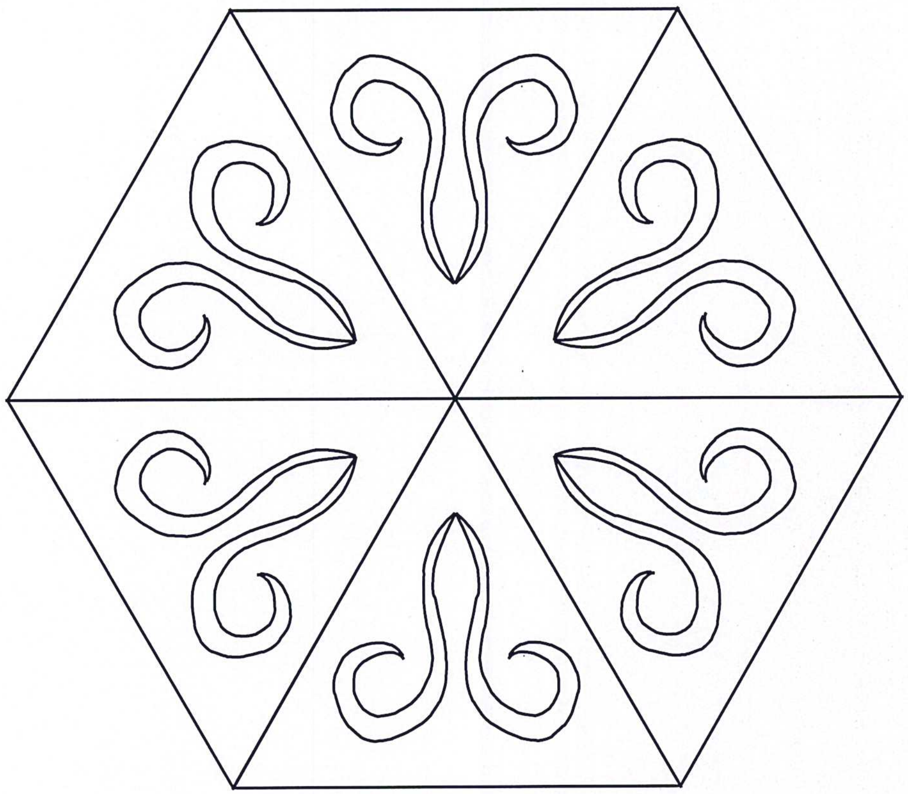
Find the group of symmetries of the following object



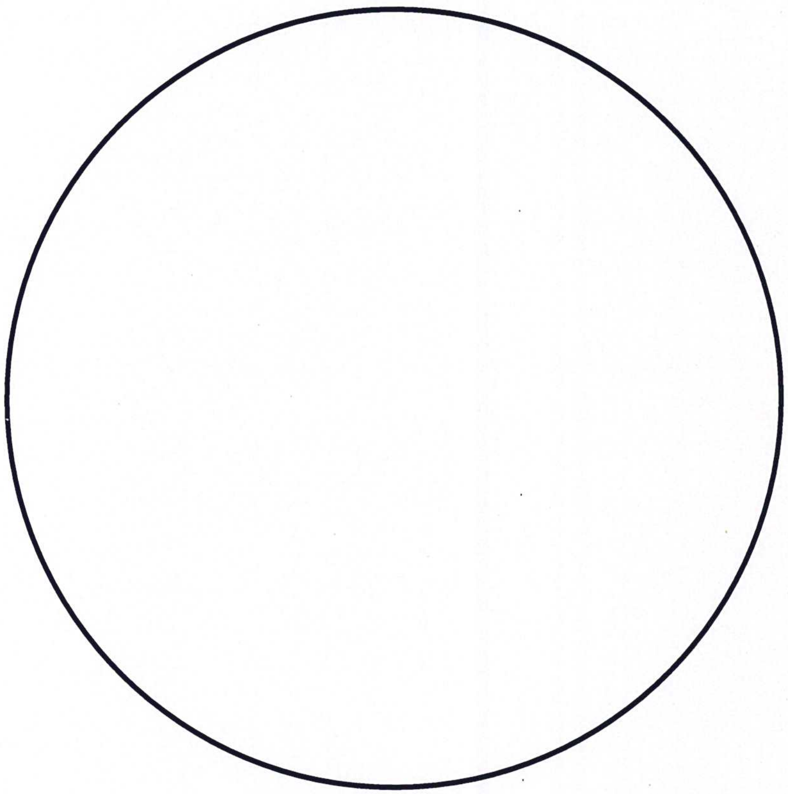
Find the group of symmetries of the following object



Find the group of symmetries of the following object



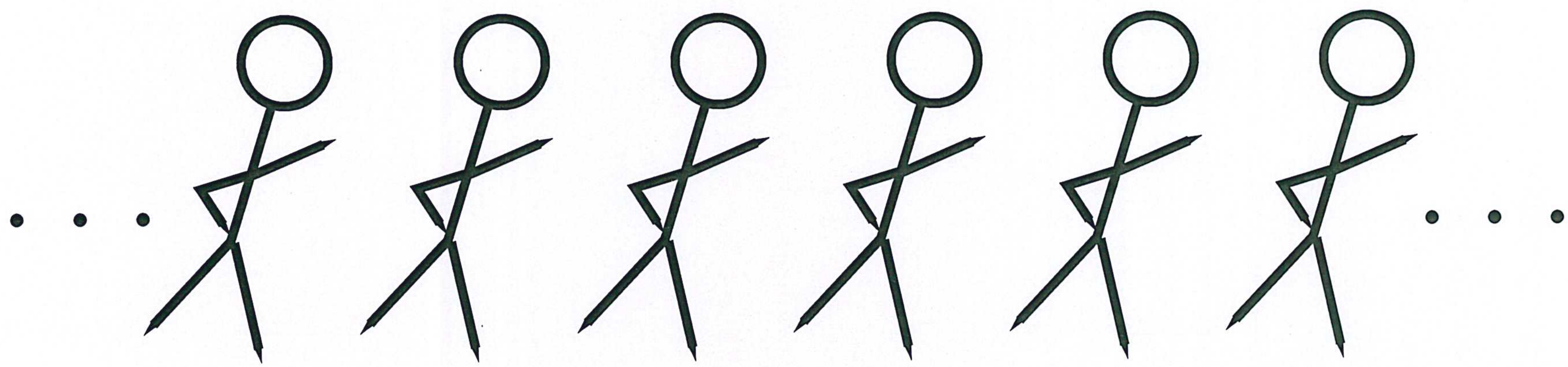
Find the group of symmetries of the following object



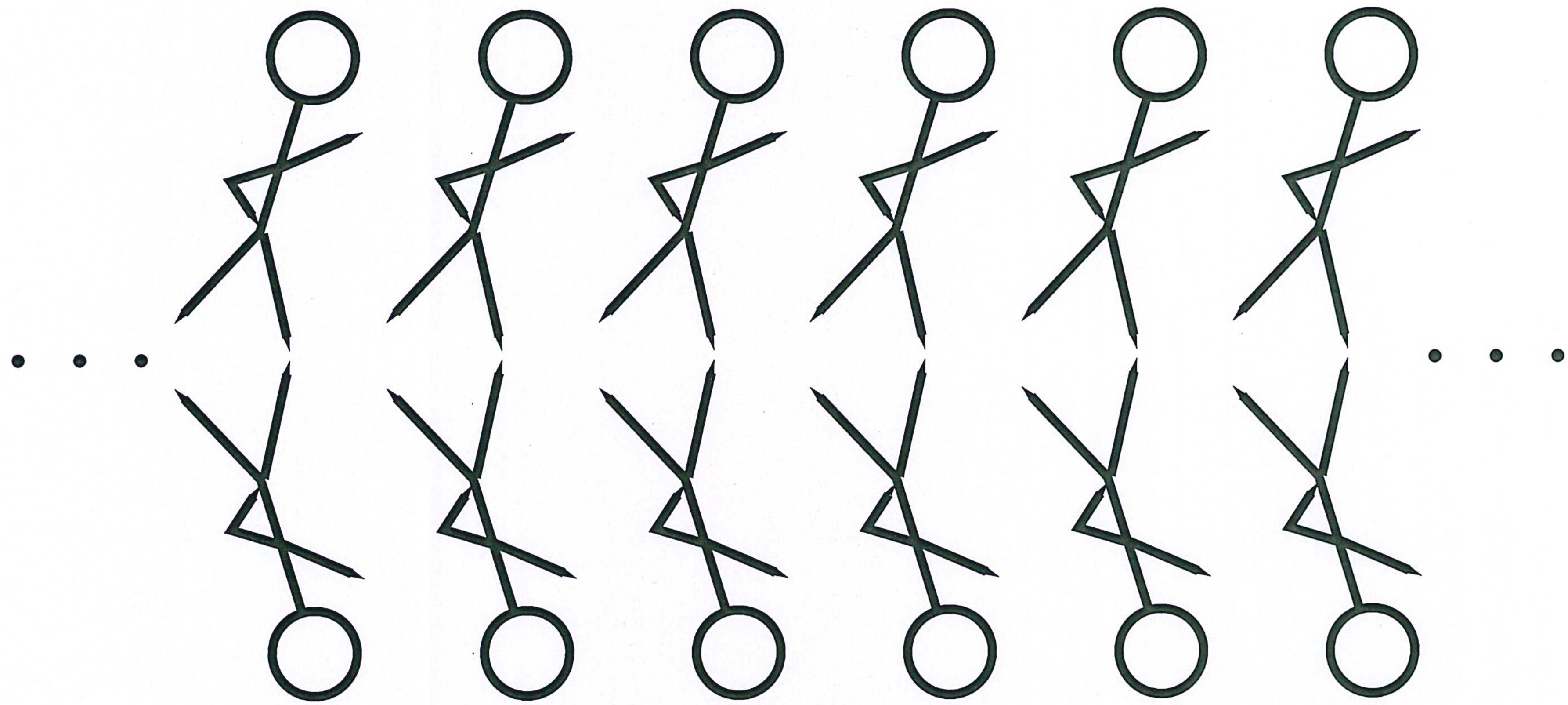
Definition (page 61 of text)

- Objects in the plane that have translation symmetries such that *the vectors of the translation symmetries are all integer multiples of *one* fixed vector* are called
- The groups of symmetries are called

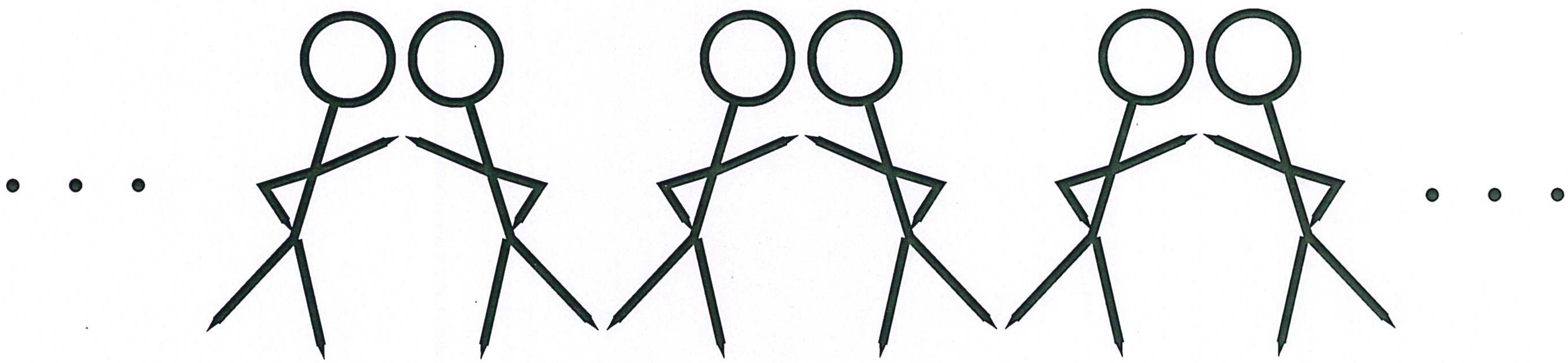
Frieze Patterns



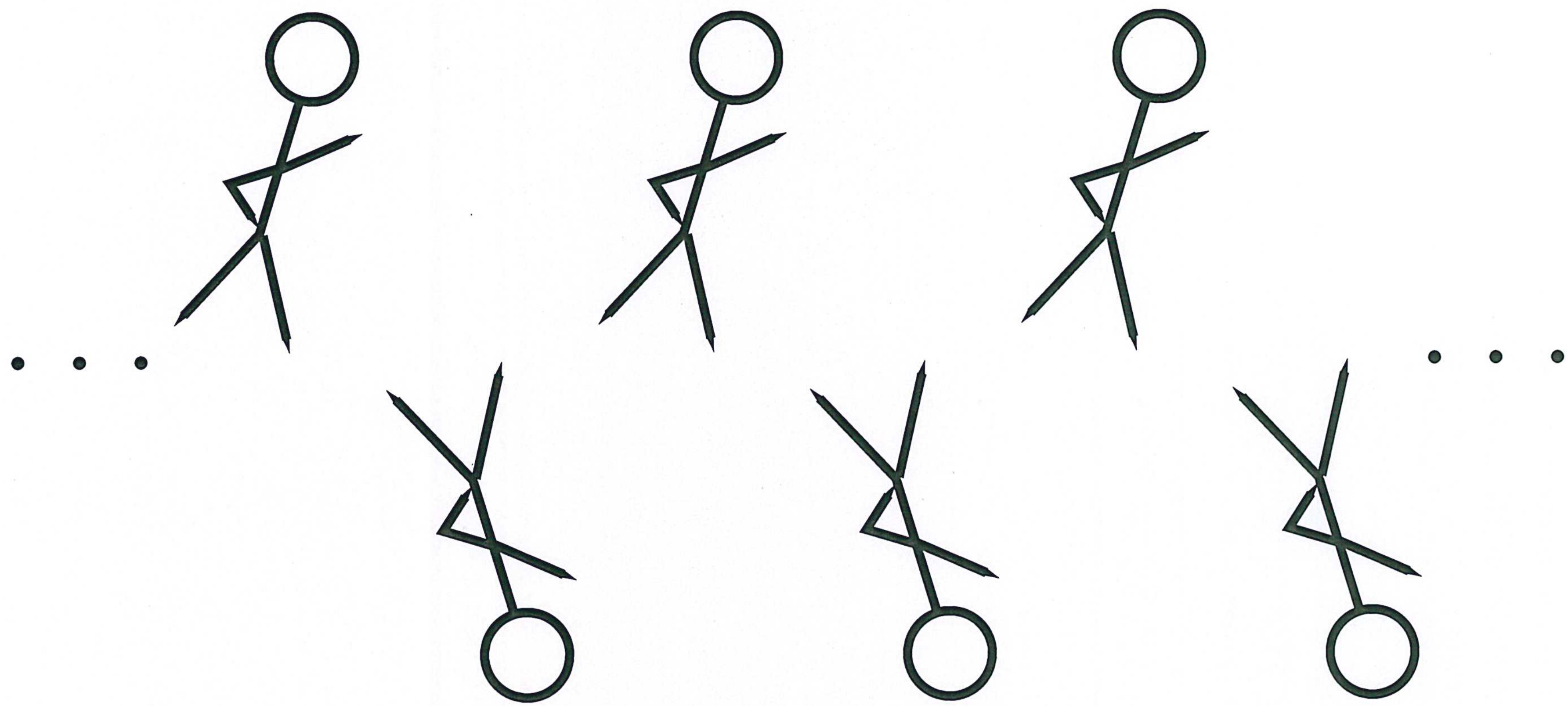
Frieze Patterns



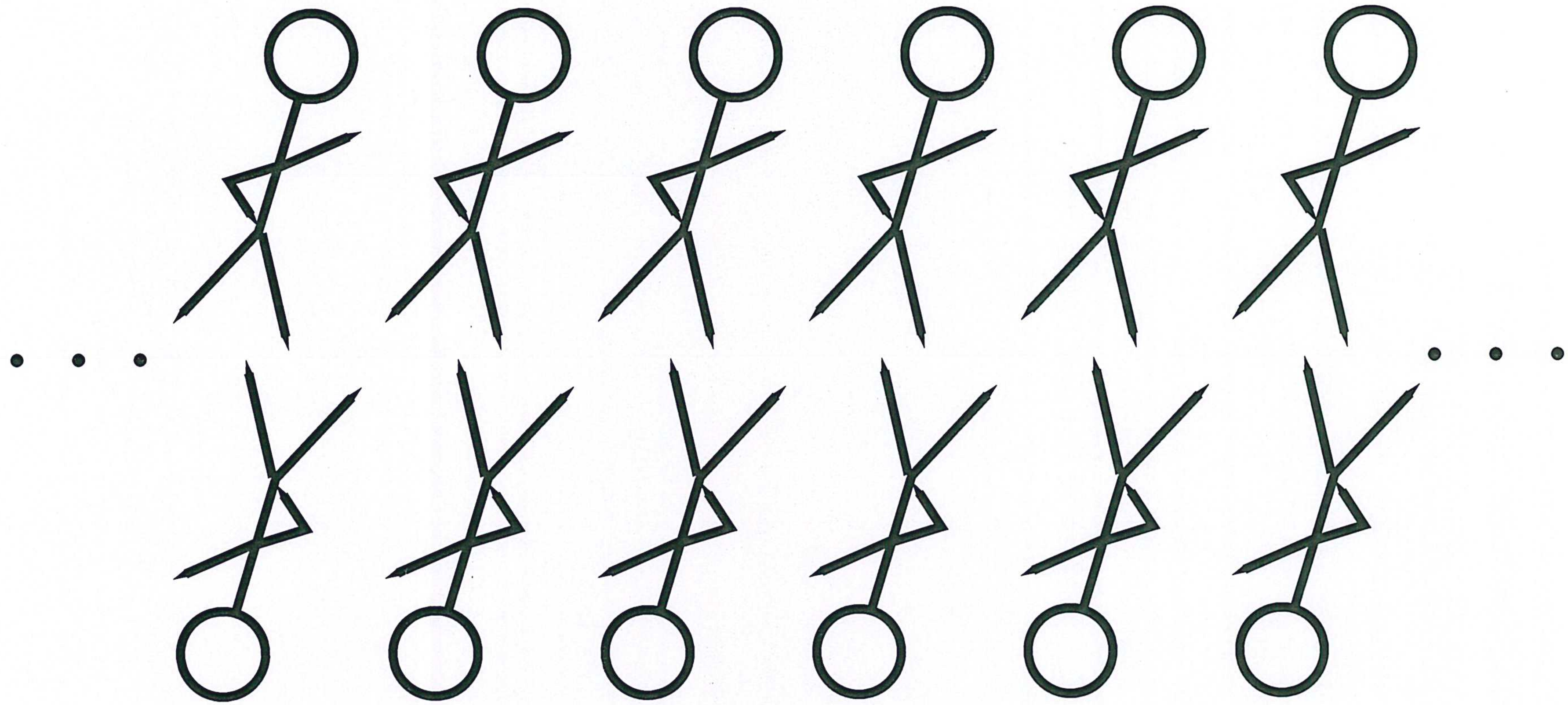
Frieze Patterns



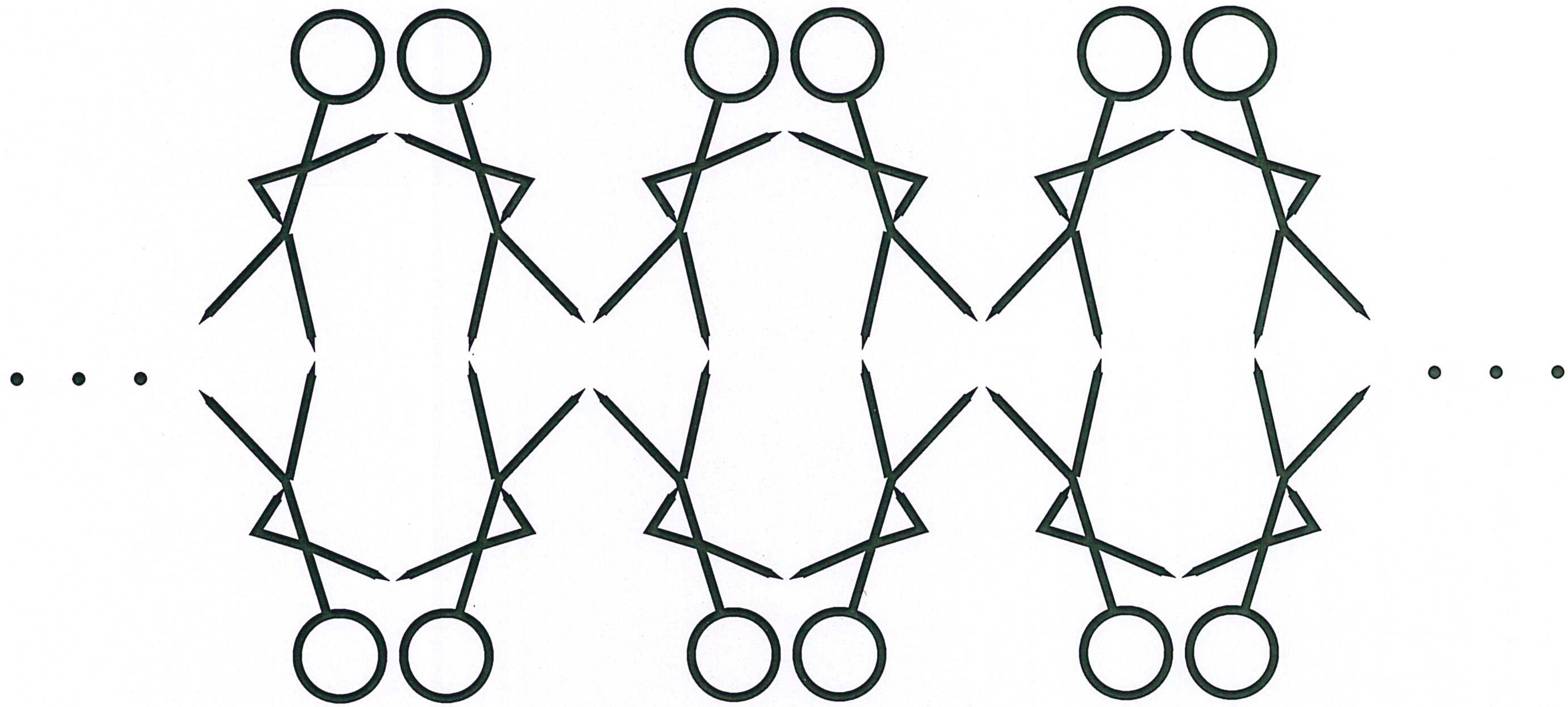
Frieze Patterns



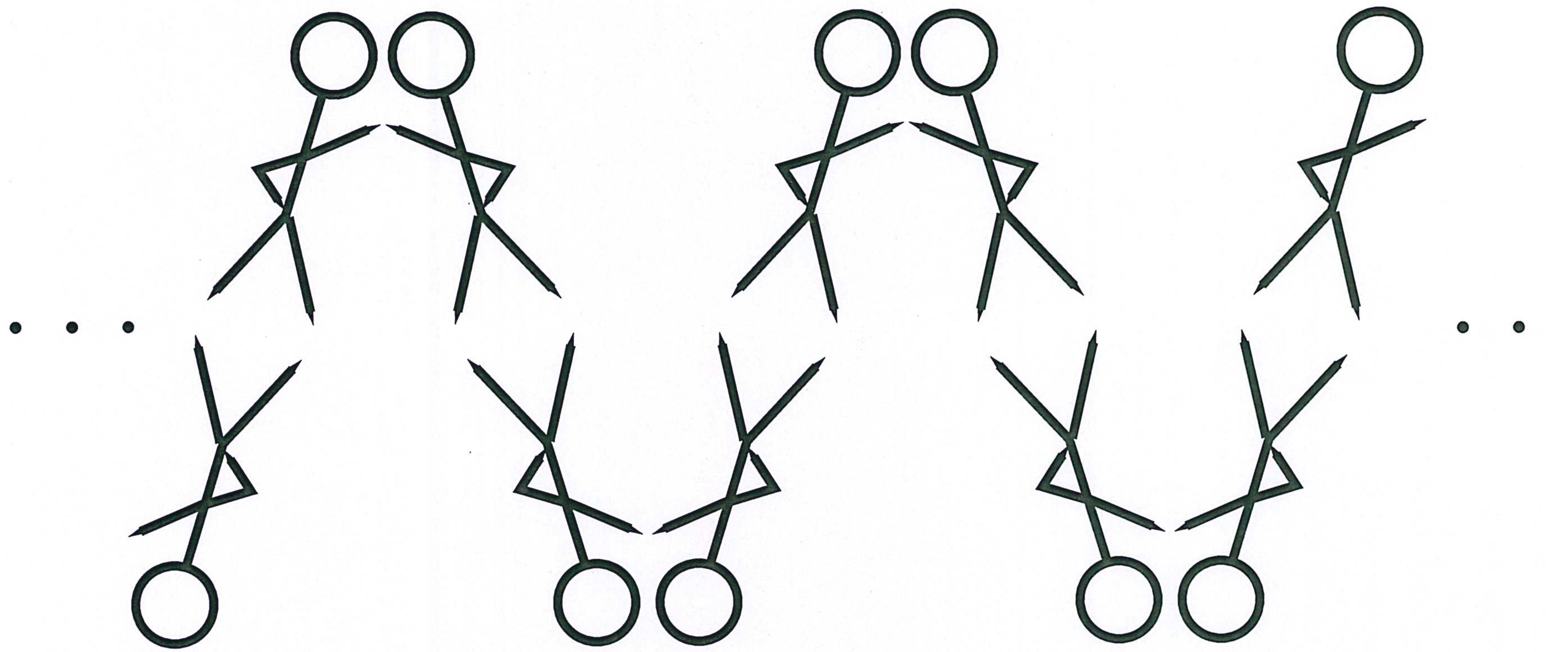
Frieze Patterns



Frieze Patterns



Frieze Patterns



The Classification Theorem For Friezes

Theorem
The seven frieze groups $F_1, F_2, F_3, F_4, F_5, F_6$ and F_7 are the **only** *frieze groups.*

Definitions (page 73 of text)

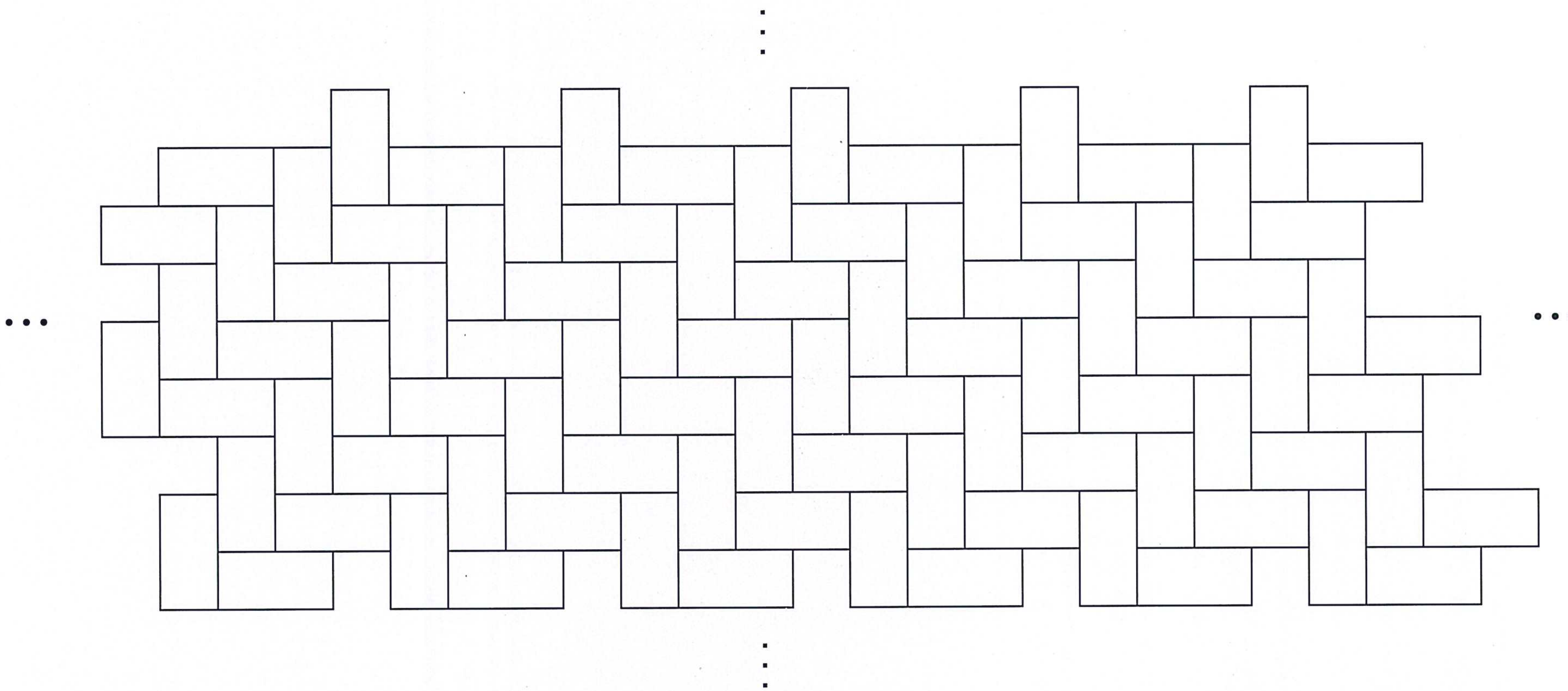
- An object in the plane is a **wallpaper design** if:

  (a) There are two non-parallel vectors such that every translation that can be obtained by composing a translation along an integer multiple of the first vector followed by a translation along an integer multiple of the second vector is a symmetry of the object.

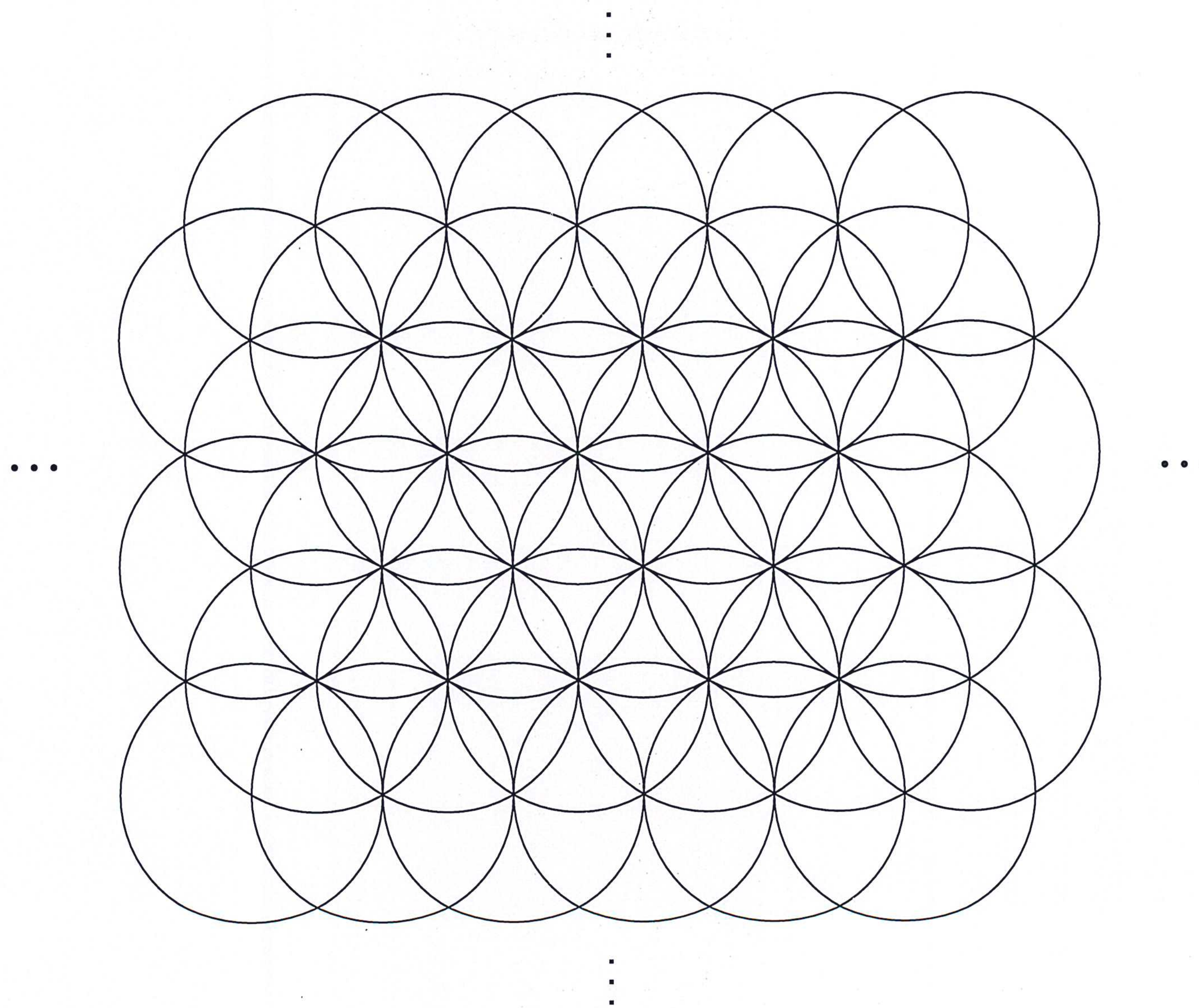
  (b) Every translation symmetry of the object must be of the kind specified in (a).

- The groups of symmetries of wallpaper designs are called **wallpaper groups**.

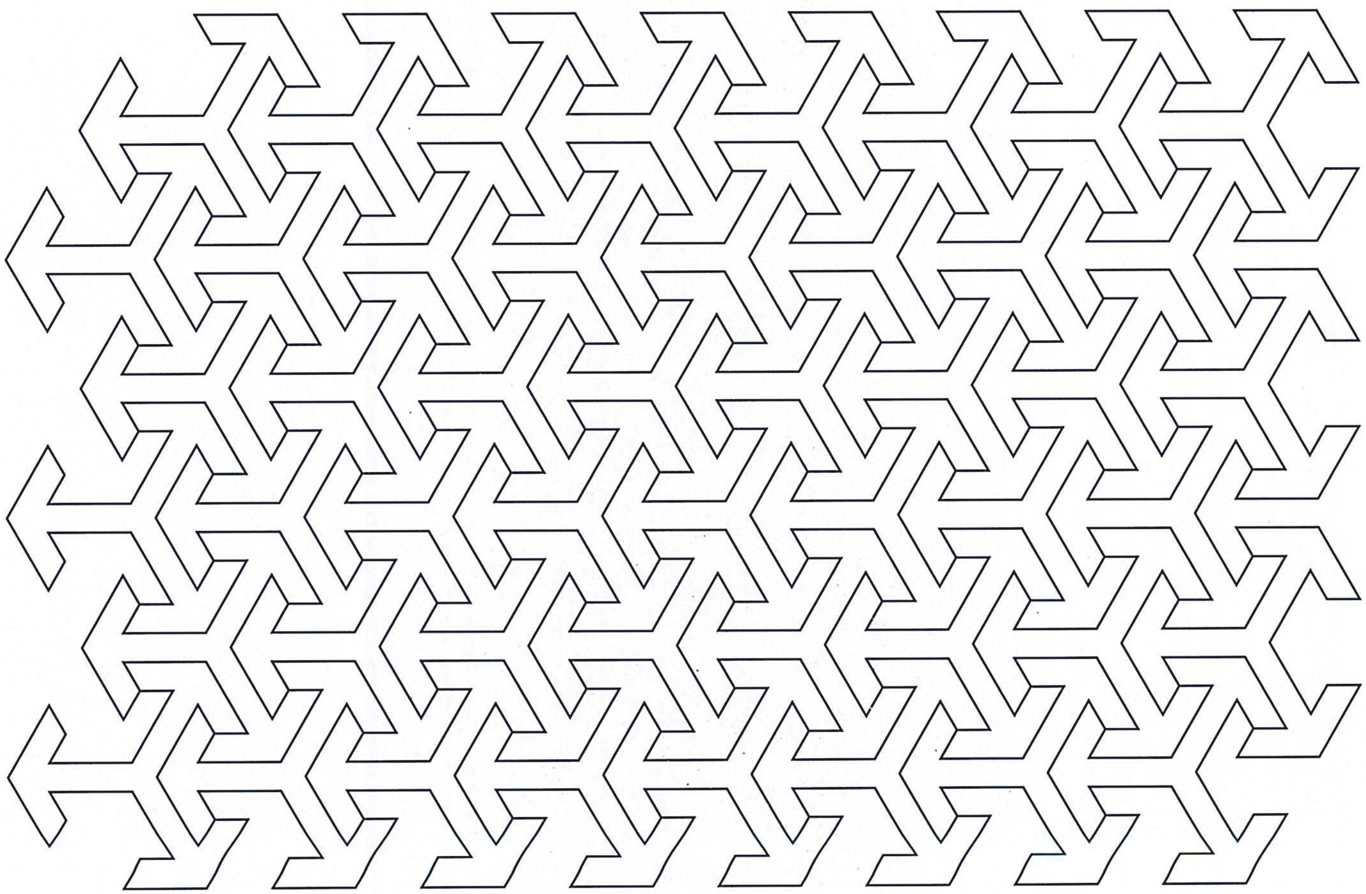
Wallpaper group



Wallpaper group



Wallpaper group



Definition (page 74 of text)

Any arrangement of objects on a plane in such a way that all of the plane is covered and such that any two tiles either share a common corner, intersect along a pair of their edges, or do not intersect at all, is called a **tiling** of the plane. The objects used to cover the plane are called **tiles**.

Regular Tilings Of The Plane (pages 77–79 of text)

A tiling of the plane is **regular** if:

- all the tiles used are regular polygons (equilateral triangles, squares, regular pentagons, etc.);
- every two adjacent polygons have either a common point or a common edge;
- if the polygons around every common point are of the same type.

Monohedral Tilings

Theorem

There are exactly 3 monohedral regular tilings of the plane.

Archimedean Tilings

Useful References

- https://en.wikipedia.org/wiki/Euclidean_tilings_by_convex_regular_polygons
- http://server.math.umanitoba.ca/~sasho/CurentCourses/1020/Files/Lectures_2017/Lecture_06.html

QUESTIONS???