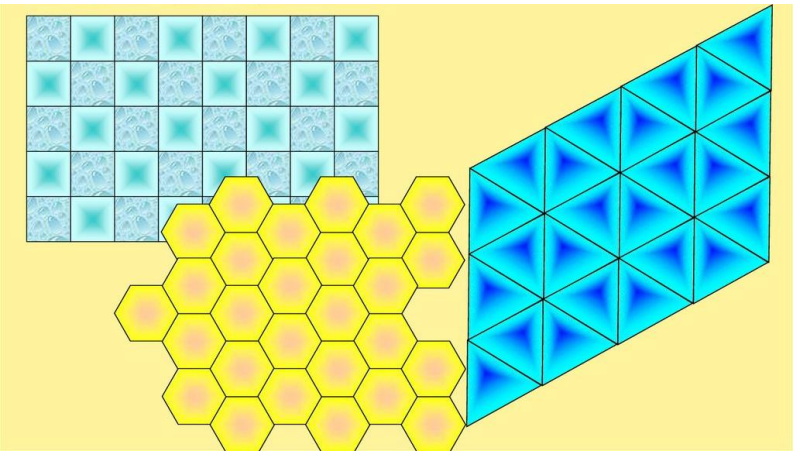
Class 11.

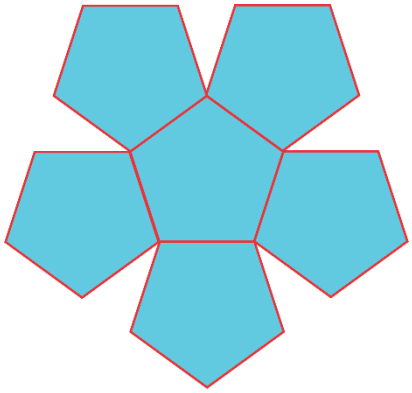
Tessellation.

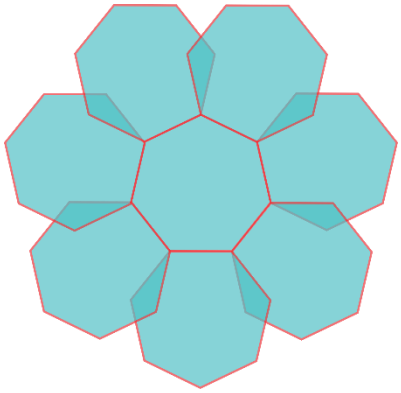
A pattern of shapes that fit perfectly together!

Tessellation with only one type of regular polygons, can be done with triangles, squares, and hexagons.



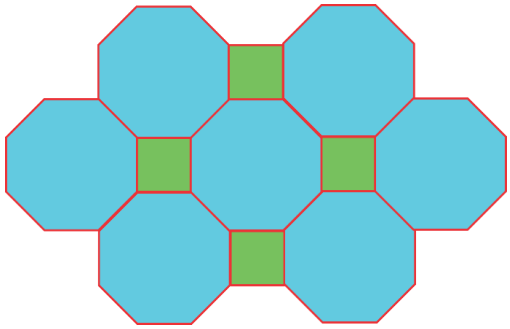
For another type of regular polygons such regular tessellation is not possible. For example, if we want to do the tessellation with pentagons or 7-polygon, we will get:

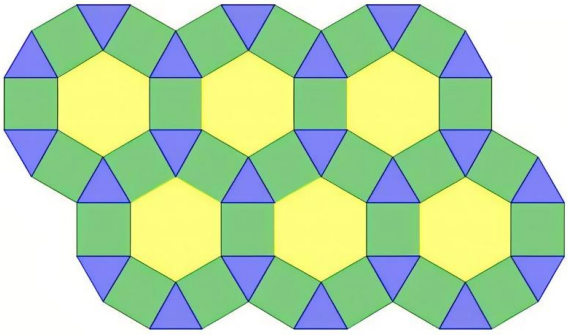


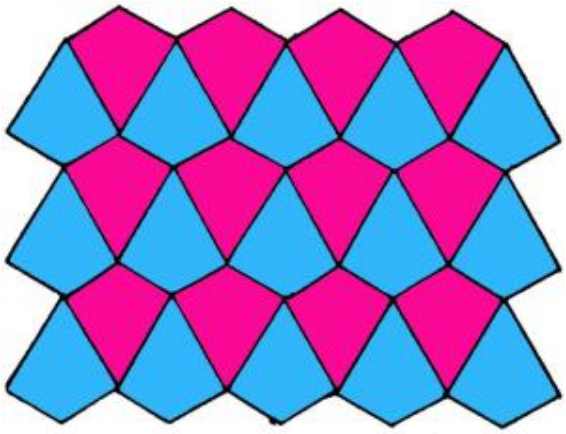


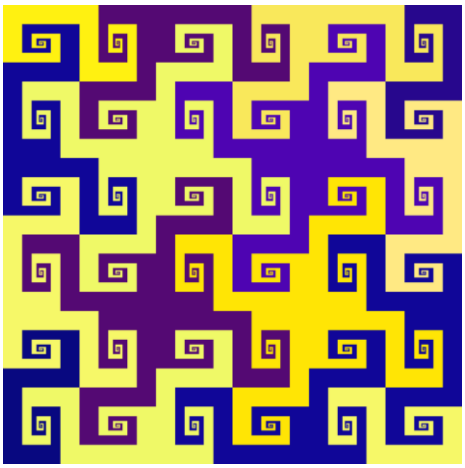
Tessellation can be done with regular polygons of different kinds, such tessellation is named semi regular.

Also, tessellation can be done with the polygons of random shapes:

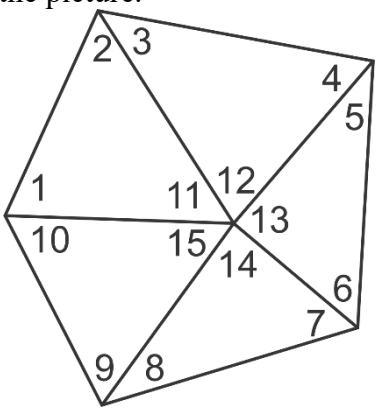








Can the plane be tessellated with the arbitrary (not regular) triangle? Quadrilateral? The sum of the angles of a polygon. Any polygon can be divided into set of triangles, with the vertices in the vertices of the polygon and an arbitrary point inside the polygon as on the picture.



The sum of all angles:

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 + \angle 9 + \angle 10 + \angle 11 + \angle 12 + \angle 13 + \angle 14 + \angle 15 = 5 \cdot 180$$

because we have 5 triangles and the sum of the angles of a triangle is 180°. But

$$+\angle 11 + \angle 12 + \angle 13 + \angle 14 + \angle 15 = 360^\circ$$

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 + \angle 9 + \angle 10 + 360^\circ = 5 \cdot 180$$

$$\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 + \angle 9 + \angle 10 = 5 \cdot 180^\circ - 360^\circ = (5-2) \cdot 180$$

Or for arbitrary convex polygon the sum of all internal angles is

$$(n-2)\cdot 180$$

n is number of sides. Based on this we can calculate the angle of a regular polygon

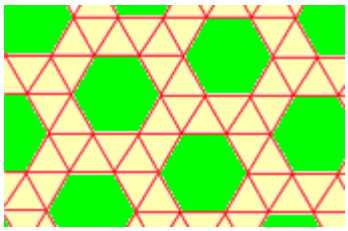
$$\frac{(n-2)\cdot 180}{n}$$

Pentagon	180
Hexagon	120
7 side	128.6
8 side	135

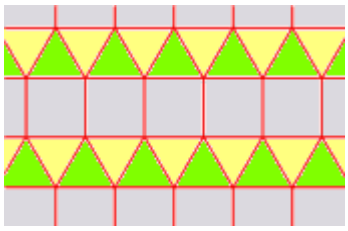
A **semi-regular** tessellation is made of two or more regular polygons. **The pattern at each vertex must be the same!**

There are only 8 semi-regular tessellations:

To name a tessellation, go around a vertex and write down how many sides each polygon has, in order ... like "3.12.12".



3.3.3.3.6



3.3.3.4.4