Covering the plane with irregular polygons is called irregular tiling (tessellation). There are no certain rules and skills to tile with irregular polygons. Sometimes, we can easily tile a plane with some types of uncommon polygons. And sometimes, we can not fit copies of an irregular polygon on a plane.

Figure 9.10

Polygon in Figure 9.10 is an uncommon quadrilateral. It is used to tile a plane (Figure 9.11).

Figure 9.11

**Edge-to-Edge Tiling**
In such tiling, each side of the polygons overlaps a side of another polygon. In Figures 9.12-13, two tilings are shown. The one build up of a hexagon is an edge-to-edge tiling. In this pattern, each side of a polygon overlapped with a side of another polygon.

The pattern in Figure 9.13 is made up of congruent hexagons. In each hexagon, some of the sides are adjacent to two sides of another hexagon. Therefore, this tiling is not an edge-to-edge type.

How to know that we can tile by a polygon?

There is no direct method on how to make a tiling. However, there are some basic facts we can use in tilings. Some of these facts are described below.

**Triangle Tiling**

We can create tilings by all the types of triangles. The tilings shown in Figure 9.14-15 are built up of scalene and isosceles triangles.
Fact 1. We can tile the plane by any triangle. A pair of any triangle can form a parallelogram. In Figure 9.16, you see how two copies of a triangle formed a parallelogram. We know that a parallelogram can easily tile a plane. Therefore, it is a basic fact that any triangle tiles a plane.

Quadrilateral Tiling

Using many different quadrilaterals, we can create tilings with different patterns. In such tilings, we can use both common and irregular quadrilaterals. Some examples are shown in Figures 9.17-20.
Instruction 9-2
Tessellations with Irregular Polygons

Figure 9.17

Figure 9.18

Figure 9.19
Fact 2. Any quadrilateral can tile a plane. The quadrilateral could be concave as well. In Figure 9.21, you see a tiling that is made up of a convex quadrilateral.