Tessellations

When polygons are fitted together to fill a plane with no gaps or overlaps, the pattern is called a tessellation. You have seen them in floor tilings, quilts, art designs, etc. Tessellation patterns can be made from one shape or from more than one shape; here our investigation will use one shape at a time.
We will start with a hands-on approach, and use pattern blocks to explore tessellations.

1. Use the green tiles to create a tessellation by equilateral triangles.
   • Sketch one tessellation.
   • How many possibilities are there?
   • How many possibilities are there if vertices are only allowed to meet other vertices?
2. Use the blue tiles to create a tessellation by rhombuses.
   • Sketch one tessellation.
   • How many possibilities are there?
   • How many possibilities are there if vertices are only allowed to meet other vertices?
3. Use the red tiles to create a tessellation by isosceles trapezoids.
   • Sketch one tessellation.
   • How many possibilities are there?
   • How many possibilities are there if vertices are only allowed to meet other vertices?
4. Use the yellow tiles to create a tessellation by hexagons.
   • Sketch one tessellation.
   • How many possibilities are there?
   • How many possibilities are there if vertices are only allowed to meet other vertices?
5. Look at Escher's Regular Division of the Plane Drawings numbers 1-21 (Visions of Symmetry pg 116-132). Make a list of the geometric shapes that are used to tessellate the plane. For example: in sketch 1, Escher bases his drawing on a tessellation by parallelograms.
6. Find a pentagon that will tessellate. Sketch the tessellation.
7. Find a pentagon that will not tessellate. Explain why not (i.e. try to explain what goes wrong when one tries to tessellate the plane using this pentagon).
8. Find a hexagon that is not regular, but which will tessellate. Do you think any hexagon will tessellate? Explain your answer.

Handin: A sheet with answers to all questions.