mobile inquiry technology
Teacher Notes

Tiling Shapes Introduction

In this activity, students will discover properties of different shapes that allow them to fit together. These properties include angles and lengths of sides. By trying to link the different shapes together, the students will be introduced to parallelograms, squares, hexagons, triangles, and trapezoids.

Students will use a drawing computer program to construct and position shapes so they fit into a pattern formation of the student's own making.

Students will develop a number of key concepts related to shapes and design including:

- exploring different combinations of regular polygons that can be used to tile a plane;
- constructing various regular and irregular polygons using a computer draw program;
- estimating angle measures.

CLOSE

mobile inquiry technology
Tiling Shapes Teacher Notes

Discussion Guide

Review regular polygons with the students. One way of doing this is to display paper versions of shapes that have all their sides and angles the same. Some of these include equilateral triangles, squares, pentagons, hexagons, and octagons. Specifically estimate the size of the angles contained in each shape by using a right angle as a template.

Use several squares of equal sizes to demonstrate how shapes can tile together. Explain that tiling means that the vertex of one angle of a shape must be completely surrounded. Ask the students to think of other polygons that can tile alone. (Only squares, triangles, and hexagons can tile the plane when used alone.)

Direct the students to "Thinking About the Question". After about 10 minutes allow the students to share their combinations.

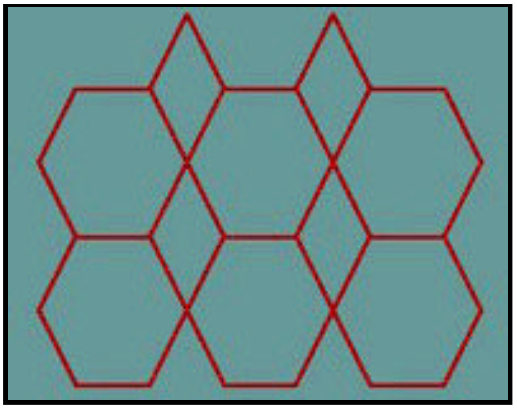
Ask the students to share their combinations with the class. There are only eight known combinations possible for tiling. They include:

1. three triangles and two squares (shown to the students)
2. a hexagon, a square, a triangle, and a square
3. two octagons and a square
4. four triangles and a hexagon
5. a square, a triangle, a square, and two triangles
6. a hexagon, a triangle, a hexagon, and a triangle
7. a square, a hexagon, and a dodecagon
8. a triangle and two dodecagons

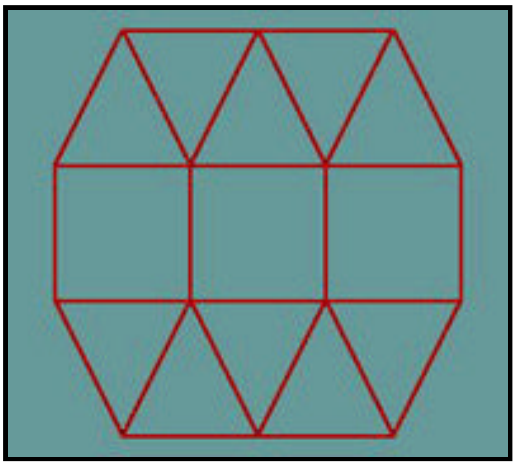
Direct the students to "Investigation I".

Possible solutions for the investigations include:

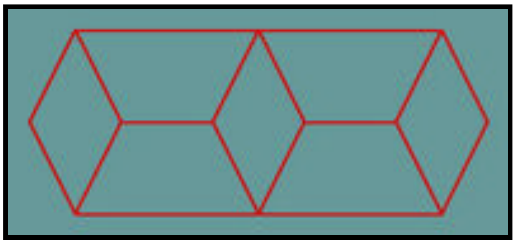
I.



II.



III.



CLOSE

mobile inquiry technology
Tiling Shapes Teacher Notes

Additional Teacher Background

Another name for tilings are tessellations. These pattern puzzles are inspired in part by the Dutch graphic artist M.C. Escher, but also by mathematicians such as Roger Penrose and Benoit Mandelbrot.

Foam rubber regular pentagons can be purchased from Tessellations (http://www.tessellations.com/index.html) for $0.25 each, if you want to be able to demonstrate this hands on.

CLOSE

mobile inquiry technology

Tiling Shapes Suggested Timeline

The amount of time you spend on introductory discussions, data collection, and analysis, will determine your overall timeline. The following represents a possible timeline.

- One class period - Introductory Discussion
- One class period - Investigation I: Tiling parallelograms and hexagons
- One class period - Investigation II: Tiling squares and triangles
- One class period - Investigation III: Tiling trapezoids and parallelograms
- One class period - Analysis

Additional days can be used for further investigations.

CLOSE