osaics

essellations

SYMMETRY
Mosaics: Overview & History

*Mosaics* are an art form in which murals are made using tiny tiles or pieces of paper cut in geometric shapes to create a picture. Mosaics are Persian in origin and are seen today all over the world. It is an ADDITIVE MEDIUM - one piece follows another - and has been used at least since the fourth millennium BC to decorate and express the needs and feelings of people, both publicly and domestically.
Ancient Babylon

Over five thousand years ago in present day Iraq at Uraq/Warka, an ancient Sumerian city, colored clay cone shaped bullets were pressed into wet plaster mud to strengthen and decorate the walls of their great temples.
Mosaics & Symmetry

There are four basic symmetries upon which art is based.

reflection symmetry: an image is reflected through a "mirror line".

Rotation symmetry: an image is repeated as it rotates around a center point. 4 times is a 90 degree and 8 times is a 45 degree rotation.
Translation Symmetry: repetition of a design along a line.

Glide Symmetry: a combination of reflection and line symmetry. Note that if there is a glide there is a translation but not the other way around.
Prior to learning about Tessellations, students should be able to recognize these four symmetries and attempt to use them in mosaics.
What are Tessellations?

Patterns covering the plane by fitting together replicas of the same basic shape have been created by Nature and Man either by accident or design. Examples range from the simple hexagonal pattern of the bees' honeycomb or a tiled floor to the intricate decorations used by the Moors in thirteenth century Spain or the elaborate mathematical, but artistic, mosaics created by Maurits Escher this century. These patterns are called tessellations.

What is a tessellation?

In geometrical terminology a tessellation is the pattern resulting from the arrangement of regular polygons to cover a plane without any interstices (gaps) or overlapping. The patterns are usually repeating.
M.C. Escher and Tessellations

Escher was an individual artist. He incorporated the fantasy of Monet, the logic and precision of Michelangelo, the perspective and three-dimensional vision of Wright, and the patterns of the Moors, into his own woodcuts, lithographs, and drawings. He created impossible worlds and outlandish creatures. His inspiration, the Moors of Alhambra, Spain.
Escher's Art

Glide Symmetry
Rotation
Symmetry
Translation and Metamorphasis

Where should we begin? How about cutting and pasting a simple translation? View the beginning of this video for our first try.
Ready for something more complex? Check out this power point...

From Kay Wagner of Edina Public schools in Minnesota
Ancient Greece

Pebble mosaics with mythological themes date to the fifth century BC, while more sophisticated designs inspired the use of smaller and smaller pebbles, eventually led to cutting and shaping stones or marble.
Roman Mosaics

By the 1st century AD, mosaics were being used to decorate the floors and walls of homes, public buildings and baths. They made borders that surrounded a center mosaic called an "emblemata".
Byzantine Mosaics

From the fourth through the fourteenth centuries, Christianity moved the mosaics to the ceiling and used glass instead of marble to create glowing color.
Mexico, Spain & Other Cultures

An icon of Mexican (Aztec) art, this was probably worn during ceremonies as a pectoral (an ornament worn on the chest).

Trencadis is a Spanish word for a type of mosaic in which shards from waste tiles are used to clad buildings. This is a picture of some benches in Barcelona by Antonio Gaudi.
Math Lessons Using Mosaics

Patterns

Here is a link to a video pattern lesson that illustrates the use of pattern in art and nature.

http://www.linkslearning.org/Kids/1_Math/2_Illustrated_Lessons/5_Patterns/index.html

Lesson 1. We will show you the graph paper file in "paint", the printed graph using colors, and mosaic shapes to manipulate into patterns, as options to introduce mosaic patterns.
Examples

Paint program
Craft sticks as mosaic shapes

construction paper mosaics
Mosaics & Fractions

Mosaics can aid in understanding fractional proportions and percentages.
Fraction Mosaic

Use scrap plywood, hard board, or heavy box lids. Help students measure and mark into fractional sections. Glue different textures (beans, rice, sand, macaroni, etc.) onto different sections to form a mosaic design.
100 Piece Mosaic

Create a mosaic using exactly 100 pieces. These could be seeds, different colored squares of construction paper,... Then write the fractions and maybe percentages of each color or seed on the back to evaluate mathematically.
Fraction Designs

Use designs to help students see different fractions within the same figure. An extended activity would be creation of original designs, using fractional modules.

Website for sample fraction cards and pattern tests: