Connecting Math and Art

SUMMARY

Mathematics and art provide opportunities to express creative ideas. Both can inspire aesthetic form and composition, and provide ways to communicate intellectual perceptions. This tip sheet suggests many topics that relate mathematics and art.

AUDIENCE

All educators; grades K-12.

WHY CONNECT MATHEMATICS & ART?

By exploring and discovering relevance between the arts and the field of mathematics, students engage in creative thinking about the meaning and structure of the world around them---helping them to grasp and retain knowledge and to gain a lifelong interest in learning.

SUGGESTED TOPICS THAT LINK ART WITH MATHEMATICS

Cultures:
- **Native American Indian**: geometric shapes in Ojibwe Dream Catchers; in sand art, in the patterns of Navajo blankets, the rotational symmetries of Hopi baskets
- **African:** batik fabric, jewelry, pottery, sculptures, housing styles
- **Chinese:** geometric symmetry in tan-grams, origami designs, paintings
- **Middle Eastern:** elaborate tessellations in mosaic tile motifs
- **Roman, Greek, and Egyptian:** the Golden Ratio as seen in vases, paintings, architecture, and sculptures, tiled tessellations on walls & floors
- **Music** from various cultures and times

Mathematical & Artistic Form:
- The **geometric ornamentation** in Islamic art shows how geometric figures have an intrinsic aesthetic appeal.
- The various folds and constructions in **Japanese origami** form interesting shapes and sculptures created from polygons and polyhedron.
- Discover **artistic perspective and the Golden Section**, also known as Phi, (or **φ)**, the irrational number 1.618034…) within famous paintings, such as works by Piet Mondrian, Leonardo Da Vinci, Michelangelo, Raphael, Rembrandt, Salvador Dali, and Seurat.
- Investigate **geometric proportions, golden sections, and artistic perspectives** in architecture and sculptures. For example: Michelangelo's *David*; *The Porch of the Maidens* and the *Parthenon* in Athens; the *Great Pyramid* in Egypt; *Chartes Cathedral*; *Le Corbussier*; the *Taj Mahal*; the *United Nations Building*; the *CN Tower*, and more
- Examine **structural geometric patterns** in honeycombs, in galaxies, in snowflakes, in the curvature of a rose, and on pineapple skin

Artistic and Mathematical Patterns in the Natural World:

- Make a RAFT "Freaky Fractal", then observe and compare the intricate formation of **Fractal self-similar growth patterns and Fractal dimension** to trees, ferns, coastlines, clouds, lightning, rivers, shells, and much more. Challenge students to discover more fractals in nature
- The **Golden Section**, is found in the proportional growth patterns of plants, humans, dolphins, logarithmic spiral shells, moths, penguins, tigers, spiders, and more. Artists have long used **φ** as a fundamental compositional guide.
- Observe **Fibonacci numbers** in the spiral growth pattern of stems, leaves, branches, petals, shells, and in the seed patterns of sunflowers and pinecones
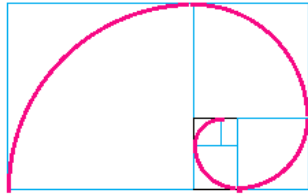
HOW TO GENERATE CURIOSITY & INTERST ABOUT ART & MATH

- **Provide appropriate resources and opportunities** to help spark student interest in art and mathematics; include objects, books, visits to art galleries, web sites, and guest speakers
- **Ask leading questions** to encourage students to discover their own connections between math and art
- **Give students class time** to brainstorm, write outlines, and draft reports
- **Have students choose** an art subject to investigate and to report back to the class

RELATED RESOURCES

RAFT hands-on activities that can easily connect art with mathematics:

Mathematical Dream Catchers –
http://www.raft.net/ideas/Mathematical Dream Catchers.pdf
Advanced Mathematical Dream Catchers –
http://www.raft.net/ideas/Advanced Mathematical Dream Catchers.pdf
Pascal's Triangle – http://www.raft.net/ideas/What is Pascals Triangle.pdf
Freaky Fractals – http://www.raft.net/ideas/Freaky Fractals.pdf
Tessellating Lizard – http://www.raft.net/ideas/Tessellating Lizard.pdf
Scallop Circle String Art – http://www.raft.net/ideas/Scalloped Circle String Art.pdf
What are Penrose Tiles? – http://www.raft.net/ideas/What are Penrose Tiles.pdf
Glove-a-Phone – http://www.raft.net/ideas/Glove-a-Phone.pdf
Cap Maracas – http://www.raft.net/ideas/Cap Maracas.pdf