INTEGRATING ART AND MATHEMATICS

Artists from different times and cultures have been fascinated by mathematical concepts and have used them to create unique works of art. From Islamic tile designs to rose windows in Medieval churches, from Amish quilts to nonobjective paintings by Victor Vasarely, and from MC. Escher’s tessellations to Buckminster Fuller’s geodesic domes, mathematical concepts have enthralled artists and architects. For all practical purposes, it is almost impossible to separate the artistic and mathematical concepts in such works.

There are particular mathematical concepts that may be best learned through experiences in art that directly correlate with math. By combining art and mathematics, students are provided opportunities to solve problems creatively and develop spatial understanding through the exploration of geometry in two and three dimensions. In addition, students are afforded experiences to understand number, measurement, and pattern concepts, use manipulatives and representations, work collaboratively, and make further interdisciplinary connections through writing about art and math.

Problem Solving

Significant art and math activities present opportunities for students to develop and apply problem-solving skills: Such activities also encourage curiosity and creativity and help students understand the application of mathematics in real-life situations and the world around them.

Geometry

Geometry offers the most obvious connection between art and mathematics. Both involve drawing, the use of shapes and forms, an understanding of spatial concepts, geometry in two- and three-dimensions, measurement, estimation, and pattern. To learn geometric concepts, students need to investigate, experiment, and explore the world of geometry through hands-on activities and everyday situations.

Students who develop an understanding of geometry are better prepared to develop spatial sense and learn number, measurement, and estimation concepts. The representation of geometric concepts through drawings or the use of two- or three-dimensional manipulatives promotes student understanding; such practices may be particularly beneficial to the visual learner.

When students explore patterns and relationships through exploratory activities, they learn about the properties of shapes and forms and develop an awareness of spatial concepts. For example, folding two-dimensional shapes into three-dimensional forms promotes the development of spatial sense. The creation of tessellation patterns made with congruent tiles or mosaics, is another example of a significant experience that promotes understanding through both art and math.

Through other activities that combine art and mathematics concepts, students can explore bilateral and radial symmetry.

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try; practice using rulers, straight edges, protractors, and/or compasses; practice estimation using such terms as 'about,' "between," 'a little less,' or "a bit more"; and create complex patterns based on geometric shapes and forms.

Computers, Art, and Mathematics

Educational computer software for student use is becoming increasingly available. Paint and draw programs and specialized programs such as Tesselmania Deluxe! can engage students in problem solving strategies in geometry, measurement, fractions and decimals, and other mathematical concepts, while creating works of art on a computer screen. Though some programs offer too many ready-made images, others do encourage students to create their own work from scratch. Computer literacy and a good sense of design also become marketable skills in our increasingly technological society.

Art, Math, and Writing

Incorporating writing with art and mathematics activities provides experiences with additional communication skills. Students can keep journals, detail the steps of a process, and write their own stories about art and math.

Nancy Walkup and Pam Stephens

Reprinted from Interdisciplinary Connections: Art and Mathematics, a Take 5 Art Print Set published by Crystal Productions, 1-800-255-8629.

The five reproductions in the set include:

- Escher Bow by Jim McNeill
- Gestalt--Zoel by Victor Vasarely
- U.S. Pavilion for Expo '87 by R. Buckminster Fuller
- Double Mine Patch, an Amish quilt
- North Rose Window, Cathedral of Notre Dame in Paris.

RECOMMENDED
ART & MATH WEB SITES

The Kennedy Center's site's curriculum studio has a number of meaningful interdisciplinary lessons based on art and math.

The Cornell Theory Center Gateway for Educators
http://www.tc.cornell.edu/Edu/MathSciGateway/

The Factory
This site is an interactive tool for creating and exploring fractals.

Geometry Through Art
This extensive site provides numerous, rich lessons and concepts for elementary geometry.
http://forum.swarthmore.edu/~sarah/shapiro/

Internet Connections: Mathematics
This site links to lesson plans, science, art, and other connections, and includes the standards and benchmarks for mathematics and over 500 links to mathematics sites.
http://www.mcrei.org/connect/math.html

Math Forum - K-12 Geometry
This site contains many links to geometry-based concepts.
http://www.mathforum.org/k12 geometry.html

Origami Mathematics
http://chasm.merrimack.edu/~thull/OrigamiMath.html

Tessellations
This site features many useful interdisciplinary connections.
http://www.geocities.com/CapeCanaveral/Hangar/1553/index.htm

Tessellations
Tessellations is a company that makes a variety of products inspired by the Dutch graphic artist M.C. Escher and the mathematicians Roger Penrose and Benoit Mandelbrot.
http://www.tessellations.com/

The North Texas Institute for Educators on the Visual Arts and this newsletter are supported by grants from The Getty Education Institute for the Arts, an operating program of The J. Paul Getty Trust; the Annenberg Foundation; the Edward and Betty Marcus Foundation; the Greater Denton Arts Council and the Arts Guild of Denton; the Texas Commission on the Arts; and Individual Donors.

The North Texas Institute for Educators on the Visual Arts

Nancy Walkup and Pam Stephens

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The North Texas Institute for Educators on the Visual Arts
SELF-TAUGHT ARTISTS OF THE 20TH CENTURY

The Amon Carter Museum and the Fort Worth Museum of Art are both hosting the exhibition, Self-Taught Artists of the 20th Century: An American Anthology, November 1, 1998 - January 24, 1999. This exhibition will survey for the first time the work of self-taught artists from the entire 20th century as we near the millennium. It examines the creative spirit and expressive capacity of artists without formal training and considers how they transform ideas, memories, fantasies, and obsessions into tangible forms through their art.

The works in the exhibition were chosen for their high aesthetic content; their expressive power, graphic presence, and formal vigor. The artists featured use a variety of media and forms: painting, sculpture, tracts, installations, and built environments. Some of the artists featured are well-known, such as Howard Finster, Horace Pippin, Bill Traylor, and Grandma Moses. Others, such as Henry Church Jr., Edgar Alexander McKillop, and Leroy Person, are little known or completely unknown. Fort Worth is one of six American cities to host the exhibition. Call the Amon Carter (817-738-1933) and the Modern (817-738-8215) for dates and details of teacher in-services for the exhibition. Information on the artists in the exhibition is available on NTIEVA's web site at M@www.art.unt.edu/ntieva/artcurr/folk/index.htm

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TEXAS SCULPTOR JESUS MOROLES NAMED KEYNOTE SPEAKER FOR NAEA'S 1999 CONVENTION

The NAEA Convention Program Coordinator has just announced that Jesus Morales will be one of the keynote speakers scheduled for the NAEA Convention, March 24-28, 1999, Washington, D.C., another reason to attend! For a preview and to meet the artist, participate in a visit to Morales's "art factory" in Rockport during the TAEA 1998 conference in Corpus Christi!
THE MANDALA: A LESSON ABOUT RADIAL SYMMETRY

Radial Symmetry

Students may explore concepts of geometry through an introduction to radial symmetry. Radial symmetry or balance is a variation of balance in which the elements of composition are regularly arranged and radiate from a central point or axis. It appears both in nature and in human-made objects. One type of human-made radial symmetry design is the mandala. A mandala is a graphic and often symbolic pattern usually in the form of a circle, divided into four or more equal sections.

Art and Mathematics

A lesson about mandalas provides a meaningful connection between art and mathematics. In this lesson, students will create an original mandala design using radial symmetry, and in doing so, will become familiar with geometric concepts of symmetry while practicing with tools such as the ruler, the compass, and the protractor. Students will also examine and discuss mandala designs from a variety of artists, cultures, and times. The making of reasoned judgments about mandalas will help guide students when creating their original designs.

Materials and Preparation

The materials needed for this activity are readily available and inexpensive. Each student needs one sheet of 12" x 12" white drawing paper or illustration board, pencils and erasers, masking tape, a ruler, scissors, and colored pencils or markers. The teacher needs to prepare 9" circle templates to share with the class and patterns for 1/4" and/or 1/6" circle wedges.

Resources

Good resources ensure a successful lesson. ARTTALK, a text by Rosalind Ragans, features some good mandala designs. Examples of radial balance from a number of cultures, slides, and prints are also helpful. Assemble and display in the classroom both reproductions and actual examples of objects that show radial symmetry.

Motivation

Display and discuss the reproductions and objects you have brought to class. Have students list and describe additional examples of radial symmetry they observe in nature as well as human-made ones such as bicycle tires, car tires, the plates they eat from, and other sources. Discuss appropriate vocabulary, especially symmetry, radial symmetry, radiate, axis, mandala, kaleidoscope, and geometry. Demonstrate the production procedures and stress the importance of repeating the same design and colors in each quadrant of the mandala to provide unity and balance, and ask students to take great care to guarantee accuracy when transferring their designs.

Procedure

The production procedure is simple, but must be followed carefully to be successful. Distribute the prepared patterns of 1/4 or 1/6 circle wedges to students. Have students draw, with a pencil, an intricate line design inside the wedge that completely fills the space. The design may be realistic or abstract, geometric or organic, but intricate designs work best when repeated through the radial symmetry of the mandala. Have students use colored pencils or markers to color in the design. Each student should have a colored design that looks like a wedge of pie!

For the next step, have students shade the back of the wedge with the flat part of a pencil, then cut out the pie wedge. Have students next use the 9" circle template to trace a circle in the center of a piece of 12" x 12" white paper. Have students each align their "design wedges" with the circle and tape in place with small pieces of masking tape. To transfer the design, students should carefully trace over the lines in the design with a pencil, taking care not to smear the transferred design. Have students repeat the process by moving the wedge and tracing the image until the circle is complete (students may need to re-shade the back of the design to ensure a good transfer).

Students should now color all of their wedges exactly the same, repeating the same colors, values, and textures in each wedge. Display the completed class work with examples of radial symmetry examined earlier in the class.

Extensions

Students can incorporate their names into the design (and challenge others to find it). Another possibility is to transfer the design to a clay slab, cut it out, and decorate it using clay tools and glaze or paint. An interesting language arts extension involves incorporating words or phrases into the mandala design. Students can each also write an artist's statement about their work for exhibition.

Resources

The Mandala (Sacred Symbols), Thames and Hudson
Creating Mandalas: For Insight, Healing, and Self-Expression by Susanne F. Fincher and Robert A. Johnson

NTIEVA NEWSLETTER ONLINE

NTIEVA's newsletter is also available online at http://www.art.unl.edu/ntieva/news/. Many of the articles have been edited to fit the space available in the print version and appear in a longer version on the website. Links to the text are also provided online.
Radial Symmetry Designs

Use the following illustrations as a guide to create a radial symmetry design. Begin by tracing a nine-inch circle (a paper plate makes a great pattern) on white drawing paper. Then, using a ruler, divide the circle in half, then into fourths, next into six parts, and finally into eighths. Draw a detailed line design in one "piece of pie," then repeat it exactly the same way in the other seven segments. Use colored pencils, markers, or paint to color each segment, again, exactly the same. 

For a simpler design, use only four sections.
ESCHER BOWL
Jim McNeill, American, born 1967 -
Computer Graphic

The Art

Action abounds throughout Escher Bowl as members of two opposing football teams mock and tackle across a shallow playing field. Clusters of players push into each other, pumping arms and grimacing as they participate in this contemporary form of what artist Jim McNeill calls “ritualized combat.” In the center of the field, framed by the surrounding action, two players—one from each team—face each other in a skirmish for the football.

The red player protectively bends over the football to cradle it while simultaneously his stiff right arm punches up into the blue team player. The posture and facial expression of the blue player show that he reacts to the hit with surprise. His eyes are opened wide, the palm and all of the fingers on his right hand are fully exposed, unlike all the other players whose eyes are squinted and whose hands are in fists.

As the drama unfolds at midpoint in the image, the playing field itself acts as a gridded, smooth backdrop for the tumbling action. Divided predominately into four vertical sections by white yardage markings, the shallow green field provides a sharp contrast to the bright colors of the players’ uniforms. Encircling and offsetting the two central characters, the green areas create a focal point that highlights the most important action. Upon closer observation, four negative green shapes define the playing field. These green shapes, or “field pieces” as McNeill calls them, are the same repeating silhouettes as those that are used to outline individual players, or “figure pieces.” The fieldpieces serve as the background plane while the figurepieces all occupy the same foreground plane (in math, a plane is a two-dimensional, flat surface that is infinite).

The Artist

Born in 1967 in Rahway, New Jersey, graphic artist Jim McNeill grew up in Edison, New Jersey, and began drawing before he entered kindergarten. Using the backs of his father’s old business stationery, McNeill began to draw at about the age of three. He has continued to draw throughout his life, although he is quick to add that he has upgraded to better art supplies than those with which he began as a young boy.

Among the first artistic influences upon McNeill were classic 1940s Warner Brothers cartoons that he watched every morning on television. After watching the cartoon shows, continued on page 8
Tessellations

**Objectives**

Students will:
1. view and discuss the tessellations of artists Jim McNeill and M.C. Escher.
2. identify, collect, and discuss examples of tessellations found in everyday life.
3. each create a tessellation that is an example of a translation, a transformation of a tessellation that involves a slide of a figure without rotation.
4. each write an illustrated explanation of how the tessellations were created (optional).

**Materials and Preparation**

- examples of tessellations in everyday life and in artwork
- four-inch squares cut from index cards or tagboard, one per student
- pencils
- scissors
- scotch tape
- white drawing paper, 12" x 18" 
- colored pencils, markers, or tempera paints

**Resources**

- a reproduction of Escher Bowl by Jim McNeill, Crystal Productions (800-255-8629), Take 5 print set, Interdisciplinary Connections: Art and Mathematics
- reproductions of tessellations by M.C. Escher
- examples of tessellations in everyday life

**Motivation**

Introduce the concept of tessellations, repeating patterns made using congruent shapes - shapes that are exactly alike in size and outline. Display and discuss examples of tessellations and congruent shapes found in both natural and human-made environments. Introduce and discuss the tessellations of Jim McNeill and M.C. Escher. If possible, also include examples of Islamic tessellating patterns often found in patterned walls, floors, and other architectural elements. Carefully demonstrate all the procedures necessary to create a tessellation, then distribute four-inch squares, pencils, scissors, and tape.

**Vocabulary**

- the exact same size and shape
- pattern: a design composed of a number of elements in a regular manner
- tessellation: a tiling of a plane without any gaps or overlaps, by a pattern of one or more congruent shapes
- translation: a tessellation transformation involving the slide of a figure without rotation

**Procedure/Production**

Number the corners of a four-inch square 1, 2, 3, and 4, beginning with 1 in the upper left side. Next, draw a simple wavy or zigzag line from comer 1 to comer 2. Cut along this line to separate the square into two pieces. Slide the shape that is cut free to the opposite and outside edge of the square. Tape it in place, matching the two straight edges of the two shapes. The shapes should fit together side-by-side, with no overlap.

Next draw a wavy or zigzag line from comer 2 to comer 3, then cut along the line. Again slide the cut shape to the opposite and outside edge of the square, align the straight edges and tape the two pieces together. This process creates a tessellation "tile" or pattern piece. When the same shape is repeatedly traced without leaving any gaps between the shapes, a repeat pattern is created which is congruent—all the shapes in the pattern are exactly alike.

To fill a paper with the tessellated pattern begin by tracing in pencil the perimeter of the "tile" next to both edges on the upper left corner of a piece of 12" x 18" white drawing paper. Fit the tessellation pattern next to the first tracing and trace again. Repeat this process, moving from left to right and top to bottom, until the paper is filled with congruent shapes. Look carefully at the design created to see if it suggests a face, animal, or object. If desired, add details such as eyes, a nose, mouth, or other feature, repeating the same process in all the tiles. Use tempera paint or colored markers to complete the tessellation (fluorescent paint looks great on black paper):

**Evaluation/Outcomes**

To what extent did students:
1. recognize and discuss tessellations in their environment?
2. verbalize thoughtful responses to the tessellations of artists McNeill and Escher?
3. correctly follow the directions to create successful tessellations?
4. exhibit imagination and creativity in their tessellations?
McNeill would attempt to draw the characters he had just seen. All through his childhood, McNeill continued to draw. He drew not only cartoons, but also often copied images from movie posters and album covers.

In 1990, McNeill graduated with a Bachelor of Fine Arts degree from the School of Visual Arts in New York City. While he attended the school, McNeill majored in illustration and concentrated upon oil painting as his primary medium. After graduation, McNeill worked as a graphic artist for a small New York magazine. It was while working for the magazine that the artist was first introduced to the Apple Macintosh computer and desktop publishing. Soon mastering electronic illustration, McNeill compiled a portfolio and began a career as a freelance artist.

As a freelance artist, McNeill became intrigued by the ability of computers "to treat lines and shapes as independent, free-standing objects that could be cloned and repositioned with a couple of mouse clicks." To McNeill's way of thinking, the computer's ability to duplicate lines and shapes seemed to echo the concepts found within the graphic work of Dutch artist M.C. Escher. The conceptual similarities between his own ideas and those of Escher led McNeill to create a series of computer-generated tessellations, including Escher Bowl.

McNeill continues to work as a graphic designer in the New Jersey area, however a new and broader-based audience was opened for him when he developed his own web site and began to use it as a virtual portfolio and exhibition space. Located at http://members.aol.com/JMcne76382/, the site includes some of McNeill's tessellated designs as well as Dream Patrol, a book for children that the artist has written and illustrated.

The artwork on McNeill's web site serves double duty. Initially, explains McNeill, "the first people I was interested in getting to see the web site were friends. It's such a great way to show the people you know what it is that you're doing and what you've done before." Now, however, McNeill also sees the web site as a place for presentations to potential clients. I love being able to mention my URL in an introductory letter to somebody new...it's really great to have a portfolio-sized presentation up on the web at all time. It gives another idea of my abilities to potential clients, including my ability to design a web site.

McNeill, for a variety of practical as well as legal reasons, maintains a clear distinction between work created for clients and work he creates for posting to his web site. While some clients have seen McNeill's tessellations and have requested that he create similar images for their business needs, the results (according to McNeill) have been generally unsuccessful. The flips, rotations, and reflections inherent to tessellated designs do not usually lend themselves to most commercial applications.

Although Escher Bowl has recently received attention through its inclusion in a study print set, McNeill is content to have the web site images remain as virtual rather than hard copy. This, according to the artist, fulfills an artistic need "to use the media to do what the media does best.'

Jim McNeill welcomes a-mail correspondence about his web site at JMcne76382@aol.com.

Two stages in the development of Escher Bowl
M.C. ESCHER: A BIOGRAPHICAL SKETCH 1898-1972

"We live in a beautiful and orderly world, not in a chaos without norms, even though this is how it sometimes appears."

Dutch graphic artist Maurits Cornelis Escher, better known as M.C. Escher, became widely known and acclaimed during his lifetime for his highly complex drawings, linocuts, and woodblock prints. Escher's images are easily recognizable, often presented in the form of tessellations (repeating, reflecting, or reversing shapes), optical illusions, or impossible constructions.

The Early Years

Born in Leeuwarden, Holland, the son of a civil engineer, M.C. Escher—whose friends and family called "Mauk"—showed little aptitude for formal education and consistently produced poor grades in his studies. Although he excelled in art classes, especially in drawing, Escher nonetheless failed his final drawing exam in secondary school and never officially graduated. Later, at the age of 20, a military deferment provided Escher additional time and opportunities to pursue his education. Accepted and enrolled at the Higher Technology School (Delft) and subsequently at the School for Architecture and Decorative Arts (Haarlem), Escher quickly abandoned classroom studies for private art lessons with graphic artist Samuel de Monqrita.

Private study (particularly in woodblock printing processes) in conjunction to extended trips to Italy became the catalyst that set Escher and his work in motion. Escher loved southern Europe. In this environment he filled sketchbooks with landscape drawings that included pictures of cacti, olive trees, and small animals. These drawings often populated his subsequent prints.

Escher's first solo art exhibition was held in August 1923 in the city of Siena. A few weeks later Escher proposed to Jetta Umiker; she accepted, and they were married within a year. Following a wedding trip through southern Europe they purchased a home in Frascati, a small town outside of Rome. The popularity of Escher's artwork—mainly depicting exact Italian landscapes—soared. In testimony to the respect that they had for the artist and his artwork, when M.C. and Jetta's first son was born in 1926, both Benito Mussolini and King Emmanuel attended the baby's christening. Throughout the 1920s Escher continued to have his works of art shown. In 1929 he had no fewer than five solo exhibitions.

Tessellations and Impossible Realities

The 1930s and 40s brought many changes for Escher, both personal and professional. With the rise of the Fascist Party in Italy, the Eschers left their beloved Italy and relocated to Switzerland. Later, the family immigrated to Brussels and then a few years later to Holland.

Within a year of immigrating to Switzerland, Escher undertook a journey to Spain where he visited the Moorish palace, Alhambra. This visit proved to be fortuitous for the artist. Captivated by the geometric-patterned tile mosaics of the palace, Escher made numerous sketches of the mosaic patterns. Returning to Switzerland, and changed his artistic focus from realistic landscapes to artwork of his own invention. Impeccably drawn and printed with precise detail, Escher's tessellations and impossible realities or constructions soon became the hallmark by which he is now best remembered. Indeed, more often than not, the orderly and perfectly drawn world in Escher's prints seem to challenge our senses and force us to question what is and is not real.

Many of Escher's complex drawings show the same object from a variety of often conflicting views of space, dimension, or infinity. To assist himself with visualization of the diverse points of view, Escher often created small models from clay or wood that often remained with him long after their original intended use. For example, a plasticine and wood model of a crocodile-like creature that the artist carved as a model for his print Reptiles, 1943, became a favorite object that remained a part of the artist's own collection and was displayed on his desk.

In the early 1950s Escher began to gain wide recognition in the United States. Although he often complained about the number of orders he was receiving for prints,because of a strong work ethic and dedication to his craft he always seemed pleased to fill them. The artist frequently gave lectures not only to groups of accomplished artists, but scientists and mathematicians as well. In further recognition, seemingly endless number of articles and books were written to explore the complexities of Escher's work. During this time Escher was also knighted in Holland, an honor that he shunned. Because of ill health that had plagued him throughout most of his adult life and much preferring to work on his prints day after day like a hermit, Escher took a respite from the lecture circuit and returned to his drafting table.

Jetta, never happy in Holland, moved back to Switzerland in 1968 where she lived the remainder of her life. Escher stayed in Baarn, Holland immersed himself in his work. His final graphic, completed in 1969, was Snakes. Following a series of frequent hospital stays and surgeries, M.C. Escher died in 1972 in Baarn. Escher's graphic art remains as popular today as it was during his lifetime and he continues to be honored with articles, books, and web sites that explore his life and work.

Internet Resources about Escher

M.C. Escher Brief Biography http://www.ercis.com/ziring/escher_bio.htm

M.C. Escherop Internet http://www.wins.uva.nl/misc/pythagoras/escher.html

CARMEN LOMAS GARZA TO BE FEATURED AT TAEA

Carmen Lomas Garza will present a lecture and slide show as the featured artist at the 1998 TAEA Annual Conference. Ms. Lomas Garza will talk about her experiences growing up Mexican American in Kingsville, a small town in South Texas. Many of her childhood memories are the inspiration for her work. Ms. Garza is well known for her paintings and illustrated books about family life and traditions such as Family Pictures/Cuartos de familia and In My Family/En mi familia.

Ms. Lomas Garza has received masters' degrees from Antioch Graduate School and San Francisco State University and exhibited one-person shows in the Hirshhorn Museum, Washington, D.C., the Whitney Museum of American Art, New York City; the Smith College Museum in Northampton, Massachusetts; the Mexican Museum in San Francisco; the Laguna Gloria Art Museum in Austin, Texas; the El Paso Museum of Art; the Mexican Fins Arts Center Museum in Chicago, Illinois; and the Oakland Museum in Oakland, California.

Another highlight of the conference will be a "field trip" to the art factory of artist Jesus Moroles, located in Rockport, Texas. Call TAEA at 972-233-9107 for more information.

Islamic Tessellation Traditions

The word tessellation is derived from the Latin word tessera. A tessellation is a pattern made from repeating shapes that interconnect without gaps or overlaps. Though in the western world we might first associate the artist M.C. Escher with tessellations, they have long been perfected in the Islamic world where they are most often found in architecture.

The Muslim religion, within the Islamic Empire, was formed by the Arab prophet Muhammad. The Qur'an (in Anglicized form, Koran) is the sacred scripture of the Muslims, and it is believed to be the sacred writings transmitted to Muhammad by Gabriel from Allah (God).

Strict interpretation of the Qur'an prohibits the representation of humans in any art, as it is believed that the works of God are not to be imitated by man. Instead, Islamic artists created (and continue to create) highly developed calligraphic and patterned geometric and organic forms categorized collectively as arabesques. Through the Qur'an's injunction, tessellations became the focus of design for Islamic artists.

The mosque, the structure used for public worship by Muslims and the focal point for the brotherhood of Islam, features ornamental components such as mosaic tiles. The surface decorations are made by inlaying small pieces of glass or stone to form a tessellating pattern. The skill and talent of the tile designers have led to the creation of masterpieces of decorative and ornamental designs.

The common use of ornaments, rosettes, and decorative arches carry over to every aspect of the Islamic community, including the homes of Muslims. Many of these works are seen in mosques, buildings, tombs, sacred places, and in other forms throughout the Islamic culture. Some of the most revered Islamic structures include the Ka'ba at Mekka, the Dome of the Rock in Jerusalem, and the Mosque of Kairouan in Tunisia.

Arthur O. Pope, a scholar in the art of Iran, wrote of Islamic designs in his book, A Survey of Iranian Art, stating "the creation of such artistic works is impossible unless there is faith in God and attachment to religion and faith. Perhaps it is true to state that the artist never intended to make a living through the creation of such artistic works, but instead it has been the artistic recognition of beauty and satisfaction of his sublime human and religious tendencies which encouraged him to embark on creating such masterpieces."

Mary Copeland

Internet Resources

Islamic Architecture
http://www.thais.it/architettura/islamica/indice/index.og.html

Islamic & Arabic Arts & Architecture

Use of Geometry in Islamic Architecture and Ornament
http://www.fa.indiana.edu/~ksdavis/islamart/
ESCHER BOWL by JIM McNEILL

About the Artist

Jim McNeill was born in Rahway, New Jersey in 1967. When he was about 3 years old he started his art career. His first original drawing was of a man petting a bird. Jim later moved to Edison, New Jersey. During high school, his band teacher gave him some advice, “your talent is your obligation.” Since he had been sketching throughout his childhood, he realized at this point that art was his obligation. Jim’s earliest works were inspired by Warner Brothers cartoons and Mad Magazine comics.

Mr. McNeill admires several artists ranging from classic artists such as Rembrandt, to present day cartoonists Bruce Timm and Paul Dinni, creators of the Batman Animated Series. Jim’s lifelong career goal has always been to be a professional artist. We believe, “the greatest thing about art is that it enables you to communicate something about the way you are at the moment you are creating it.”

Jim McNeill spends most of his time working as a freelance artist in Iselin, New Jersey. This has allowed him the time to create his own Web site, explore tessellations, and to write a children’s book.

About the Art

As part of his tessellation series, McNeill created Escher Bowl in 1996. McNeill says that most of his inspirations for art happen when he is otherwise preoccupied. He could spend hours with his sketchbook and not have any ideas, but then they come to him as a brainstorm while vacuuming.

Escher Bowl started as loose, handdrawn sketches based upon silhouettes. The drawing of the silhouettes was the most time-consuming aspect of this process. These silhouettes were then scanned into a computer where Jim was able to manipulate the silhouettes, turning the indentations of the players until they formed a perfect fit. If you look closely, he uses the negative space of a player to create the field.

Each player was also given common facial expressions and gestures with exception to the two players in the center. Interior details of the two players include open eyes in surprise to a hit, as well as the other player protectively carrying a football. Although there were no specific football players who inspired Escher Bowl, Jim McNeill is a big fan of the New York Giants.

Questions to Consider

1. Congruent means having the same shape and size. In Escher Bowl, how many different congruent shapes are used? Pattern is a design that repeats in a regular manner. What patterns of congruent shapes are used? How do the patterns of congruent shapes create a sense of movement?

2. Color is also repeated in Escher Bowl. What pattern is created by the artist’s use of color? Why is the pattern of color important?

3. Negative space is the empty space within or around shapes or forms. What areas in Escher Bowl would be considered negative space?

Online interview of Jim McNeill and article by fifth grade students from Mitchell Elementary, Plano, Texas, under the direction of Suzanne Wilson and Angie Verschage.
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