# Mathematics in Islamic Art

ANNOTATED BIBLIOGRAPHY OF RESOURCES


Bennett, Dan, *Exploring Geometry with The Geometer's Sketchpad,* Sketchpad Version 4, Key Curriculum Press, Emeryville, CA, 2002.

This is Key's book of high school geometry activities for Sketchpad. A few of the activities in the handout for this session were drawn from this volume.

Beyer, Jinny, *Designing Tessellations: The Secrets of Interlocking Patterns, Contemporary Books*, Chicago, 1999.

This book is written for quilters but it is a beautiful (maybe expensive) introduction to symmetry and tessellations. Doesn't have anything specifically on Islamic tessellations.

Bourgoin, J., *Arabic Geometrical Pattern and Design*, Dover, New York.

This book has virtually no text but wonderful tessellations done as outlines. It's a great coloring book. Copy some of the pages for students and ask them to color the pages with two colors, then three, four. That exercise can lead to a lot of student thinking about mathematical structures.

Costa, Antonio F. & Gómez, *Arabesques and Geometry*, Springer.

This is an excellent video. The authors explain the topic of symmetry in mathematics with examples from Islamic art filmed at the Alhambra in Granada, Spain.

Critchlow, Keith, *Islamic Patterns: An Analytical and Cosmological Approach*, Inner Traditions, Rochester, Vermont, 1976.

Both of the books above come highly recommended by Doris Schattschneider. Both give a very good idea of the geometrical underpinnings of Islamic designs, and are filled with wonderful examples of Islamic designs. Dover also has several other titles on Islamic art.

El-Said, Issam, *Islamic Art and Architecture: The System of Geometric Design,* Garnet Publishing, Reading, UK, 1993.

This book is my second favorite. My favorite is the book below.

El-Said, Issam & Ayse Parman, *Geometric Concepts in Islamic Art*, World of Islam Festival Publishing Company Ltd., London, 1976 (hard cover, out of print).

———, *Geometric Concepts in Islamic Art*, Dale Seymour Publications, 1985 (paperback, out of print, used copies available on the Internet).

This book is the best "how to" resource for making Islamic tessellations. It is worth searching the Web and booksellers for used copies. Many of the pages in this handout come from this book.

Esposito, John L. (ed.), *The Oxford History of Islam,* Oxford University Press, New York, 1999.

This is an excellent reference and considered one of the authoritative histories of Islam. It includes general material on Islamic art. Don't buy it for the art information though, it's a big and comprehensive history with only a small section (relatively) relevant to this subject.

Field, Robert, *Geometric Patterns from Art and Architecture,* Tarquin Publications, Norfolf, England, 2000.

This book is a nice color picture book showing patterns and photos of Islamic art. It is light on mathematical analysis and uses a "grid" or graph paper method of analyzing the patterns that obscures their transformational character. A good reference that is visually interesting, but not the best reference.

Jackiw, Nicholas, The Geometer's Sketchpad, Key Curriculum Press, 2002.

Sketchpad is the basis of this workshop and necessary to use the file Tess_&_Islamic_Art.gsp. If you don't have Sketchpad, an Instructor's Evaluation Edition is available at www.keypress.com/sketchpad.

Lee, Kevin, *KaleidoMania! Interactive Symmetry*, Key Curriculum Press, 1998.

*KaleidoMania!* is a unique tool for dynamically creating and analyzing symmetric designs and for exploring the mathematics of symmetry. This CD-ROM software and its accompanying book of blackline masters, the *KaleidoMania! Interactive Symmetry Activity Book*, offer a comprehensive, interactive unit on transformational geometry and symmetry. Students build important mathematical analysis skills that give them a deeper understanding of, and appreciation for, the patterns they see all around them. This software is particularly useful for understanding wallpaper symmetry groups and how to analyze them. It has excellent tours that teach.

*The Mathematics of Islamic Art: A Packet for Teachers of Mathematics, Social Studies, and Art* (slide packet), Metropolitan Museum of Art, The Library and Teacher Resource Center in The Ruth and Harold D. Uris Center for Education, New York, 1979. Email inquiries to: education@metmuseum.org.

Schattschneider, Doris, *Visions of Symmetry: Notebooks, Periodic Drawings, and Related Work of M.C. Escher,* W.H. Freeman and Company, New York, 1990.

This book is about the mathematics of the work of M.C. Escher. Escher's tessellating art is not Islamic, but his deep interest in tessellations began with his analysis of the tilings of the Alhambra palace in Grenada, Spain.

Schattschneider, Doris, *The Plane Symmetry Groups: Their Recognition and Notation*, American Mathematical Monthly (MAA), Volume 85, Washington DC, 1978.

This article is the clearest mathematical explanation of the wallpaper symmetry groups that I've seen.

Serra, Michael, *Discovering Geometry: An Investigative Approach,* 3d ed., Key Curriculum Press, Emeryville, CA, 2003, cover page and pp. 20–23.

This is Key Curriculum's high school geometry text. It has an early lesson on Islamic tessellations and a good chapter on the mathematics of tessellations.

Wilson, Eva, *Islamic Designs for Artists and Craftspeople,* Dover Publications, New York, 1988.

This is an excellent resource on Islamic art that is readily available. It covers more than tessellations. It also reproduces many of the El-Said and Parman designs.

SKETCHPAD RESOURCE CENTER WEB SITE

Here's the URL for the Sketchpad Resource Center at Key Curriculum Press. There you can download an Instructor's Evaluation Edition of Sketchpad as well as find and download the Sketchpad sketch for this talk. Look for Recent Talks in the left menu bar.

**http://www.keypress.com/sketchpad**