The Mathematical Tourist

Ian Stewart*

The catapult that Archimedes built, the gambling-houses that Descartes frequented in his dissolute youth, the field where Galois fought his duel, the bridge where Hamilton carved quaternions — not all of these monuments to mathematical history survive today, but the mathematician on vacation can still find many reminders of our subject's glorious and inglorious past: statues, plaques, graves, the café where the famous conjecture was made, the desk where the famous initials are scratched, birthplaces, houses, memorials. Does your hometown have a mathematical tourist attraction? Have you encountered a mathematical sight on your travels? If so, we invite you to submit to this column a picture, a description of its mathematical significance, and either a map or directions so that others may follow in your tracks. Please send all submissions to the Mathematical Tourist Editor, Ian Stewart.

Octagons Abound

István Hargittai

A recent article [*The Mathematical Intelligencer*, vol. 16 (1994), no. 2, 18–24] on octagons in Renaissance architecture prompted me to communicate a few examples of octagons in design and decoration.

A beautiful three-dimensional example of octagonal architecture is Castel del Monte in Apulia, southern Italy (Fig. 1), built in the 13th century for nonmilitary purposes on the top of a hill. The outer shape is an octagon, as is the inner courtyard. Even the eight small towers have octagonal symmetry.

Tilings provide characteristic two-dimensional examples. As is known, the regular octagon cannot tile the surface without gaps or overlaps, and, of the regular polygons, only the equilateral triangle, the square, and the regular hexagon can, as is illustrated in Figure 2. Nonetheless, regular as well as nonregular octagons are often used for tiling together with squares. Examples are shown in Figures 3 – 6.

Budapest Technical University
Szt. Gellért 4
H-1521 Budapest, Hungary
e-mail: hargittai@ch.bme.hu

Figure 1. Castel del Monte on Italian stamp.

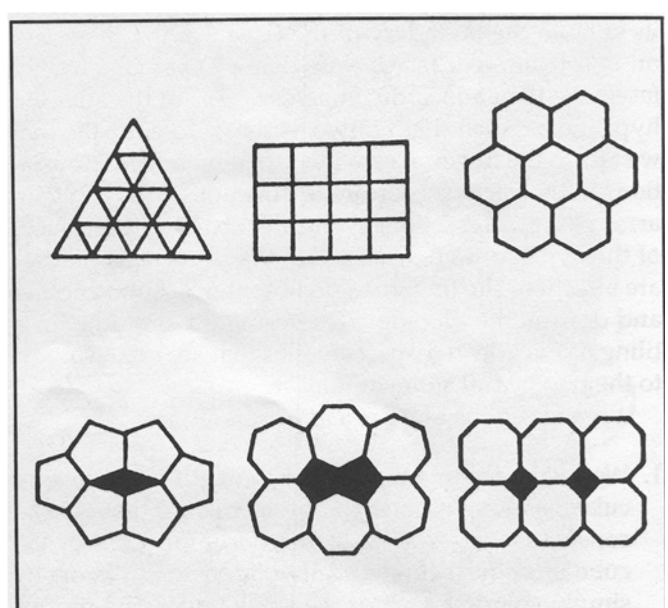


Figure 2. Planar networks of regular polygons with up to eightfold symmetry.

***Column Editor's address:** Mathematics Institute, University of Warwick, Coventry, CV4 7AL England.

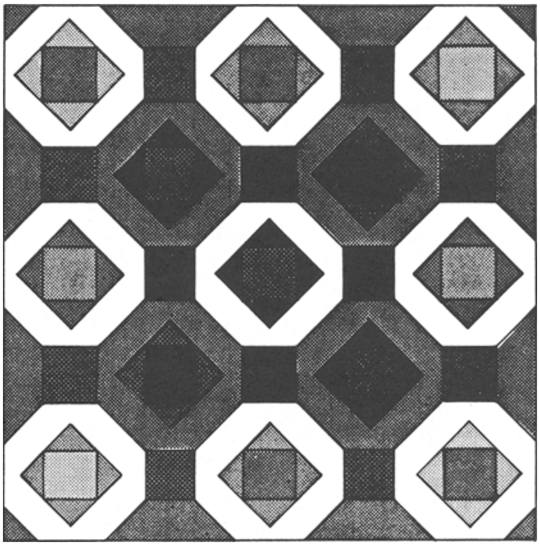


Figure 3. Octagons and squares after Victor Vasarely.

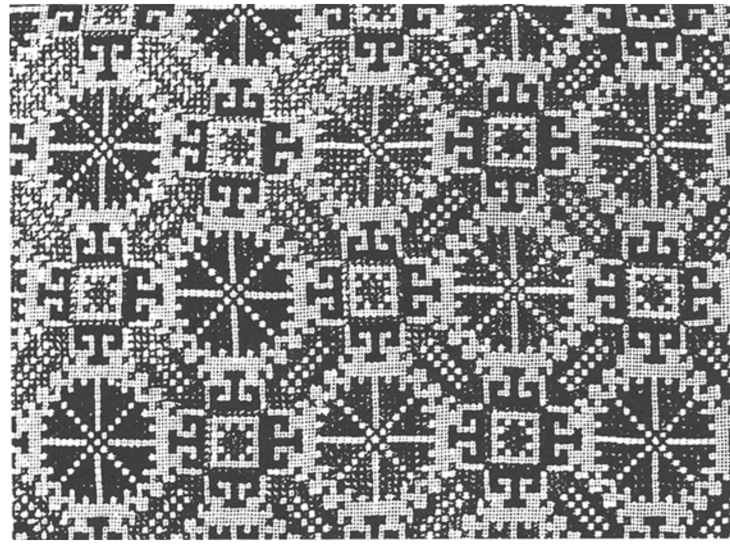


Figure 4. Hungarian embroidery.

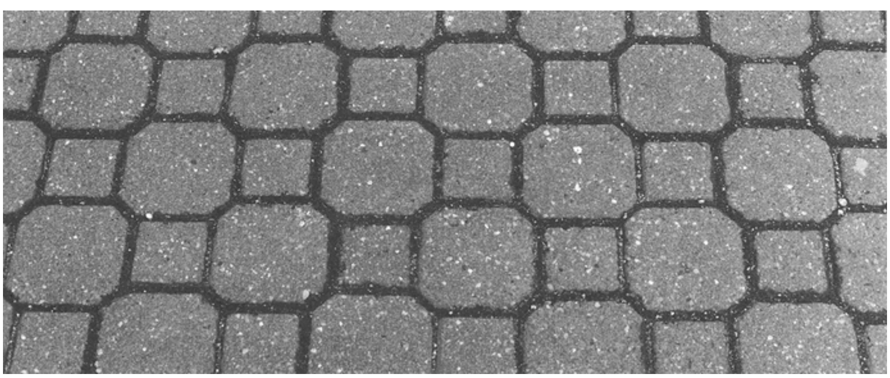


Figure 5. Pavement on the campus of Northwestern University, Evanston, Illinois.

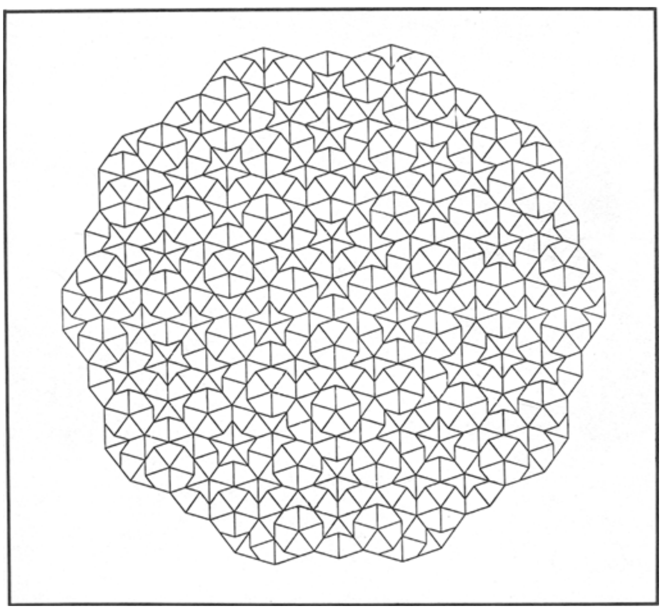
Figure 6. Detail of Tintoretto's *El lavatorio* (© Prado Museum, Madrid. Rights reserved.).

Penrose Tiling in Northfield, Minnesota

Brian J. Loe

Northfield, Minnesota proclaims itself to be a town of "Cows, Colleges, and Contentment." This attitude of rural contentment leads many to draw comparisons of Northfield to Lake Wobegon, the fictional Minnesota town of Garrison Keillor's *A Prairie Home Companion*, which is described as "the little town that time forgot, that the decades could not improve."

However, at Carleton College, the Department of Mathematics and Computer Science, having been housed in the Goodsell Observatory since it was erected in 1887, felt that after ten decades there *was* room to improve. In September of 1993, Carleton College opened the doors of its Center for Mathematics and Computing.



While the new building provides contemporary computing and teaching facilities which are common to many college and university campuses, it also has one unique feature: the floor of the atrium of the Center is laid with a Penrose tiling. Roger Penrose's kites and darts were popularized in the January, 1977 issue of *Scientific American* by Martin Gardner [1].

The Carleton tiling is a central portion of the infinite cartwheel, like the pattern which appeared on the cover of *Scientific American*. The aptness of the cartwheel design is derived from the special place that cartwheels hold in proving fundamental results about tilings by Penrose kites and darts, e.g., local isomorphism (consult [2] for details).

The tiles were cut from standard 8-inch square ceramic tiles of four different colors. The tiling contains 650 tiles and is approximately fifteen feet in diameter.

The tiling was installed with the consent of Roger Penrose who was a guest of the college, and featured speaker, for the formal dedication of the building April 11, 1994.

References

1. Martin Gardner, Extraordinary nonperiodic tiling that enriches the theory of tiles, *Scientific American*, January 1977, pp. 110–121.
2. B. Grünbaum and G. C. Shephard, *Tilings and Patterns*, W. H. Freeman, New York, 1987, pp. 520–582.

Brian J. Loe
7102 135th Street
Apple Valley, MN 55124, USA