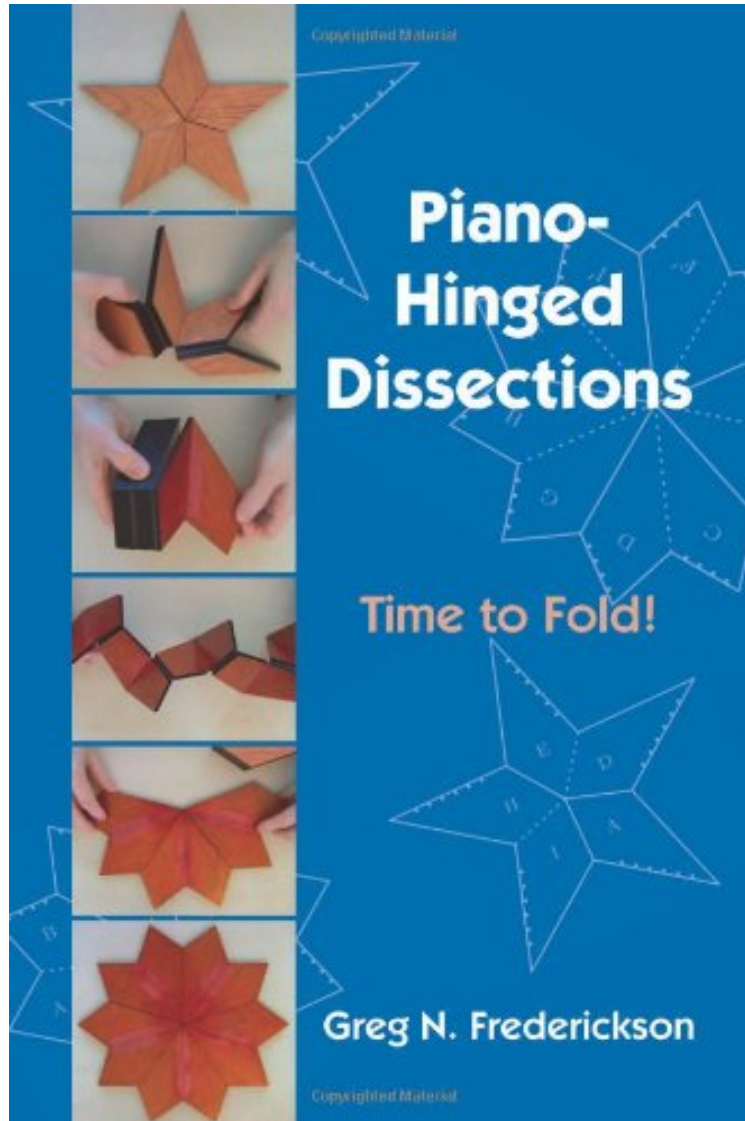


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## Piano-Hinged Dissections: Time to Fold!

*Greg N. Frederickson*

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**Greg N. Frederickson : Piano-Hinged Dissections: Time to Fold!** before purchasing it in order to gage whether or not it would be worth my time, and all praised Piano-Hinged Dissections: Time to Fold!:

A dissection involves cutting a polygon into pieces in such a way that those pieces form another polygon; for a hinged dissection, the pieces must be attached by hinges. A piano hinge is "a long narrow hinge with a pin running the entire length of its joint." So, unlike regular hinged dissections, which swing or twist (around single point of hinge), piano-

hinged dissections fold along an edge. This book discusses the history, methods, and variations of these dissections and is rich with illustrations that clearly depict the cuts of the dissections and three-dimensional simulations of the dissections in the process of being folded. A CD that includes video recordings of select dissections being transformed accompanies the book.

" Frederickson's ability to discover (or should I say create?) elegant dissections, hinged, folded, or otherwise, is awesome. His beautiful book contains challenges that will keep recreational geometricians happily at work for decades. A bibliography runs to more than 120 references! -Martin Gardner, Martin Gardner, January 2007 Armed, as it were, with little more than an inquiring mind, moderate hand-eye coordination and the anticipation of a delightful outcome, you can follow Frederickson (computer science, Purdue U.) into the world of dissecting polygons so the resulting pieces, which are attached by hinges that must fold along an edge rather than swing or twist, form another polygon. The geometry is fascinating, and so are the illustrations Frederickson offers to show how he came up with the results, which range from the remarkably complex Theobald 11-piece dissection to a plethora of hexagrams that become hexagons. Working in some cases with the unique approach of Ernest Irving Freese, Frederickson produces both beautiful dissections and the concepts to back them up. His self-made video on the accompanying CD-ROM truly helps those of us who need more hands-on training and less apprehension that it cannot be done. -SciTech Book News, March 2007 Frederickson's first book on Dissections was an encyclopedic survey of all the classical results on geometric dissections with many new extensions. His second book, Hinged Dissections, and the current book extend the ideas into dynamical and three-dimensional versions. These versions were previously undreamed-of. It is unusual to see a radically new aspect of mathematics being developed and Frederickson is to be congratulated for discovering one. The ideas presented here will entertain and fascinate many geometers and should provide inspiration for many further investigations in the coming decades. -David Singmaster, February 2007 With this book Greg fanatically explores a world filled with piano-hinged dissections. Initially you would think it to be impossible to make more than a few dissections with piano-hinges (a piano-hinge is a long narrow hinge the runs the full length of a joint), but Greg show[s] that given time and effort many more dissection[s] can be realized with piano-hinges than you could ever imagine. In this book an amazing piano-hinged version of the Triangle to Square is presented. The book comes with a CD with a video in which Greg actually demonstrates his hinged dissections: almost an hour of wonderful dissections folding and unfolding before your eyes. Most of these are paper realisations, but Greg also shows a number of amazing wooden piano-hinged dissections; simply great!" Greg's books are valuable sources for the puzzle designers and an obvious must have for dissection lovers. -Rik Van Grol, Cubism for fun, March 2007 Because essentially all the moves discussed need a three-dimensional space, it is sometimes difficult to give a clear explanation of the operations to be performed. This gave Frederickson the idea of including a cdrom on which he demonstrates the folding, decomposing and recomposing the dissections. Some are really complicated, and even if you see him doing it, it is sometimes impossible to see how all the pieces fall into place. At least it is a visual proof that the method does indeed work. It is quite funny if you see him fighting with a wooden model of a hinged dissection that is a loop consisting of 30 triangles hinged together. And there are many other of these geometrical puzzles. Some of them are relatively simple and e.g., related to the way we fold a paper large map into some handy pocket sized format. Others, in fact most of them, are quite a challenge and are beautiful in their complexity. -Adhemar Bultheel, BMS - NCM, March 2007 [These] problems should be particularly attractive to fans of recreational mathematics... highly recommended to fans of geometric dissections who are looking for some new and challenging dissection problems. - Brian Borchers, MAA, February 2007 book goes a good bit beyond tangrams... challenging for teachers and students, but a good bit of fun as well. -Math Teacher, September 2007 This brilliant book can be recommended to students of geometry and teachers of mathematics, as well as students and all people who are interested in geometric dissections. Every creative reader will find new material for his own discoveries. The reader can easily experiment...without special mathematical knowledge, materials, [or] computer programs. -EMS, September 2007 [This book] introduces so many beautiful and ingenious piano-hinged dissections that have never been known before and that are so non-trivial to discover. -Mowaffaq Hajja, Zentralblatt MATH, March 2008"About the AuthorGreg N. Frederickson is a professor of computer science at Purdue University. He has written two previous books on dissections Dissections: Plane Fancy (1997) and Hinged Dissections: Swinging Twisting (2002), and is considered an international authority on folding unusual polygonal geometries. He also won the 2004 Polya Award of the Mathematical Association of America for a related article.