



Frabjous

A Sculpture / Puzzle

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Frabjous is a sculpture and a geometric assembly puzzle. My G4G7 gift exchange item is a one-inch version of the sculpture, i.e., the puzzle solution, illustrated on the next page. It is made of nylon by a selective laser sintering (SLS) process, so it starts out as a fine nylon powder. A computer-controlled laser fuses the powder into a solid at just the places that define the object, leaving loose powder to be vacuumed away from the spaces. I dyed the initially white nylon various colors.

The swirling geometric form is composed of thirty identical copies of the flat shape shown at left. To make your own puzzle, copy the template at left on to thirty pieces of card stock and cut them out with scissors or a knife. Then try taping the parts together in groups of three (at the straight edges) to make a form like a dodecahedron of vortices. There will be twelve five-fold spirals in places that correspond to the dodecahedron's faces. Weaving the parts through each other so each remains planar is trickier than it looks. The smaller SLS version should be a useful assembly guide.

I have also made a one-of-a-kind sculpture of *Frabjous* from laser-cut wood, shown at the bottom of the next page. Laser cutting singes the wood edges, imparting a rich brown for an attractive visual contrast to the lighter aspen.

Mathematically, the planes of the shape are the face planes of a "great rhombic triacontahedron," a self-intersecting polyhedron with thirty rhombic faces. But the shape at left is a carefully designed subset of the rhombus that doesn't intersect copies of itself. For more information about my sculpture puzzles, see <http://www.georgehart.com>

The word *Frabjous* is, of course, from *The Jabberwocky* of Lewis Carroll: *O frabjous day! Callooh! Callay!*

Thank you Jim Quinn for use of the SLS machine.



***Frabjous* gift exchange:** 1 inch nylon models, of selective laser sintering, colored.



Wood *Frabjous*: 11 inch diameter, assembled from 30 identical laser-cut aspen parts.