Martin Gardner Modular Origami G4G12 Rhombic Dodecahedron By Peter Knoppers

Description

This artwork was designed for G4G6 to cover the 6 faces of a cube. As most of you will know, a Rhombic Dodecahedron can be constructed from a cube by adding a pyramid with square base and height 0.5 to each face of the cube. Faces of a pyramid on adjacent cube faces are then joined to create 12 Rhombuses. To match the artwork, it needed to be stretched by a factor √2 along the long diagonal of the Rhombus. The (very charming) property of this artwork on a cube that all faces show essentially the same image is not maintained. The Rhombic Dodecahedron requires three different clippings.

Folding instructions

There are 12 numbered pages. Each page must be folded the same way.

Solid lines (as printed on the sheets) become (initially) hill folds; dotted lines valley folds. The printed lines are indications; you get a better result by making fold markings (step 1 below) and folding the various corners of the paper up to those markings in steps 2..7 as indicated below.
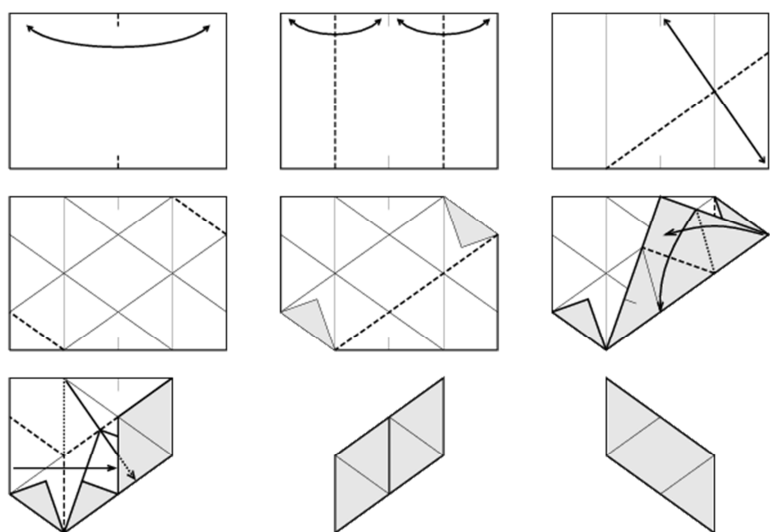
The image shown here is © by Ole Arntzen who has a web site that generates pages for a 12 month calendar using this folding and assembly method (image reused with permission). You can find this calendar generator at http://folk.uib.no/nmioa/kalender/.

1	Put the printed side up. Mark the center of the long edges by folding the A4 page in half; Only make the fold near the edges to mark the halfway points; unfold.
2	Fold a short edge up to the marking points made in step 1; unfold.
3	Fold the other short edge up to the marking points made in step 1; unfold
4	Printed side down. Place a corner onto the marked center of the opposite long edge; fold; unfold.
5	Place the next corner onto the marked center of the opposite long edge; fold; unfold.
6	Place the next corner onto the marked center of the opposite long edge; fold; unfold.
7	Place the last corner onto the marked center of the opposite long edge; fold; unfold.
8	Fold the corner in; the fold line should connect the points where fold lines 4 and 5 meet the edges of the paper; do not unfold. (The folding lines are numbered on, what at this time should be, the bottom side of the paper.)
9	Fold the opposite corner in; the fold line should connect the points where fold lines 4 and 5 meet the edges of the paper; do not unfold.
10	Fold along line 4; pull up fold line 6 and push it down to align on top of fold line 4; flatten the result.
11	Fold along line 5; pull up fold line 7 and push it down to align on top of fold line 5; flatten the result.
12	Lift the flap with fold lines 3-4-6 of step 11 and tuck the square protrusion of step 11 underneath it. You should now have a nice symmetrical shape
13	Fold up along line 4; leave that fold about 90 degrees up.
14	Fold up along line 5; leave that fold about 90 degrees up. You should now have a rhombus with slots along two opposite edges (near folds 6 and 7) and triangular tabs sticking up along folds 4 and 5.

Assembly instructions

After folding all 12 pieces (or, if you want to see a partial result before doing all that folding, after folding sheets 1 and 2) you can start assembly. Each piece has two numbered tabs and two numbered slots. To view the number of a slot you have to open it slightly. A tab with number N should go into a slot with that same number. If you want to make it more of a puzzle, ignore the tab numbers and use only the artwork to figure out which tabs should go into which slots.

Display suggestions

For optimal readability of the Martin Gardner graphics the object should be positioned on one of its 4-edge vertices. You can place the object with this vertex down on a big curtain ring, or a glass, or hang it from a string. (Tie a large paper clip to the end of a string; open up the top vertex of the Rhombic Dodecahedron, insert the paper clip, close the vertex.)

Addendum

If you copy / print your own copy, ensure that the 12 pages of the puzzle get copied / printed onto single sided A4 size paper.