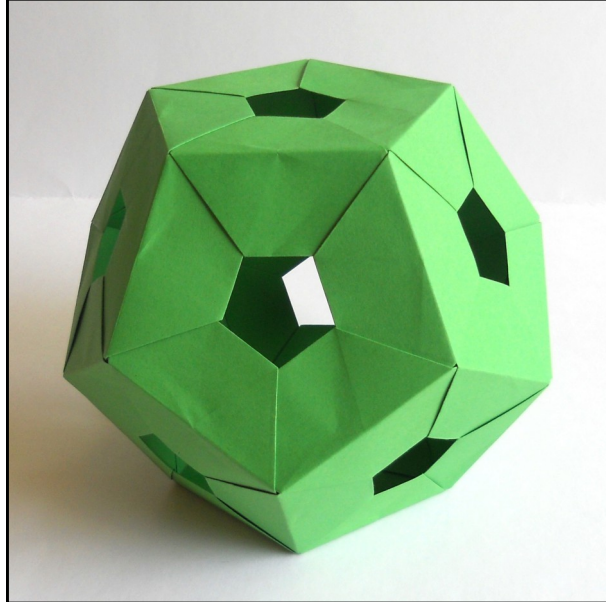


## Dodecahedron with Windows

Designed by David Mitchell and Francis Ow.

This robust version of the regular dodecahedron is made from thirty modules, each of which contributes part of two faces to the form. I have chosen to use A6 size silver rectangles for this version of the design but almost any size or shape of rectangle could be used instead. The size of the central hole in each face will vary with the proportions of the rectangle used.



It is a common strategy in modular origami to prefer to approximate pentagonal angles by a simple folding sequence than to produce mathematically correct angles by using a more complicated one. In this case the angles of the design are found using natural silver rectangle folding geometry (in a way unrelated to the actual paper shape used). This gives angles at the corners of the faces of approximately 110 degrees rather than the correct 108 degrees. As a result the faces are slightly convex. However, this is barely noticeable in the finished design.

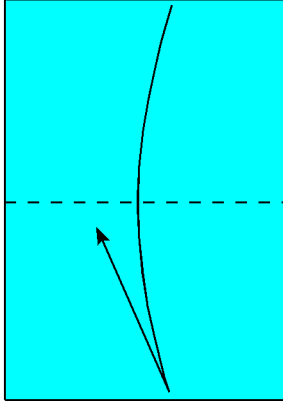
I discovered this design for myself in 1989, then, in October 1990, Francis Ow sent me a copy of his then just-published book, *Modular Origami*, in which the same design appears. I do not know which of us has priority in the design.

A version of this design was published in the first edition of my book *Mathematical Origami* under the name 'Outline Dodecahedron'.

These diagrams show you how to make the design from six sheets of paper in each of five colours but, as the photo above shows, the design also works well from a single plain colour.

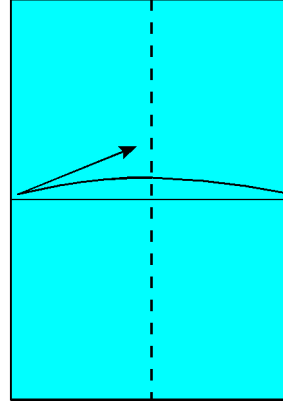
## Folding the modules

1



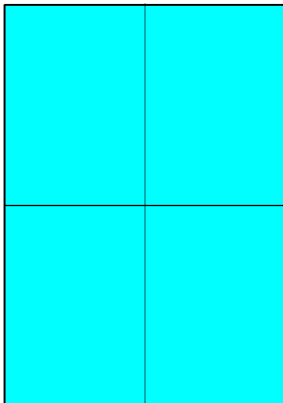
1. Begin with a sheet of A4 paper. Fold in half downwards, then unfold.

2



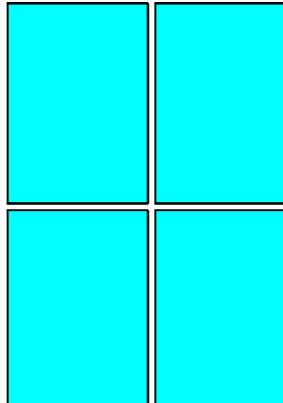
2. Fold in half sideways, then unfold.

3



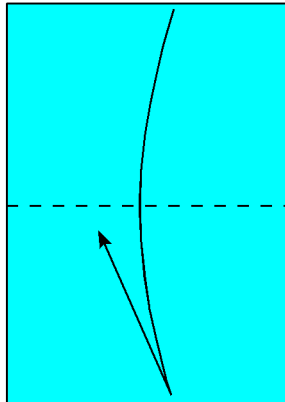
3. Cut along the creases to separate into four smaller pieces.

4



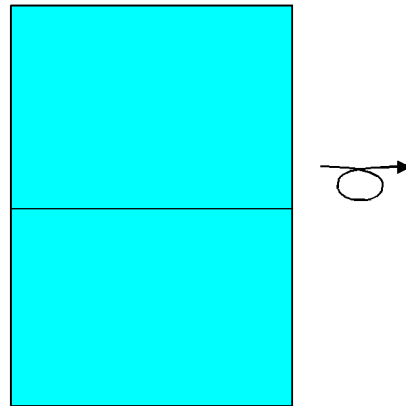
4. You will need six sheets of paper in each of five contrasting but complementary colours. The next picture is on a larger scale.

3



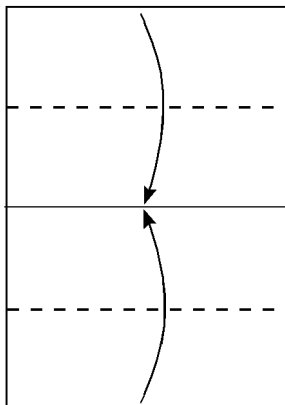
3. Fold in half sideways, then unfold.

4



4. Turn over sideways.

5



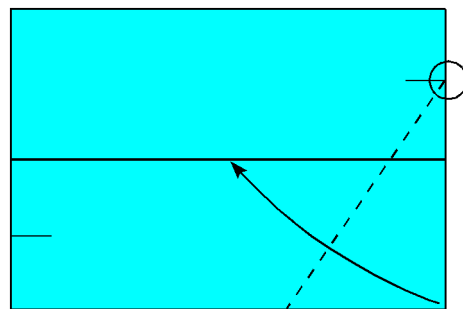
5. Fold both the top and bottom edges into the centre. The next picture is on a larger scale.

6



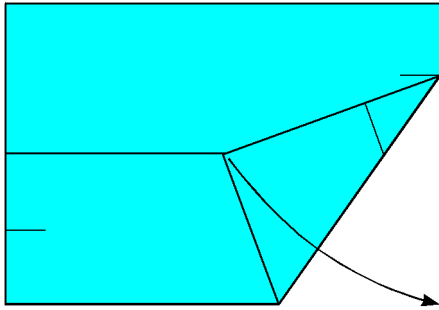
6. Make two tiny creases to mark the centre of the right edge of the top flap and the left edge of the bottom flap.

7



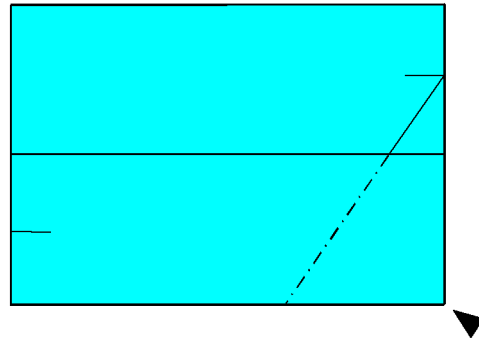
7. Fold the bottom right corner onto the line where the two front flaps meet in the centre making sure that your new crease begins from the point where the tiny crease made in step 6 (marked with a circle) intersects the right edge.

8



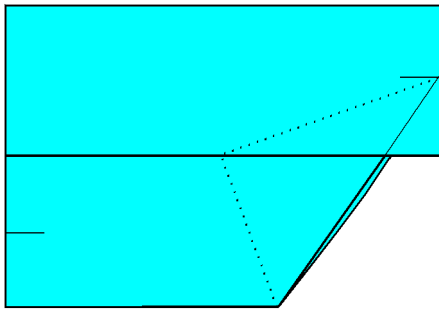
8. Unfold.

9



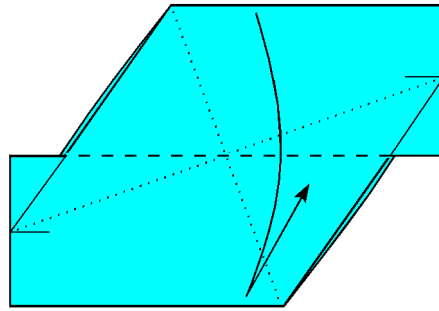
9. Turn the bottom right corner inside out in between the other layers using the existing creases.

10



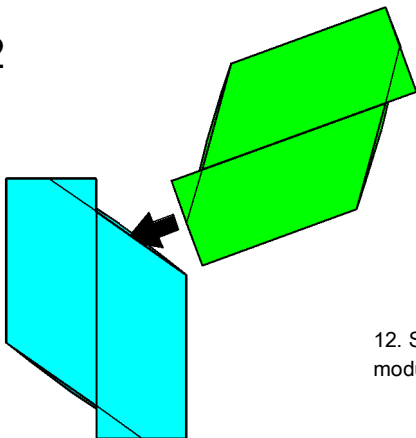
10. Repeat steps 6 through 9 on the top left corner.

11



11. Fold in half downwards to reinforce the existing crease, then unfold. Fold all thirty modules to this stage.

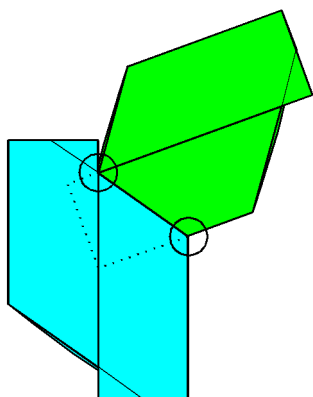
12



12. Select a pair of modules. Insert the tab of one module into the pocket of another.

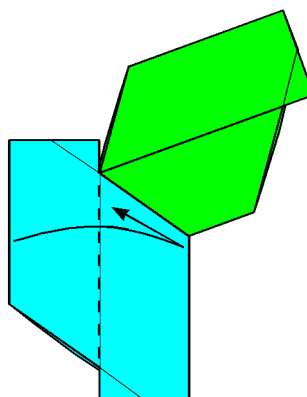
4

13



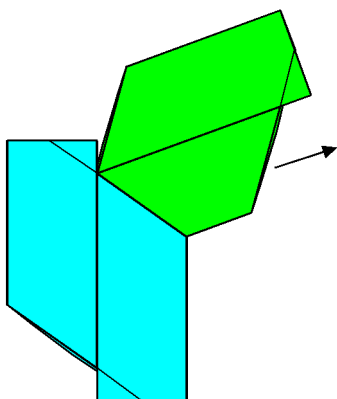
13. Make sure the modules are aligned in the way marked with circles here.

14



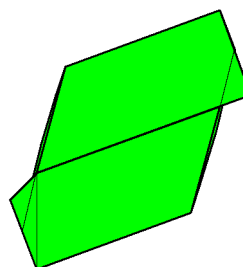
14. Fold the lower module in half using the existing crease, then unfold, making sure the upper module does not slip out of alignment as you do so,

15



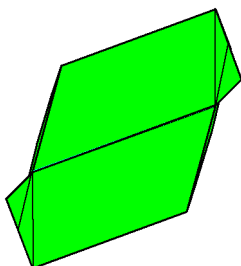
15. Remove the upper module from the pocket.

16



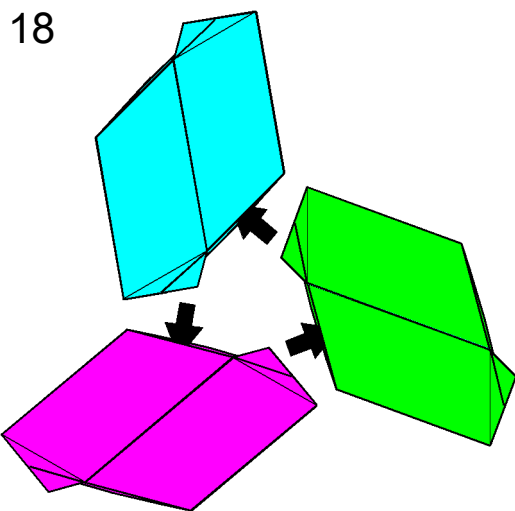
16. Rotate the upper module through 180 degrees ( without turning it over ) and repeat steps 12 through 15 on the other end of the upper module.

17

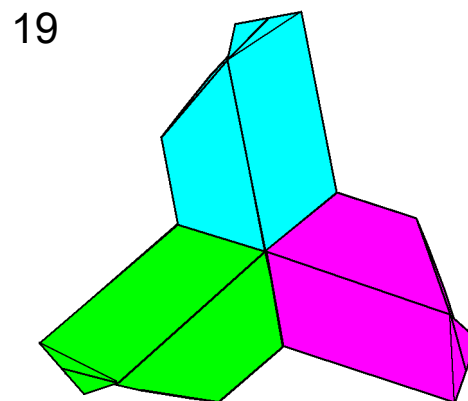


17. The first module is finished. Now reverse the positions of the modules and follow steps 12 through 16 again. Repeat with the fifteen other pairs of modules.

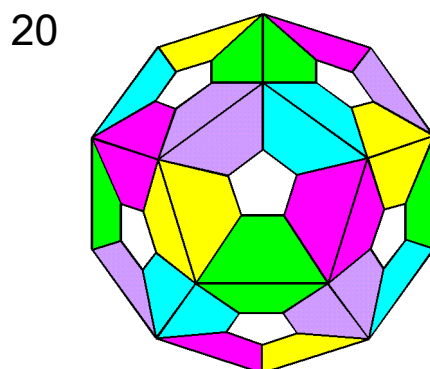
## Putting the modules together



18. Three modules go together like this to build one vertex of the dodecahedron.



19. Add further modules to build further corners on the other ends of these modules. Continue building corners until the assembly is complete. Picture 20 shows the colour scheme you should be aiming at.



20. The finished dodecahedron with windows will look like this.

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