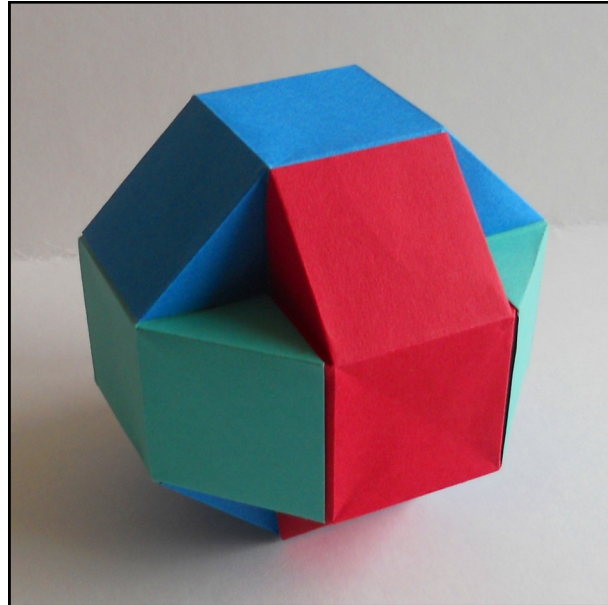


6-part Rhombicuboctahedron

These diagrams show you how to make three different versions of the 6-part Rhombicuboctahedron. This form is a surface analogue of the cube. Version 3 is also a method analogue of Kenneth Kawamura 's Harlequin Cube and Robert E Neale 's Octahedron.



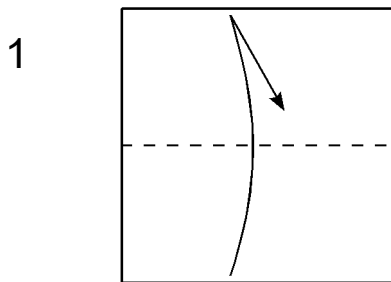
The module for Version 1 is folded from a square which has first been divided into a 3x3 grid of smaller squares, whereas Version 2 is folded from a square that has first been divided into a 4x4 grid of smaller squares. Version 3 is identical to Version 2 except that the flaps that are hidden away inside the design in Version 2 are brought into use, half of them visible and half still hidden away inside, so that it becomes an even distribution design. The method used to keep the flaps in contact with the other layers is the same as that used in Kenneth Kawamura 's Harlequin Cube,

Version 1 was discovered by Kenneth Kawamura in the early to mid 1970s and diagrams were included in his booklet 'Geometrical Compound Origami - Meditations on a Waterbomb ' which was published in 1977. Robert E Neale independently discovered Version 1, and quite possibly also Versions 2 and 3, but cannot now recall at what date the discovery was made. He has also designed a version of the same form made from playing cards, which is called Intersection. Michael Naughton and I both also discovered these designs for ourselves in 1991 and 1988 respectively. Michael realised that the proportions of the designs could be varied so that the flat faces become oblongs rather than squares. He calls this variable version the Multi-Ball.

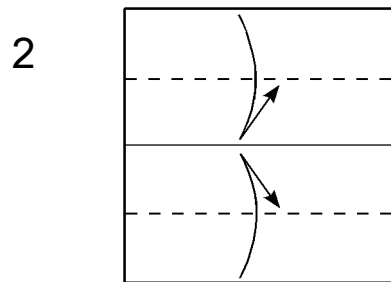
The diagrams show you how to make all three versions using two squares in each of three contrasting but complementary colours.

Version 1 - from the 3x3 grid

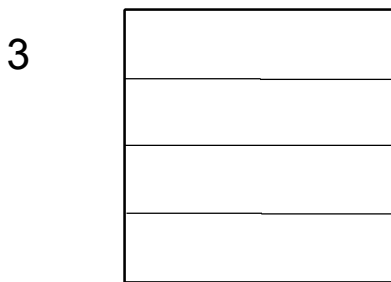
You will need eight squares of paper, six for the design and two more to act as templates, one of which is used to fold the other. Begin by adding folds to your first template square.



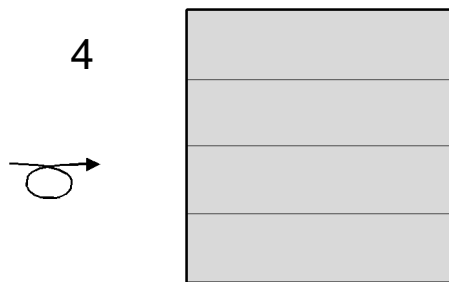
1. Fold in half downwards, then unfold.



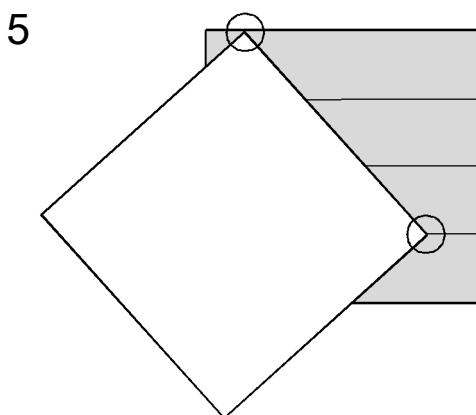
2. Fold the top and bottom edges into the centre, then unfold.



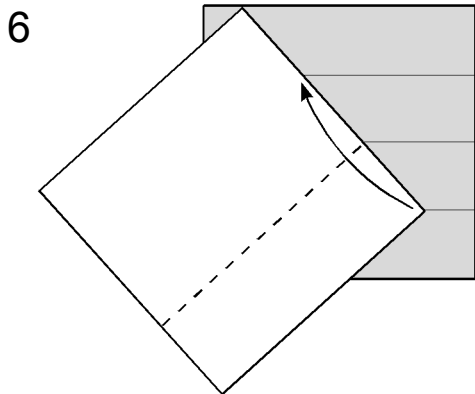
3. Turn over sideways.



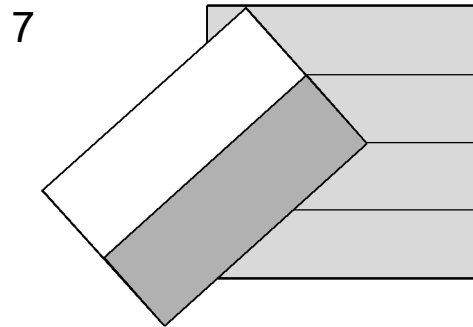
4. The first template is finished.



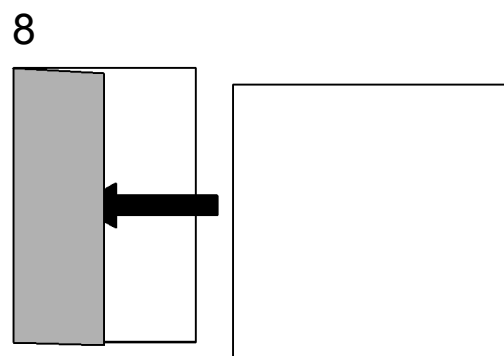
5. Lay the second template square on top of the template white side up so that one corner lies on the top edge and another on the quarter way crease.



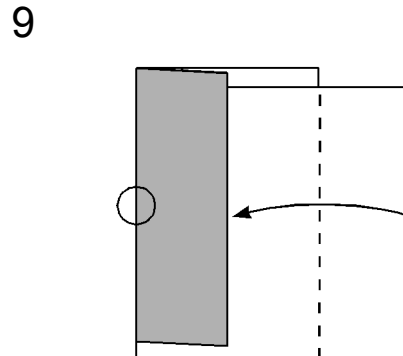
6. Fold the right corner of the top square onto the top edge at the point where it is intersected by the upper quarter way crease of the template.



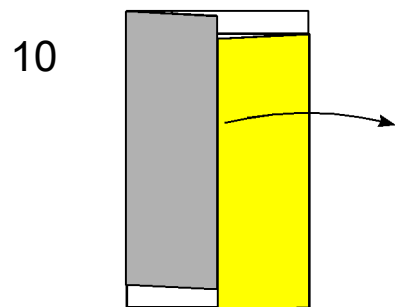
7. The result should look like this. Remove the top square. You can now use this top square as a template to add the creases for the 3x3 grid



8. Slide a second sheet inside the template as far as it will go. You do not need to line the top and bottom edges up exactly.

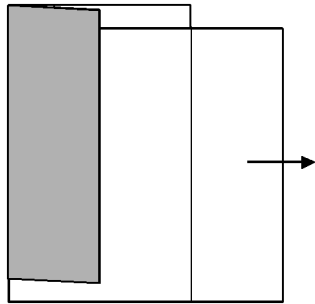


9. Hold the two sheets firmly together with your left hand at the point marked with a circle. Use your right hand to fold the right hand edge of the second sheet over so that it butts exactly against the edge of the template.



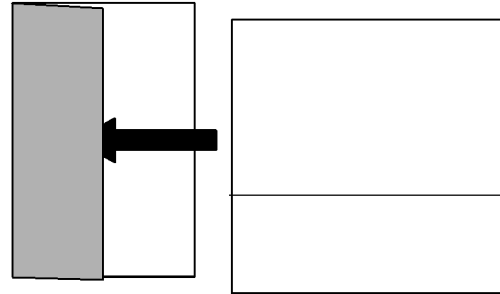
10. Unfold.

11



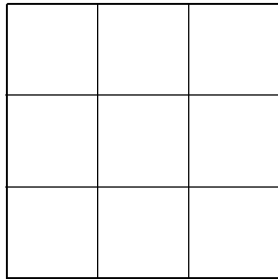
11. Remove the second sheet from the template, rotate it through 90 degrees and re-insert it.

12



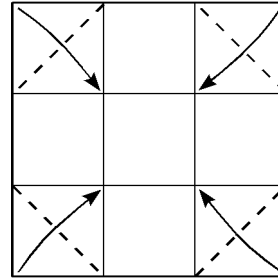
12. Repeat steps 7 through 10 until you have made all four creases.

13



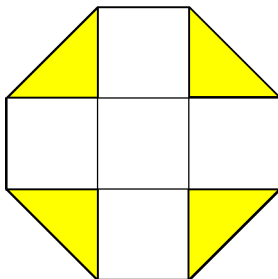
13. This is the 3x3 grid.

14



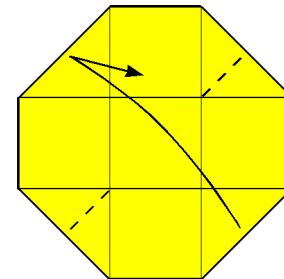
14. Fold all four corners inwards as shown.

15



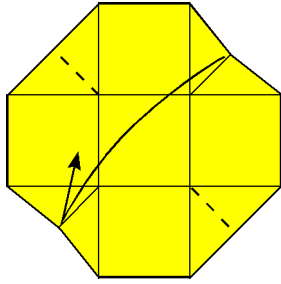
15. Turn over sideways.

16



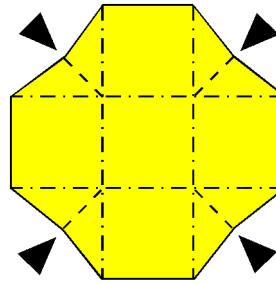
16. Fold in half diagonally, then unfold but only flatten the fold to form creases in the areas marked by fold lines.

17



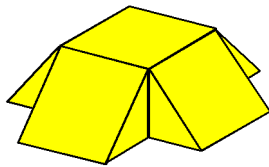
17. Fold in half diagonally in the alternate direction, then unfold but only flatten the fold to form creases in the areas marked by fold lines.

18



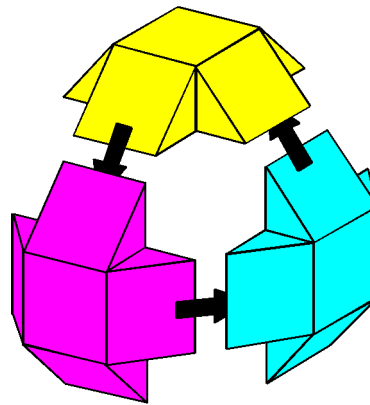
18. Collapse into the form shown in picture 19.

19



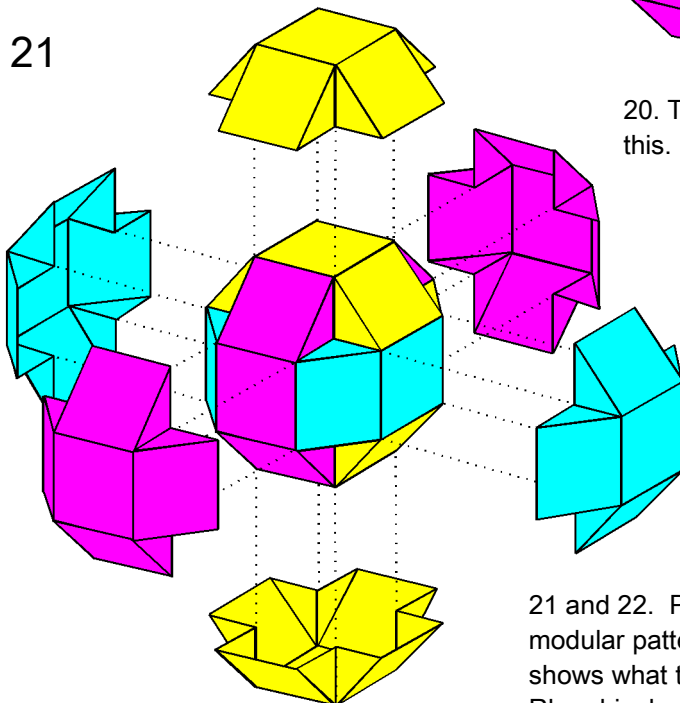
19. The first module is finished. Make all six.

20

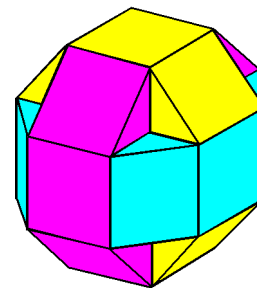


20. Three modules fit together like this.

21



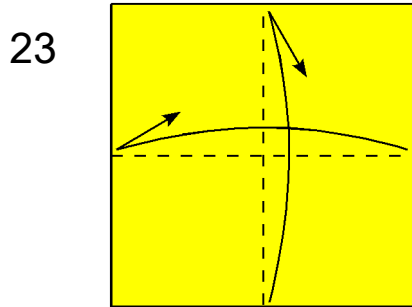
22



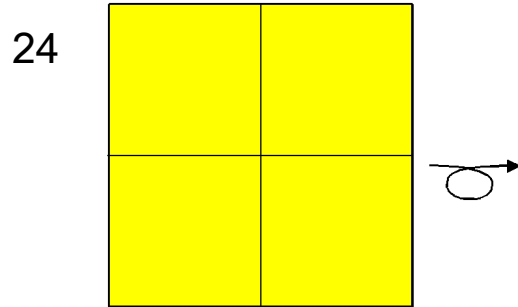
21 and 22. Picture 21 shows the overall modular pattern of the design and picture 22 shows what the finished 6-part Rhombicuboctahedron should look like.

Version 2 - from the 4x4 grid

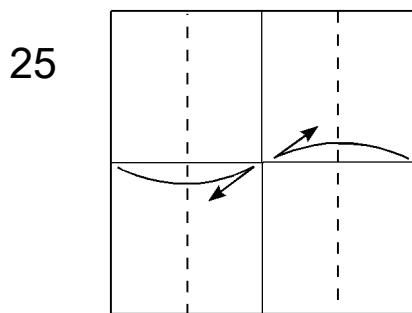
You will need six squares of paper. If you are using irogami begin with your paper arranged white side up.



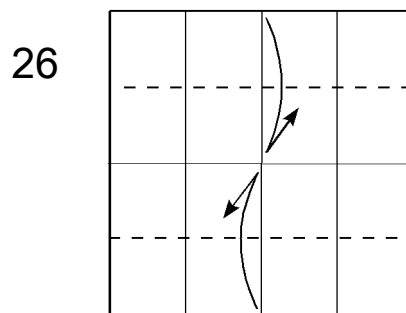
23. Fold in half edge to edge, then unfold, in both directions.



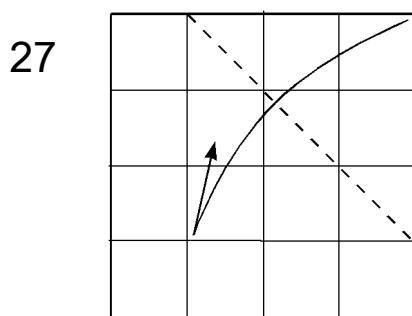
24. Turn over sideways.



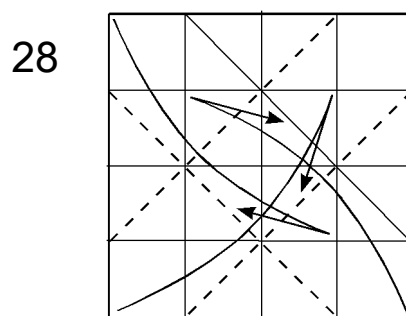
25. Fold both outside edges to the centre, then unfold.



26. Fold the top and bottom edges to the centre, then unfold.

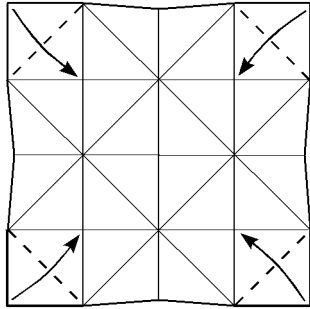


27. Fold the top right corner inwards as shown, then unfold.



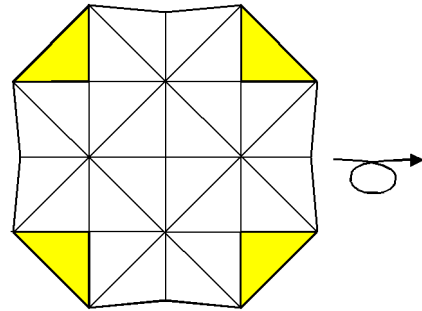
28. Repeat step 27 on the other three corners in turn.

29



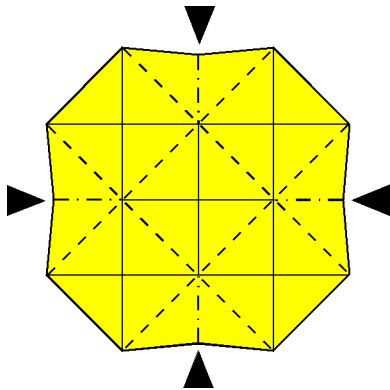
29. Fold all four corners inwards as shown.

30



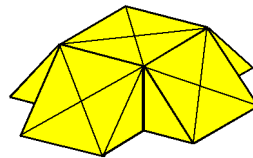
30. Turn over sideways.

31



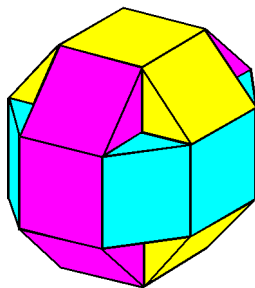
31. Collapse into the form shown in picture 32.

32



32. The first module is finished. Make all six.

33

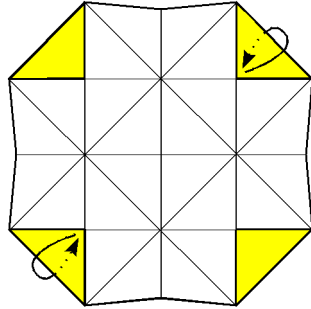


33. The modules are assembled in the way shown in pictures 20 and 21 of version 1. The result should look like this.

Version 3 - even distribution design from the 4x4 grid

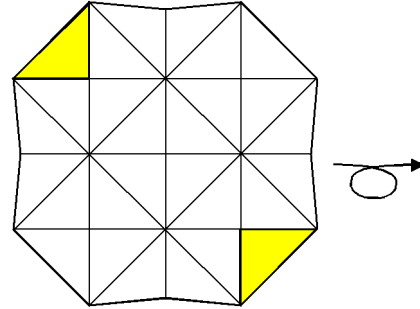
Begin by following steps 23 through 29 of version 2.

34



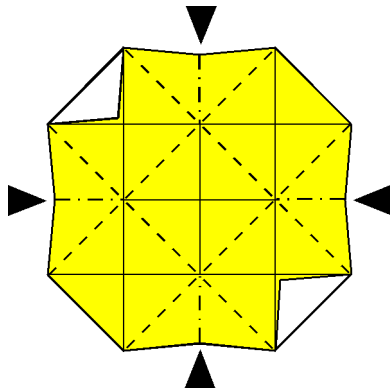
34. Fold the top right and bottom flaps to the back by reversing the direction of the existing creases.

35



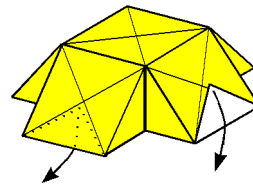
35. Turn over sideways.

36



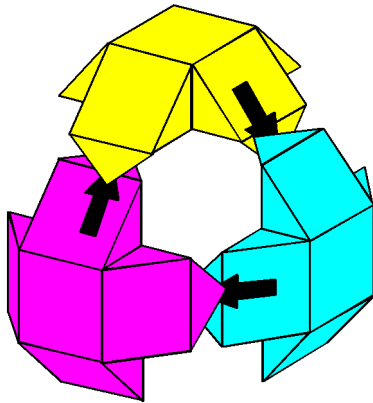
36. Collapse into the form shown in picture 37.

37



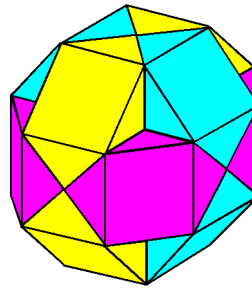
37. This is the finished module. Make all six. Note that as you assemble the design the external flaps must be tucked inside and the internal ones brought to the outside. You will need to do this carefully as you assemble the modules without reversing the direction of the creases so that tension holds the flaps in place against the internal and external surfaces of the other modules.

38



38. Three modules go together like this.
The full pattern is the same as for version
1 - see picture 21.

39



39. When it is finished the even
distribution version of the 6-part
Rhombicuboctahedron will look like this.

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