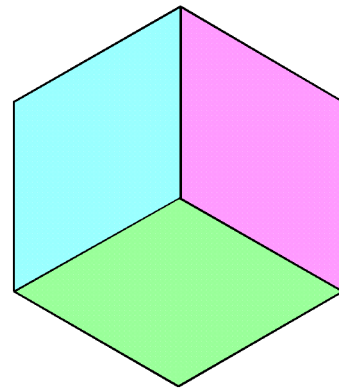


Counter-Rotating Cube and Cuboctahedron

These designs are derived from the Magic Cube design of Jeremy Shafer, which I first saw at the British Origami Society convention in York in 1999 and was subsequently published in his book *Origami to Astonish and Amuse*.

As soon as I saw the design I realised it could probably be simplified. And simplifying it also produced a bonus. Whereas the original design was placed on a table and you moved your head to make the illusion work, the simplified version could be held in the hand and the illusion made to work by turning it gently from side to side.

I am sure you know the illusion where a hexagon divided into three diamond shapes can be seen either as an empty room, with the centre pointing away from you, or as a cube, with the centre pointing towards you. If not you can look at the picture to the right and see it now. You should find it quite easy to toggle between the two views.



You can view the Counter-Rotating Cube in exactly the same two opposite ways, but it is slightly harder to see the cube because the design is three-dimensional, rather than flat, and you need to see what is actually an empty room as a cube. Focussing through the design so that it becomes blurry often helps with this.

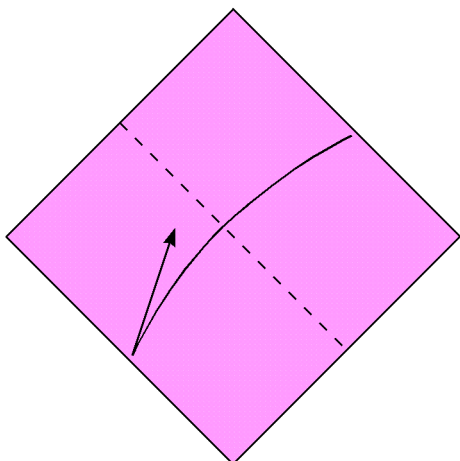
Once you can turn the room into a cube you can hold the design at arms length and rotate it to the right and back to the left, or vice versa. The cube will rotate in the opposite direction to the way you rotate the design. If you rotate the design to the left the cube will rotate to the right. If you rotate the design to the right your cube will rotate to the left. It is, indeed, a quite astonishing, and amusing, effect.

The Counter-Rotating Cube is very simple to fold but I like my designs very simple indeed. In trying to come up with an even simpler version I discovered the Counter-Rotating Cuboctahedron. Enjoy!

The Counter-Rotating Cube

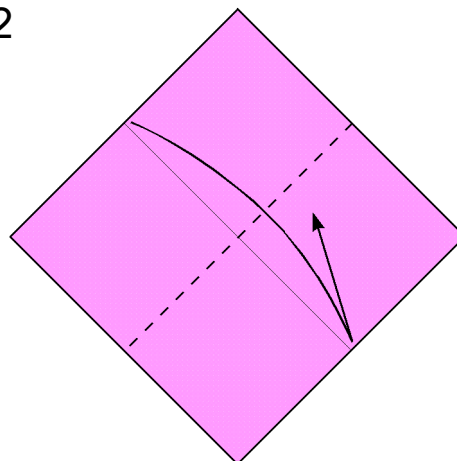
You will need a single square of any kind of paper. The illusion works best if the square is fairly small and the paper fairly stiff. If you are using irogami begin with your paper arranged coloured side up.

1



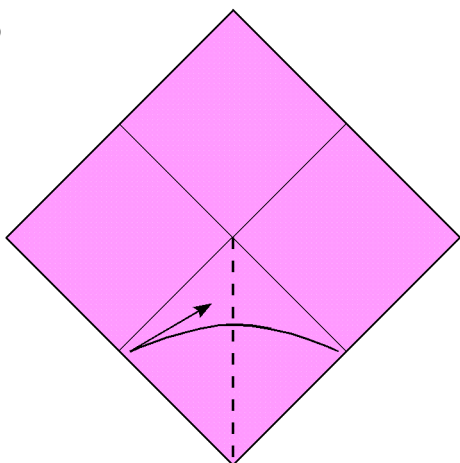
1. Fold in half edge to edge, then unfold.

2



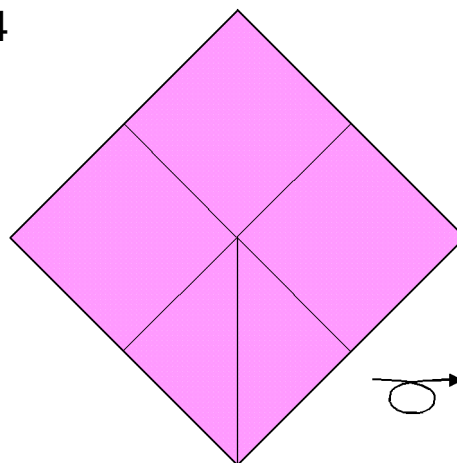
2. Fold in half edge to edge in the alternate direction, then unfold.

3



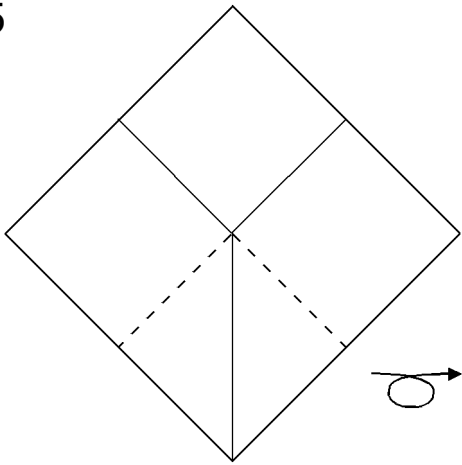
3. Crease half of one diagonal like this.

4



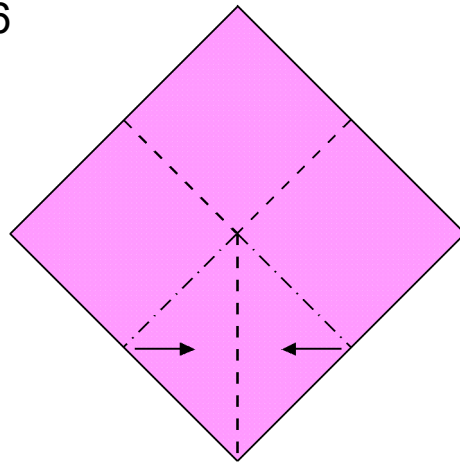
4. Turn over sideways.

5



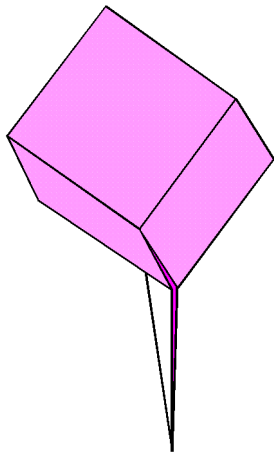
5. Change the direction of the two creases marked with dashed lines then turn back over.

6



6. Form the empty room by squeezing the sides together and allowing the centre to become concave.

7

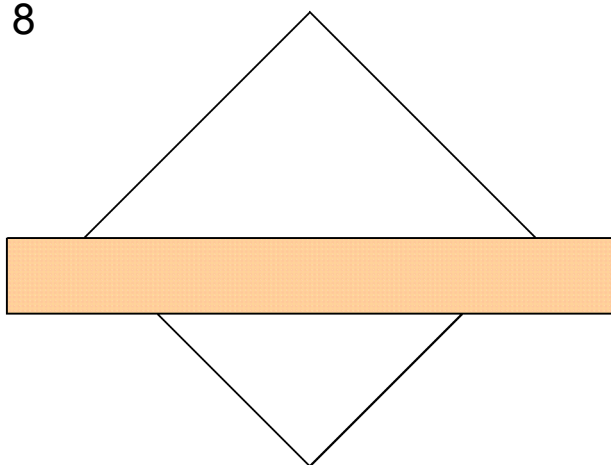


7. The result should look like this. Take hold of the spike at the bottom of the design between finger and thumb and hold it away from you so that you can see into the empty room. Focus through the centre of the design and the room should change into a cube. Twist the spike gently to right and left between your fingers. Whichever way you twist it the cube will appear to rotate in the opposite direction. A little practice will make perfect.

The Counter-Rotating Cuboctahedron

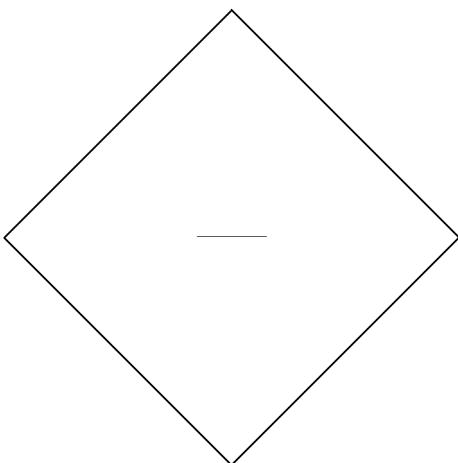
You will need a single square of any kind of paper. The illusion works best if the square is fairly small and the paper fairly stiff. If you are using irogami begin with your paper arranged white side up. The design looks best if there are no creases across the centre of the paper. Steps 8 through 11 show you how to avoid this.

8



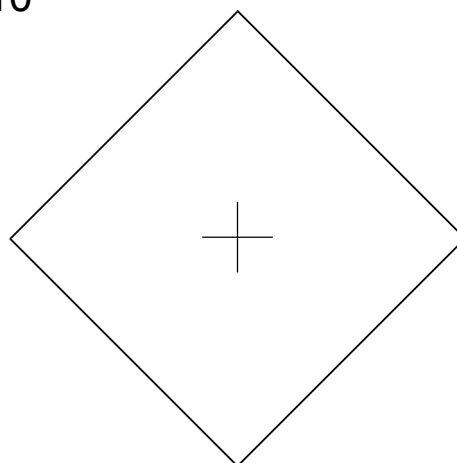
8. Lay a ruler across the diagonal of your square and draw a very faint and light pencil line in the centre.

9



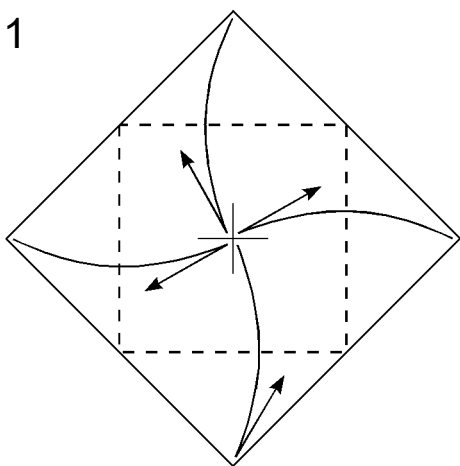
9. Repeat step 8 across the other diagonal.

10



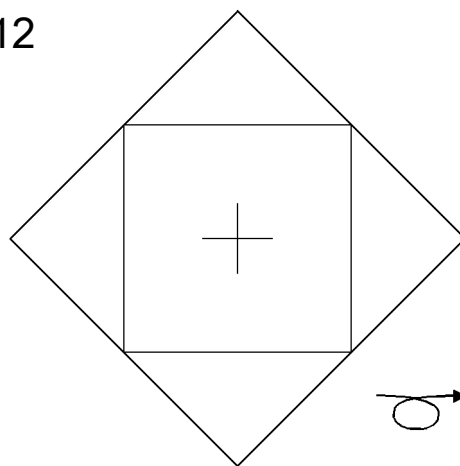
10. The point where the pencil lines cross is the centre of the paper.

11



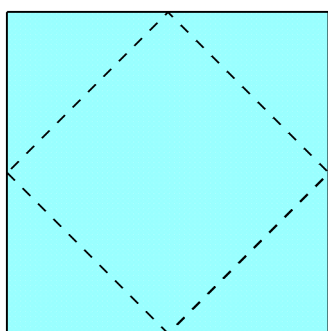
11. Fold all four corners into the centre, then unfold.

12



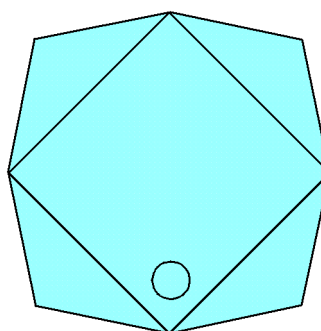
12. Turn over sideways.

13



13. Reverse the direction of all four creases and raise them towards you at an angle of somewhere between 30 and 45 degrees.

14



14. The result should be a shallow dish that looks like this. Take hold of the bottom centre of the base of the bowl between finger and thumb and hold it away from you so that you can see into the bowl. Focus through the centre of the design and allow it to change into a cuboctahedron. Twist gently to right and left between your fingers. Whichever way you twist it the cuboctahedron will appear to rotate in the opposite direction. A little practice will make perfect.

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