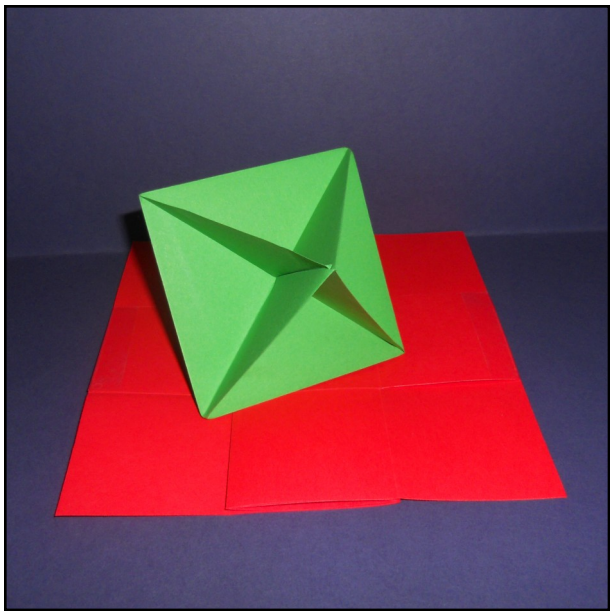
Purgatory

Designed by David Mitchell

Purgatory is a puzzle in the form of a flexible mat made from two folded and interwoven sheets of paper. This mat can be manipulated to reveal a hidden hole in the centre of the mat through which a surprisingly large object, the Nolid Octahedron shown in the photo, can be passed. The challenge is, of course, to discover the whereabouts of this hidden hole.

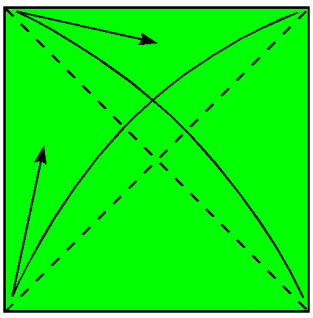


I designed the Nolid Octahedron in 1988 and Purgatory in 1996. Both are made from two squares. All the squares should be the same size.

Making the Nolid Octahedron

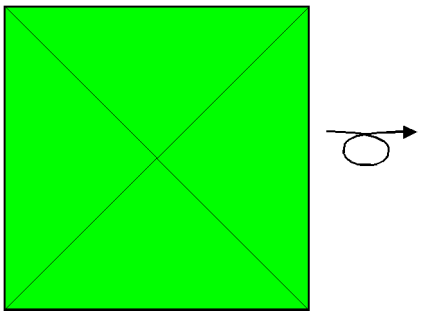
Your paper should be the same colour both sides. The diagrams have been drawn with the two squares tinted in different colours but this is only so you can easily see what is going on. The design works equally well, and looks more attractive, when both squares are the same colour.

1



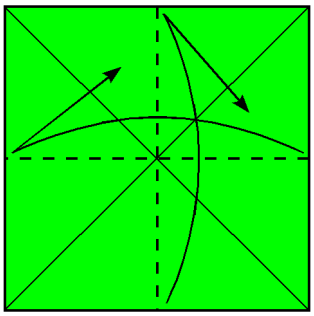
1. Fold in half diagonally, then unfold, in both directions.

2



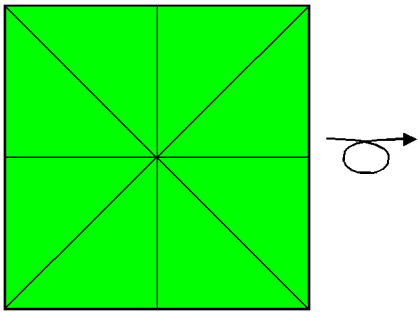
2. Turn over sideways.

3



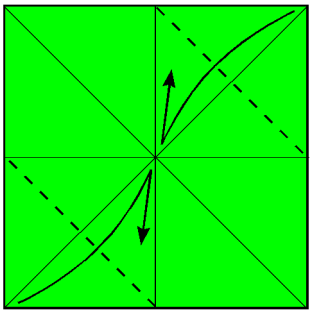
3. Fold in half edge to edge, then unfold, in both directions.

4



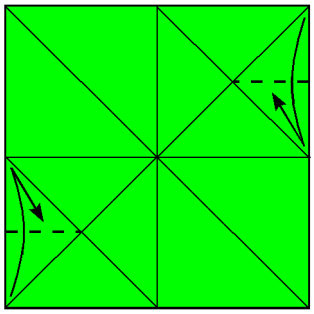
4. Turn over sideways.

5



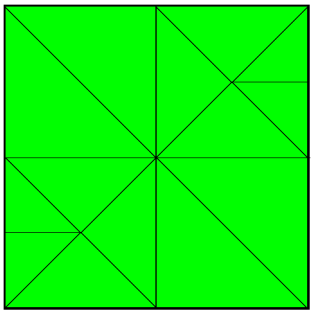
5. Fold the top right and bottom left corners into the centre, then unfold.

6



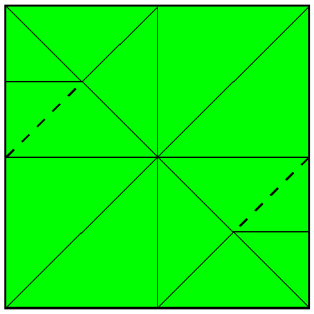
6. Make two small creases in the right and left edges as shown here.

7



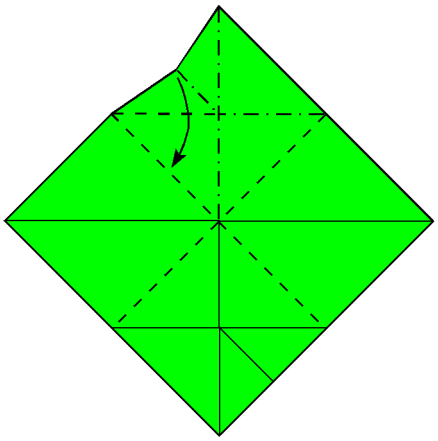
7. Turn over sideways.

8



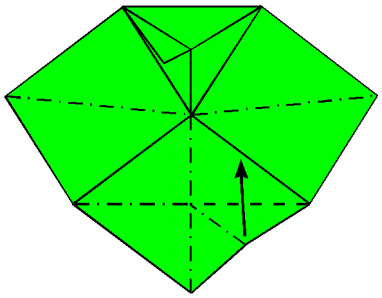
8. Reverse the direction of the two creases marked with dashed lines.

9



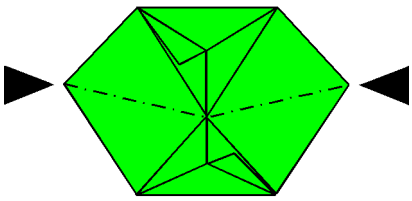
9. Collapse the paper into the shape shown in picture 10. The centre of the paper becomes concave as you do this.

10



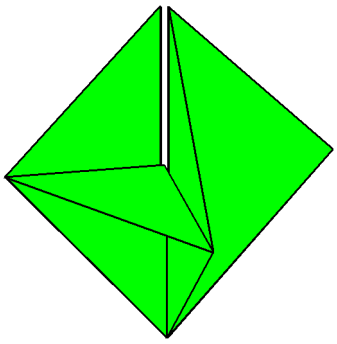
10. Repeat step 9 on the other half of the paper.

11



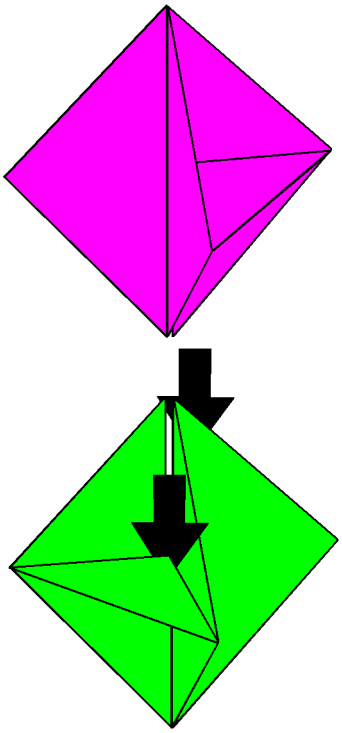
11. Push the left and right points (that are pointing up towards you) together to complete the module.

12



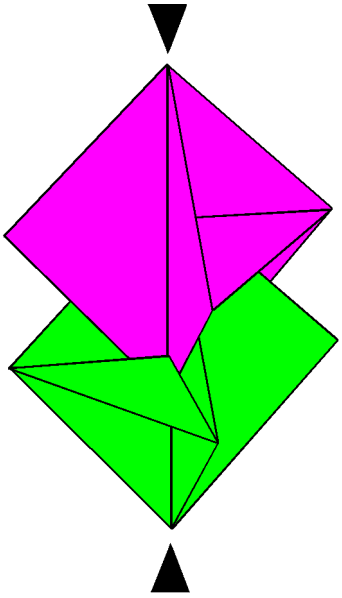
12. The result should look like this. Make two.

13



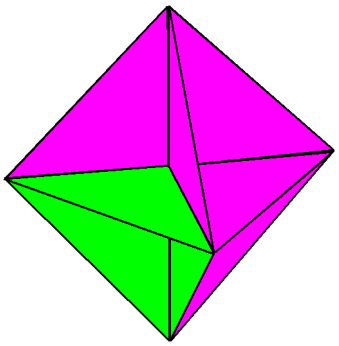
13. The modules go together like this. It is difficult, but not quite impossible, to persuade all the points to slide gently into their matching pockets.

14



14. Slide the modules fully together like this.

15

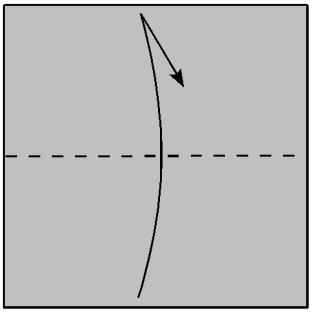


15. The 2-part Nolid Octahedron is finished.

Making Purgatory

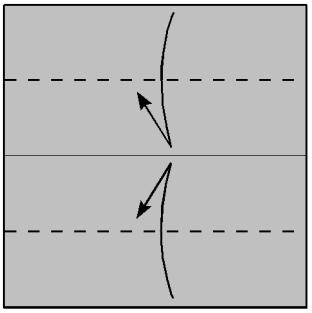
Purgatory is made from two squares which have been divided into 3x3 grids. These should be the same colour both sides. The diagrams have been drawn with the two squares tinted in different colours but this is only so you can easily see what is going on. The puzzle works equally well when both squares are the same colour. You will also need a third square of the same size to use as a template to help you divide your first two squares into a 3x3 grid and some sticky tape to join some of the edges of the two squares together.

1



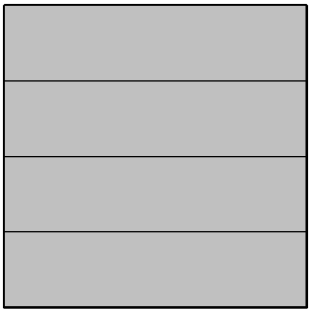
1. Fold the template in half upwards, crease, then unfold.

2



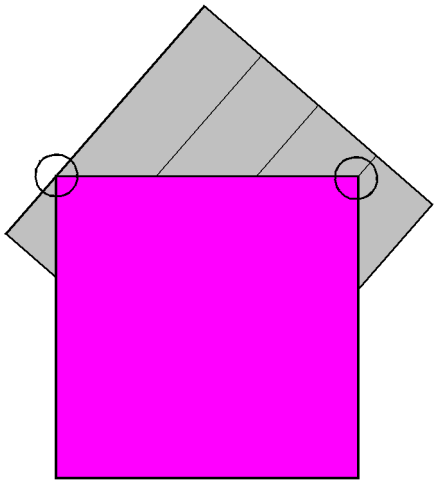
2. Fold both the top and bottom edges to the middle, crease, then unfold.

3



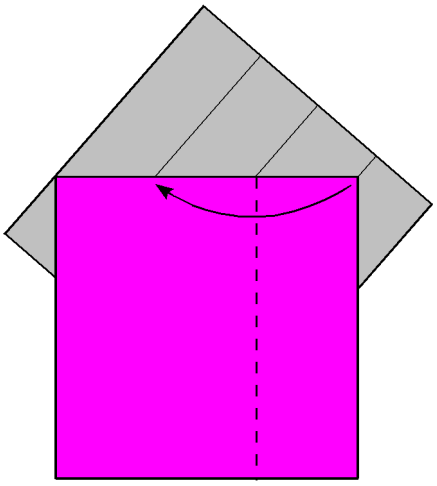
3. The template is finished.

4



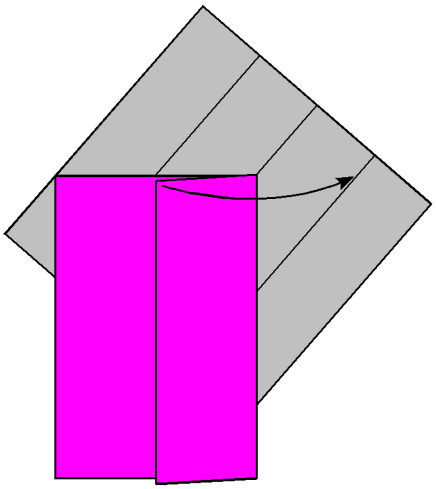
4. Begin by laying your square on top of the template like this, making sure the corners are aligned to the edge of the template and the crease in the way marked with circles here.

5



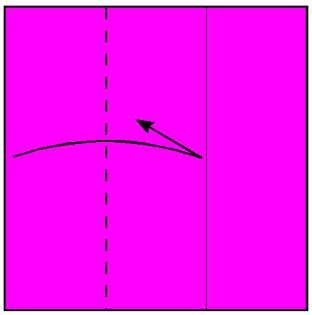
5. Fold the right hand corner inwards as shown. Make sure the two squares don't slip out of alignment as you make this fold.

6



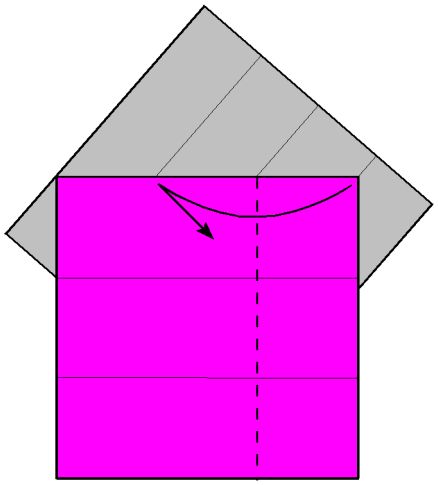
6. Open out the fold made in step 5 and remove the square from the template.

7



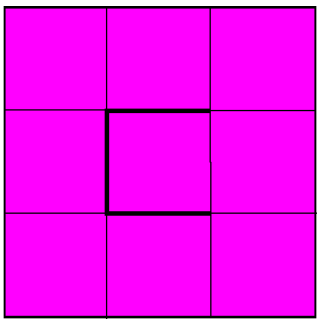
7. Fold the left hand edge onto the crease made in step 5, crease, then unfold.

8



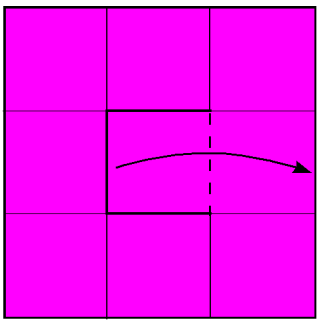
8. Your paper is now divided into thirds. To divide the paper into thirds in the other direction as well, rotate the paper through ninety degrees and repeat steps 4 through 7.

9



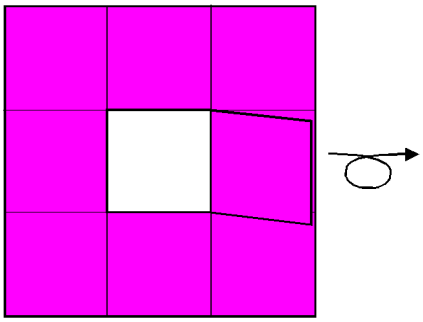
9. The paper is now divided into a 3x3 grid of smaller squares. Make sure all the creases fold easily in both directions then cut around three edges of the small centre square to create a flap.

10



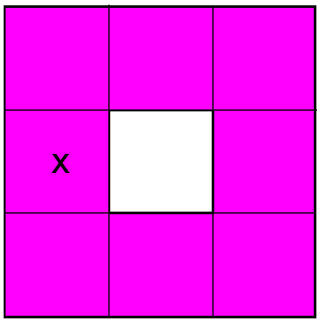
10. Fold the flap across to the right.

11



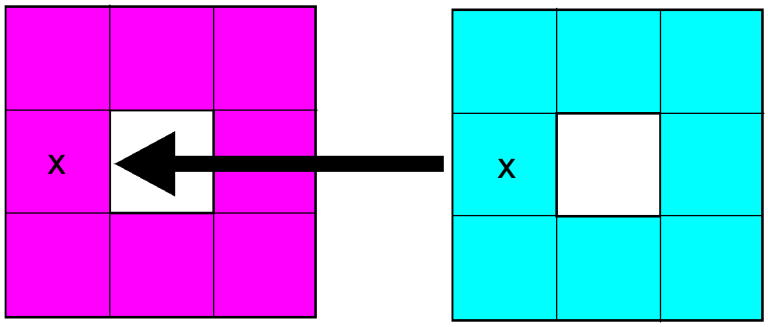
11. Turn over sideways.

12



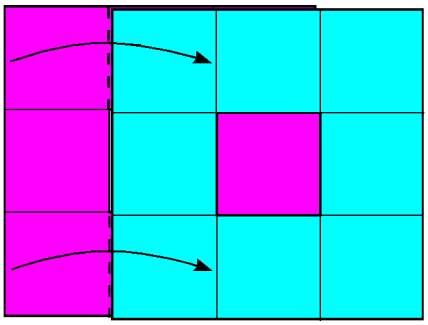
12. Fold both squares to this stage. The position of the flap behind the paper is marked with a x.

13



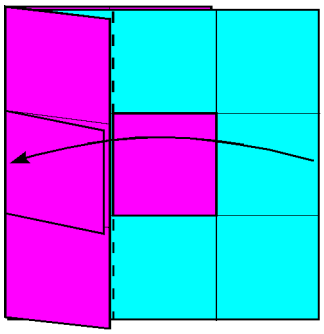
13. Lay one square on top of the other like this.

14



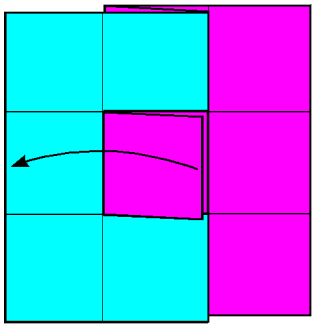
14. Fold the left edge of the bottom square across to the right using the existing crease.

15



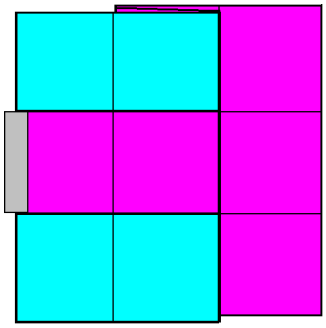
15. Fold the right edge of the other square across to the left as shown using the existing crease.

16



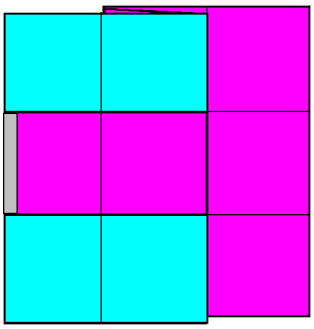
16. Fold the central flap across to the left.

17



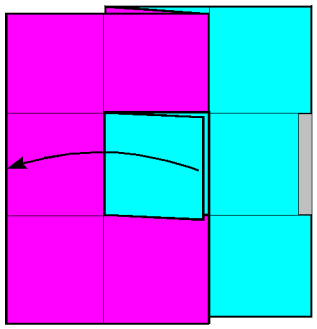
17. Trim a piece of sticky tape to the appropriate size then use it to seal the edges of the two squares together along the middle part of the left edge.

18



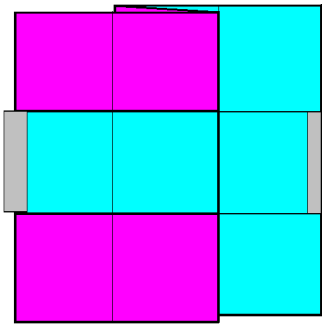
18. Turn over sideways.

19



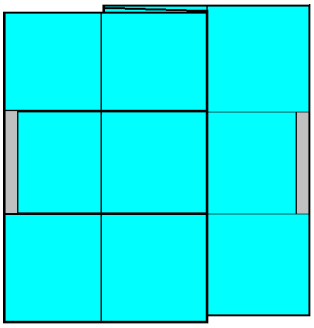
19. Fold the central flap across to the left.

20



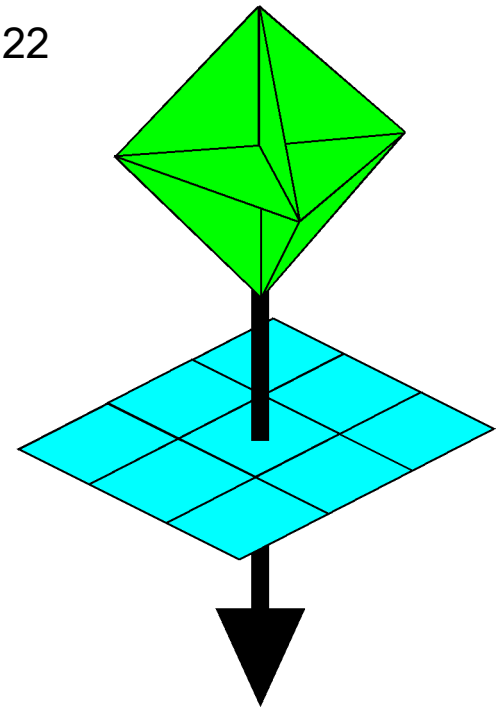
20. Repeat step 17 on this side of the apparatus.

21



21. Purgatory is finished. If you use two squares of the same colour the result will look like this.

22



22. Purgatory conceals a hidden hole through which a surprisingly large object, such as a 2-part Nolid Octahedron folded from the same size of squares, will easily pass. You do not need to add any extra creases to Purgatory to find this hole.