

Octagon Isosceles Tiles

These diagrams show you how to fold octagon isosceles tiles from silver rectangles, squares and leftover rectangles.

DIN paper sizes such as A4, A5 etc are good enough approximations of silver rectangles for practical paperfolding purposes.

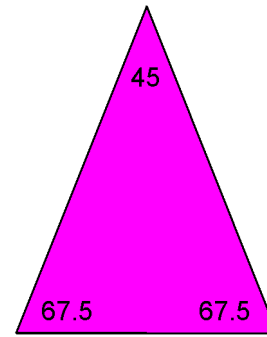
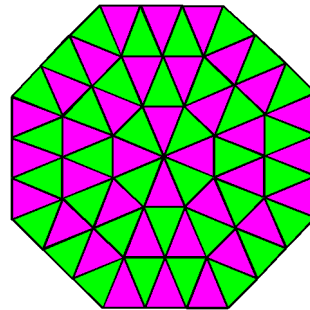
Leftover rectangles have sides in the proportion of $1:\sqrt{2}+1$ and are easily obtained from silver rectangles by removing the largest possible square.

Two methods of folding octagon isosceles tiles from squares are given. This is to allow you to combine them in tiling patterns with other tiles which have varying lengths of long side.

When folded from a silver rectangle the area of the octagon isosceles tile is half the area of the rectangle it is folded from. This can be used to illustrate and explain the formula for calculating the area of a triangle.

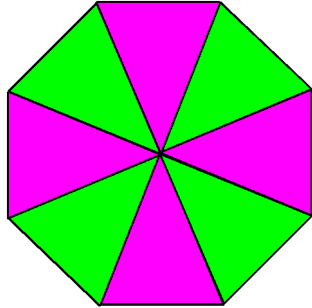
The isosceles triangle tile has reflective symmetry so that although a mirror-image file can be folded it appears identical once turned over to show the clean surface.

I do not know who first discovered the method of making this tile from a silver rectangle. I discovered the method from a leftover rectangle and method 2 from a square in 2000. Method 1 from a square is a common preliminary fold in origami.



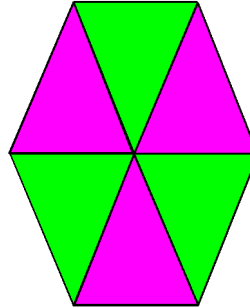
Tiling patterns

1



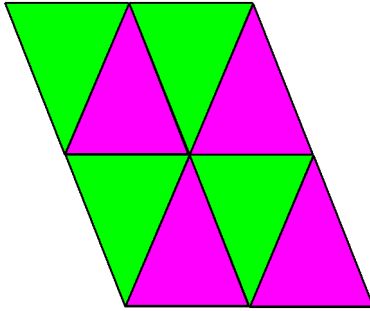
1. Eight tiles will go together to form an octagon.

2



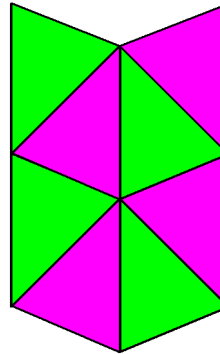
2. Six tiles will go together to form a hexagon.

3



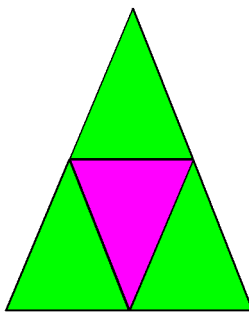
3. Rows of tiles will tile the plane like this ...

4



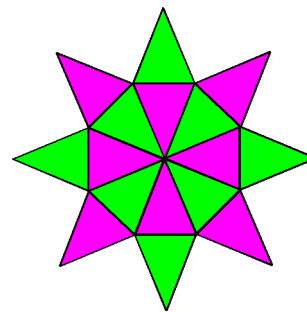
4. ... or like this.

5



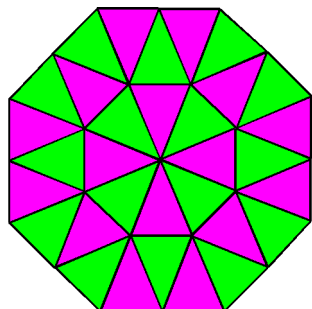
5. Four tiles will form a larger tile of the same shape.

6



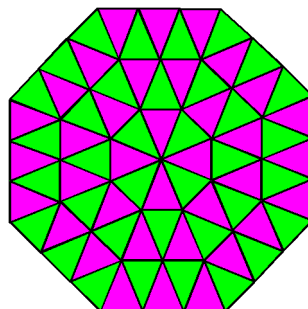
6. A star can be made by adding eight more tiles to the octagon.

7



7. Filling in the gaps between the points of the star with further pairs of tiles produces a larger octagon.

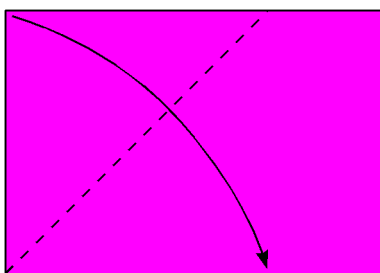
8



8. Further concentric layers of tiles can be added to produce larger and larger octagons. This process can be continued ad infinitum.

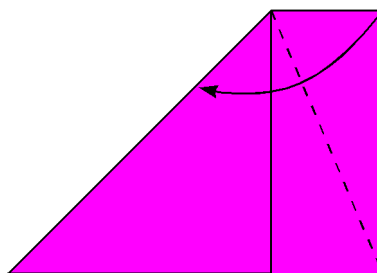
Folding from the silver rectangle

9



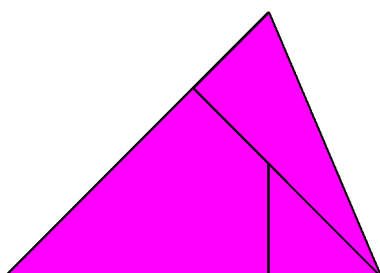
9. Begin with a silver rectangle or with a square that has been pre-folded into a silver rectangle (see page xx). Fold the left hand edge onto the bottom edge.

10



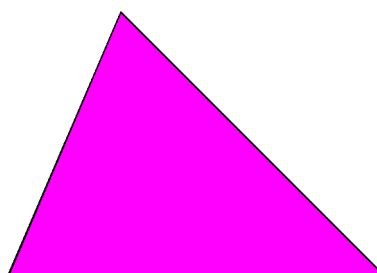
10. Fold the top edge onto the sloping edge. In theory this crease should automatically intersect the bottom right hand corner. In practice it usually need adjusting slightly in order to do so.

11



11. Make sure the layers all lie flat then turn over sideways.

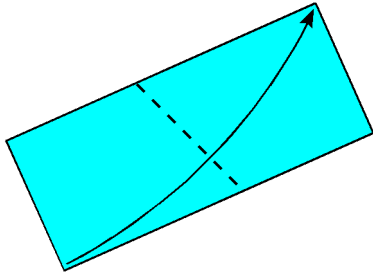
12



12. The octagon isosceles tile is finished.

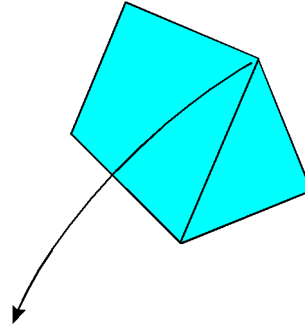
Folding from the leftover rectangle

13



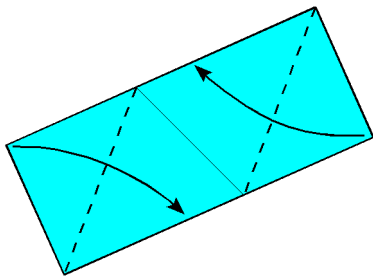
13. Fold in half corner to opposite corner like this.

14



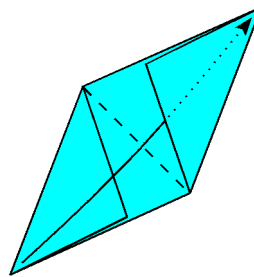
14. Unfold.

15



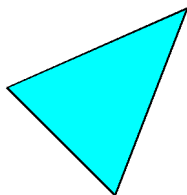
15. Fold the left edge onto the top edge and the right edge onto the bottom edge, then unfold.

16



16. Remake the fold you made in step 13 interlocking the internal flaps as you do so. This will lock all the layers together.

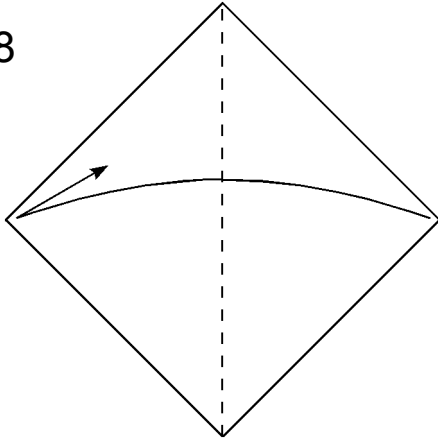
17



17. The octagon isosceles tile is finished.

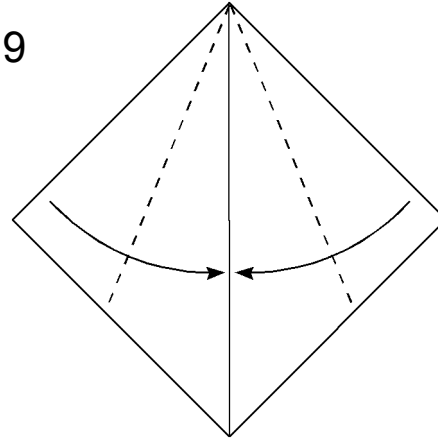
Folding from the square - method 1

18



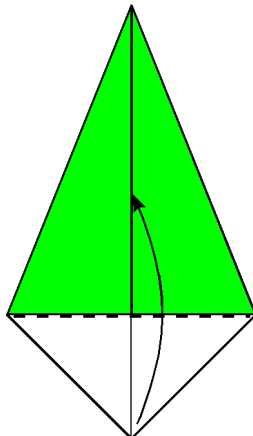
18. Fold in half sideways, then unfold.

19



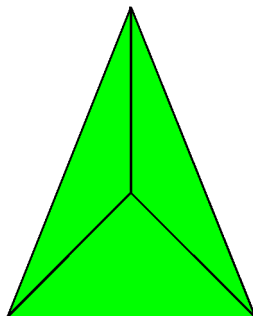
19. Fold the top right and left sloping edges onto the vertical crease.

20



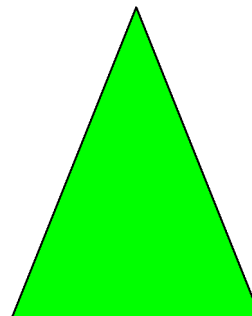
20. Fold the bottom corner upwards along the line of the bottom edges of the front layers.

21



21. Turn over sideways.

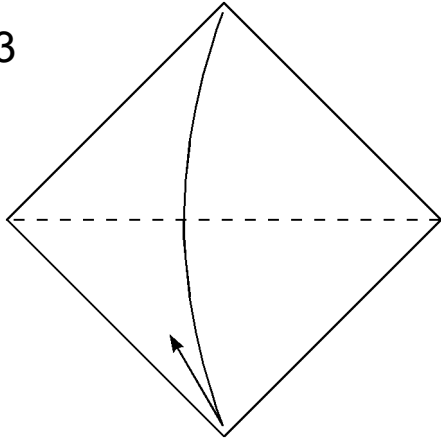
22



22. The octagon isosceles tile is finished.

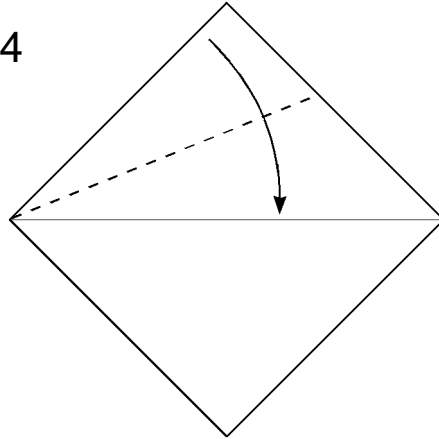
Folding from the square - method 2

23



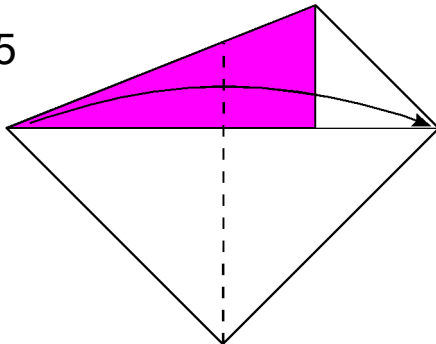
23. Fold in half downwards, then unfold.

24



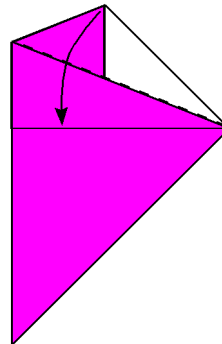
24. Fold the left sloping top edge onto the horizontal crease.

25



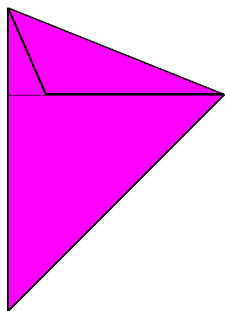
25. Fold in half sideways.

26

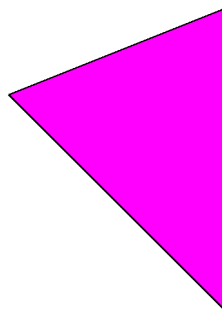


26. Fold the top corner inwards along the line of the sloping top edge of the front layers.

27



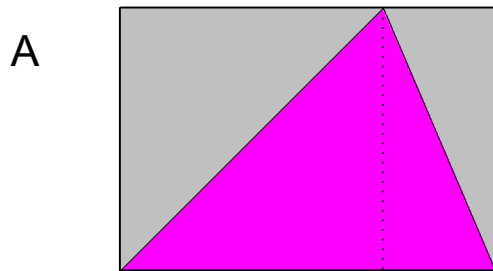
27. Turn over sideways..



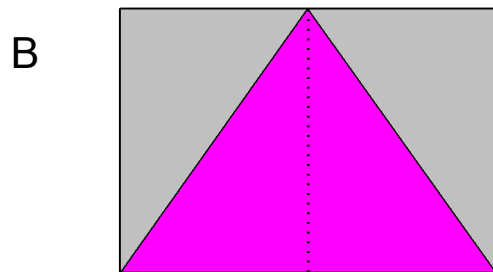
28. The octagon isosceles tile is finished.

Notes

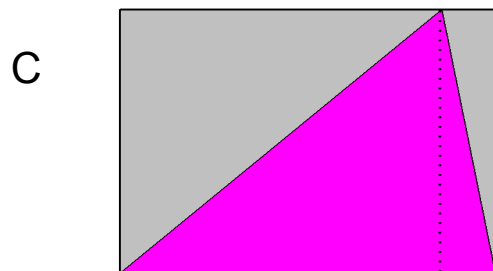
Working out the area of the silver rectangle tile



A. Dropping a perpendicular from the apex of the tile divides the paper into two rectangular regions and shows that the area of the tile is half the area of the original rectangle.



B. This remains true for all other triangular tiles made by folding the right and left edges inwards where the two creases intersect along the top edge ...



C. ... and can be used to illustrate and explain the formula for calculating the area of a triangle.

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