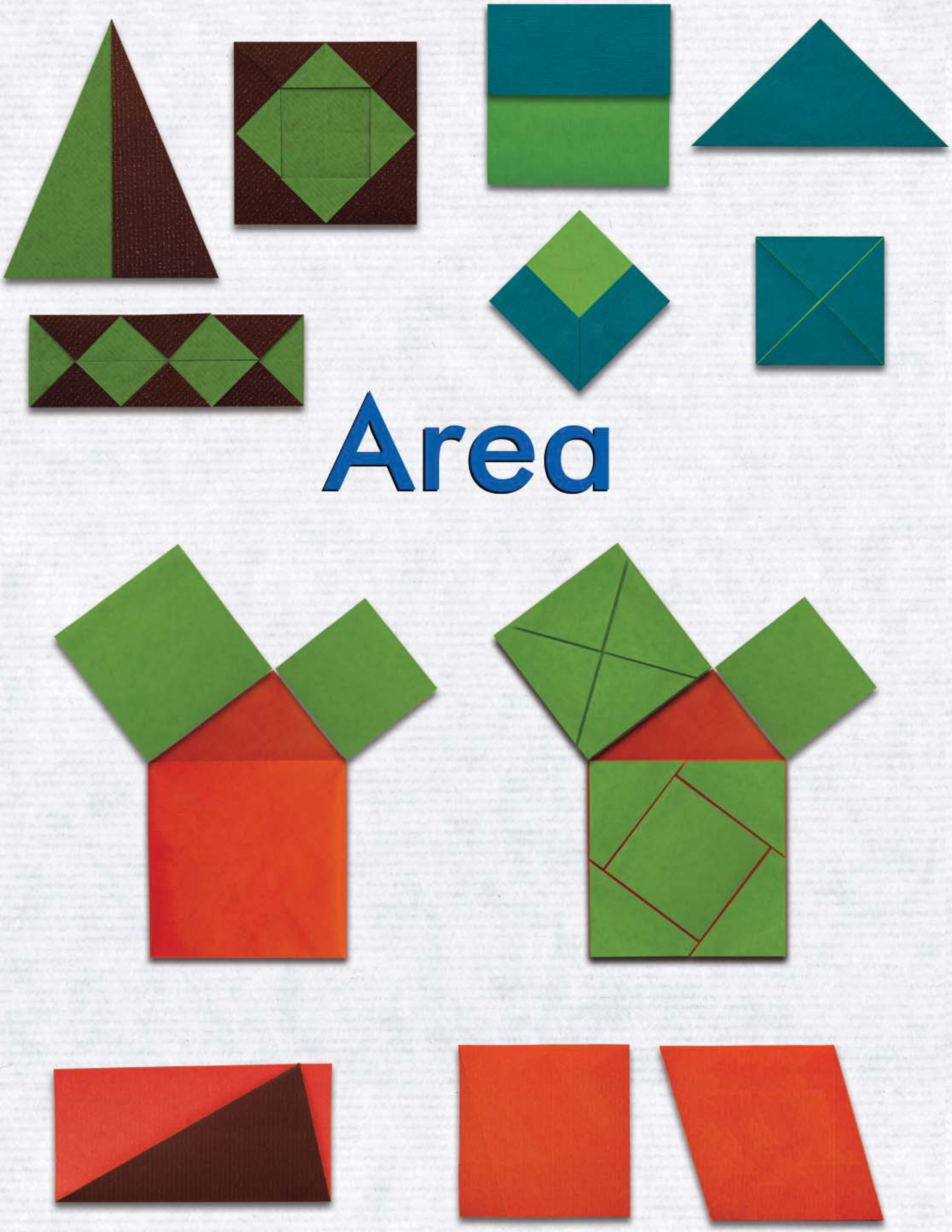
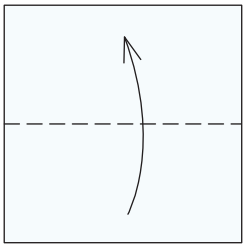

Area

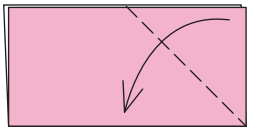
Seeing Both Sides Equally

For this origami puzzle, you'll need squares whose two sides are different colors (one side can be white). Your goal is to fold each square so that when you lay it flat, the visible portions of the two sides are equal in area.

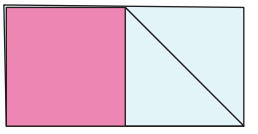
Try this challenge yourself before exploring some of the possible approaches that follow. This is also a great puzzle to share with a group. Collectively, you'll likely discover way more solutions than you imagined possible.



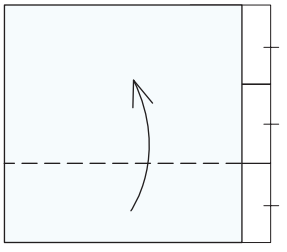
1. Begin with a square. Fold it in half.



2. Fold one of the corners down.

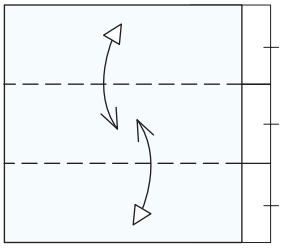


3. You can now see both sides equally.

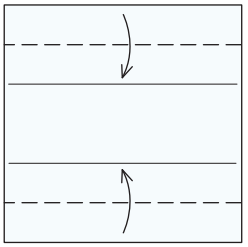


4. Fold a square piece of paper along the 1/3 division.

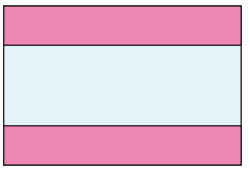
5. You can now see both sides equally.



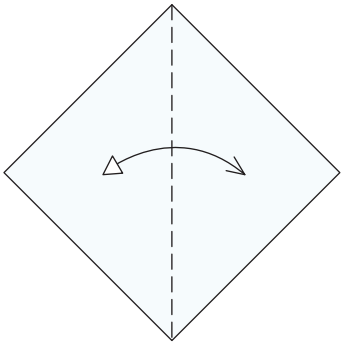
6. Precrease a square along the 1/3 divisions.



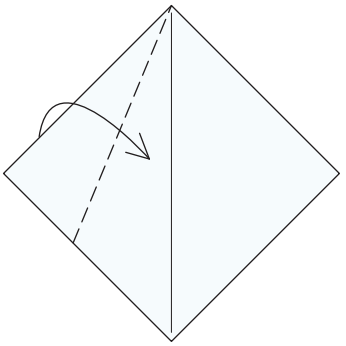
7. Fold the edges to the creases.



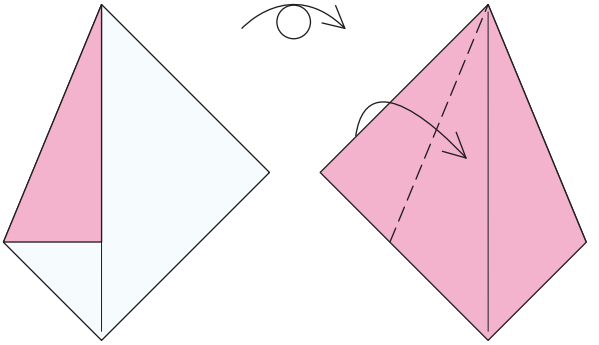
8. You can now see both sides equally. The two darker rectangles add up to equal the lighter section.



9. Precrease a square in half.

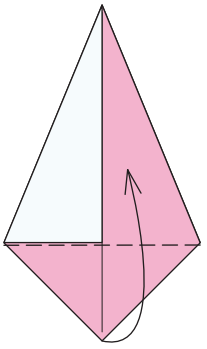


10. Fold the edge to the crease.

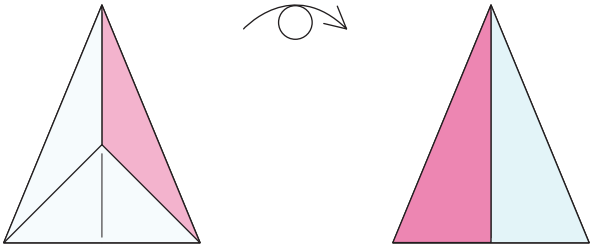


11. Turn over.

12. Fold the edge to the crease.

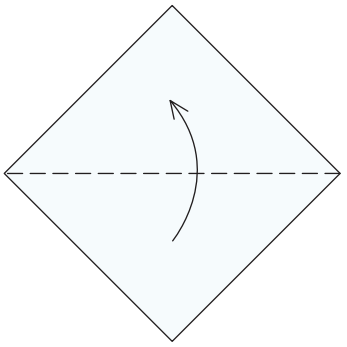


13. Fold the bottom corner up.

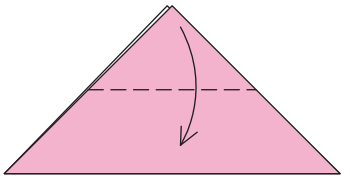


14. Turn over.

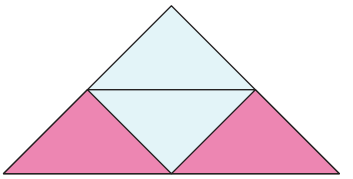
15. You can now see both sides equally.



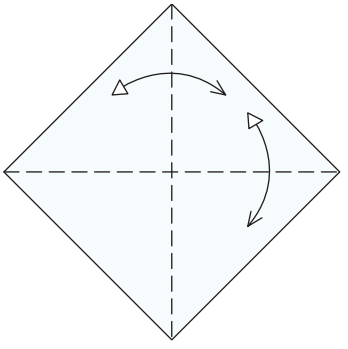
16. Fold a square in half.



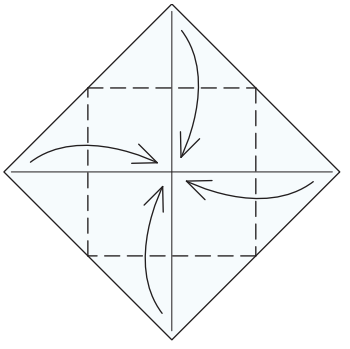
17. Fold the top corner down.



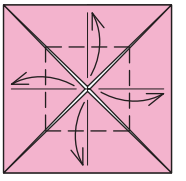
18. You can now see both sides equally. The two darker triangles add up to equal the lighter square section.



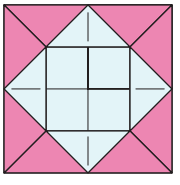
19. Precrease a square along the diagonals.



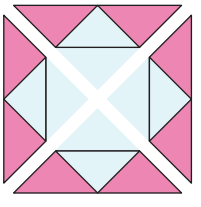
20. Fold the four corners to the center.



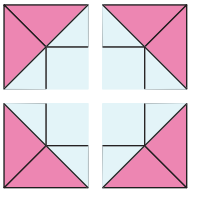
21. Fold the four corners outwards.



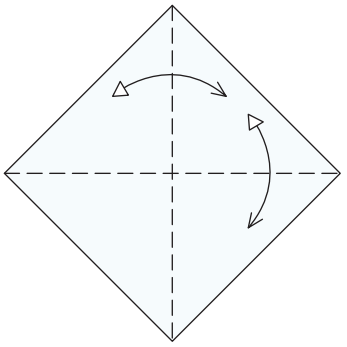
22. You can now see both sides equally. It is easier to see this by mentally dividing the paper into four pieces.



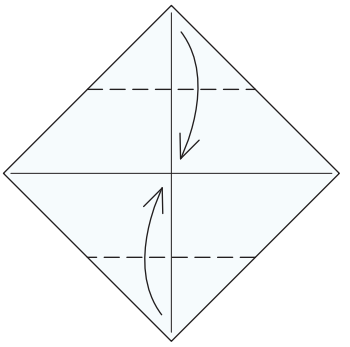
23. Each triangular piece is equivalent to what you constructed in step 18.



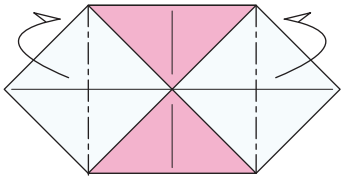
24. Alternatively, you can mentally divide your square into four smaller squares. Each square is evenly divided into two colors along its diagonal.



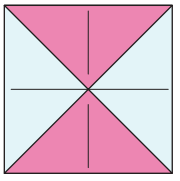
25. Precrease a square along the diagonals.



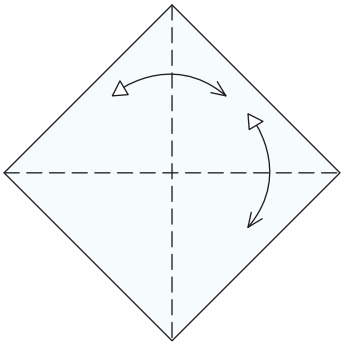
26. Fold the corners to the center (dividing each section into 2 equal widths).



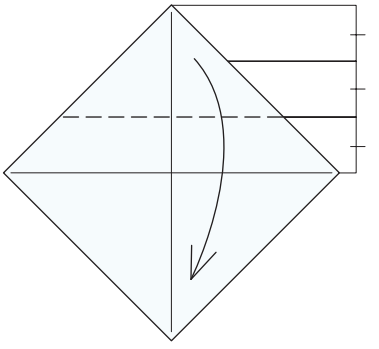
27. Fold the sides behind.



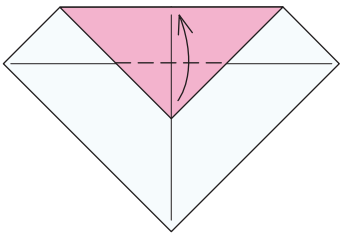
28. You can now see both sides equally.



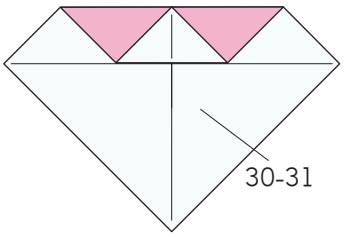
29. Precrease a square along the diagonals.



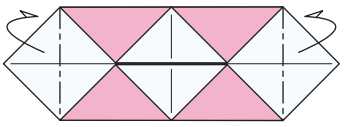
30. Fold the top down along the thirds division. You will be dividing the top into 3 equal widths.



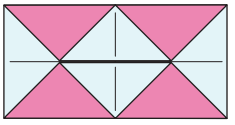
31. Fold the corner up to the top.



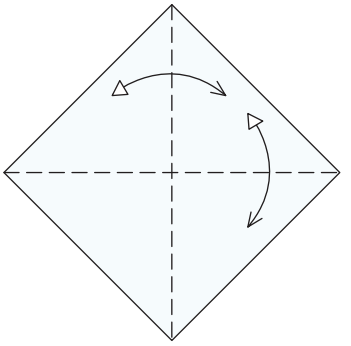
32. The top is divided into 3 equal widths. Repeat steps 30-31 on the bottom.



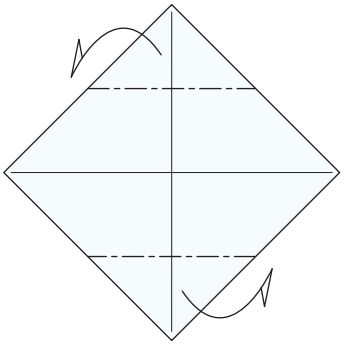
33. Fold the corners behind.



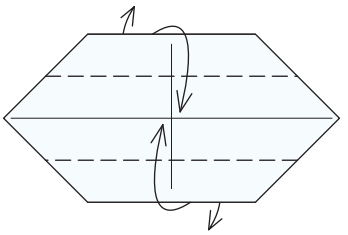
34. You can now see both sides equally. There are four triangles of each color.



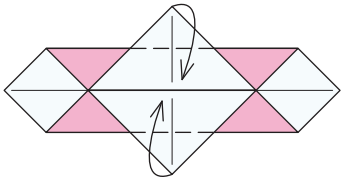
35. Precrease a square along the diagonals.



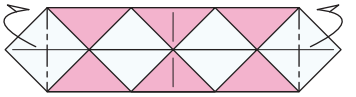
36. Fold the corners behind so they meet at the center.



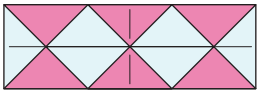
37. Fold the edges to the center, allowing the flaps from behind to swing forward.



38. Fold the corners to the center.



39. The top and bottom are divided into 4 equal widths. Fold the corners behind.



40. You can now see both sides equally. This is similar to the examples in step 28 (two equal widths) and step 34 (three equal widths). You can generalize this process by using any number of equal divisions and then folding the corners behind.

The *Triangle Area* model on page 86 is yet another solution to this puzzle.

These are just some of the many (indeed infinite) ways to fold a square to see both sides equally. How many more ways can you and your friends find?