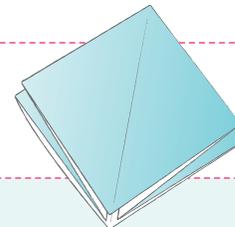


LESSON 4: PRELIMINARY BASE



Activities

Activity 1: Fold the Preliminary Base

Activity 2: Fold a Simple Flower

Activity 3: Fold a Star Basket

Models for this lesson:

Preliminary Base, Simple Flower, and Star Basket

Materials needed:

Paper

Targeted grade levels:

Grades: 4,5,6,7

Math Concepts:

Square, ratio, bisect, quadrant, intersection

NCTM Standards:

1. Investigate, describe, and reason about the results of subdividing, combining, and transforming shapes;
2. Explore congruence and similarity;
3. Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects;
4. Describe, extend, and make generalizations about geometric and numeric patterns;
5. Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.

Math Vocabulary:

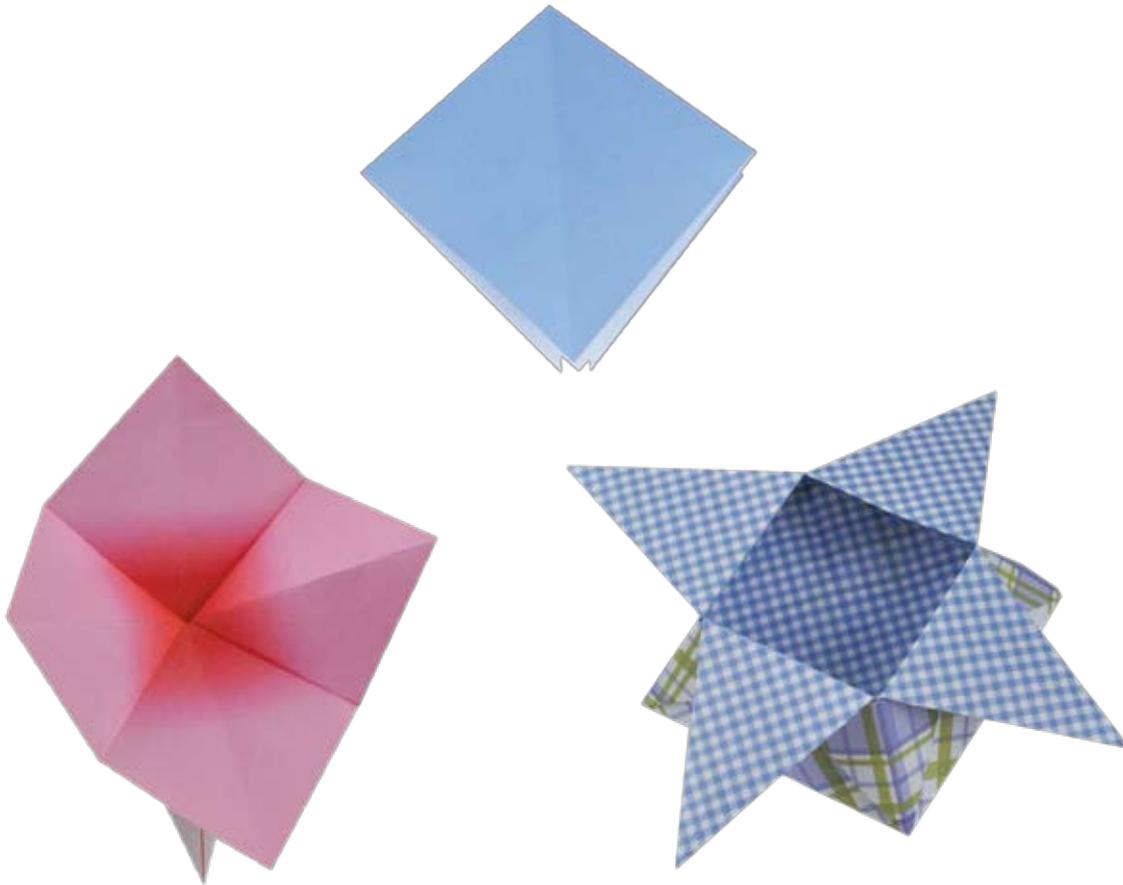
Square, triangle, congruence, similarity, perimeter, area, volume, symmetry, diagonal

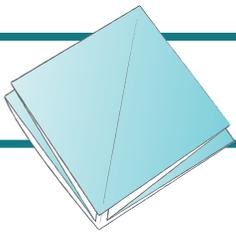
Teaching Tips and Techniques:

- Remind students to make sharp creases.
- Have students keep their papers on the table or other hard surface. It will help them to have neater folds.
- Demonstrate how to line up the edges when making a diagonal in order to achieve accurate creases and sharp points.
- If the students fold two copies of a model, have them unfold one so they can examine the crease patterns they made. Have them name or color the different shapes.

Lesson Introduction

We hope you are enjoying the bases and models we have been presenting in the last few chapters. We are truly excited to present this section and see you progress into more advanced levels of folding. This chapter is dedicated to the Preliminary Base, one of the most important bases in origami. A very large number of models begin with this Base and it is therefore critical to master the Preliminary (sometimes referred to as the Square) Base. There are more than a dozen methods of getting to this Base and here we present one of them. The Preliminary Base is also the first steps to learn the Bird Base, which will be covered in chapter 6.

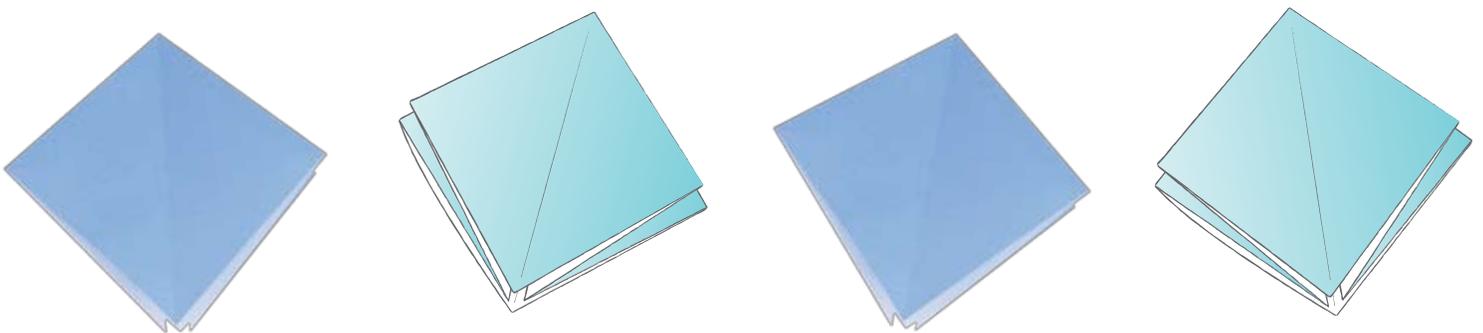




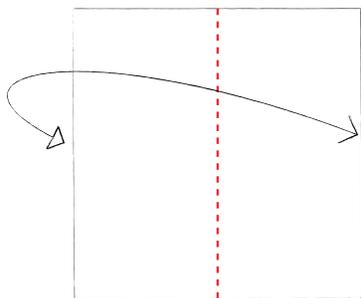
ACTIVITY 1 - *Fold a Preliminary Base*

In making the Preliminary Base, neatness really pays off, especially in step 5 (the collapse). Take the time to make your first diagonal neatly. How many diagonals does the square have?

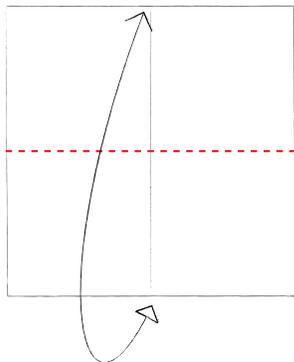
1. If the length of square is a , what is the length of diagonal?
2. What is the perimeter of the triangles?
3. The intersection of the two diagonals and the two “book folds” is a point. How many mini-triangles resulted from this? What is the area of each triangle? Are they all the same? If yes, how?
4. When collapsing the base in step 5, pay close attention to the fact that all the four corners of the square come together.
5. The Preliminary Base has two flaps on one side and two on the other.



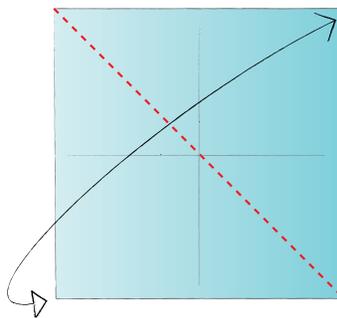
PRELIMINARY BASE *Traditional*



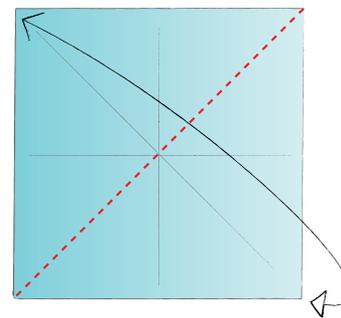
1 Start with white side of paper facing up. Fold in half side edge to side edge. Unfold.



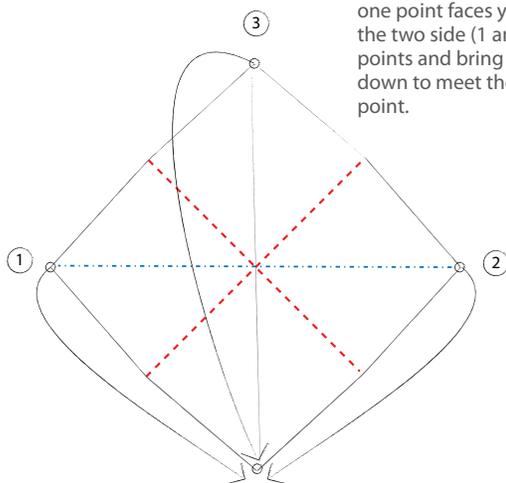
2 Fold in half bottom edge to top edge. Unfold. Turn over so the colored side is facing up.



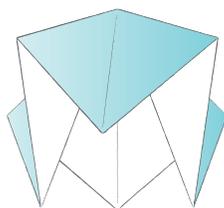
3 Fold the top right corner down to the bottom left corner, creating a diagonal crease. Unfold.



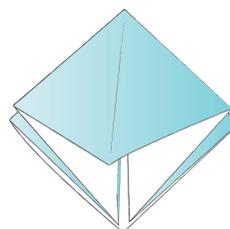
4 Fold the top left corner down to the bottom right corner, creating a second diagonal crease. Turn over to the white side.



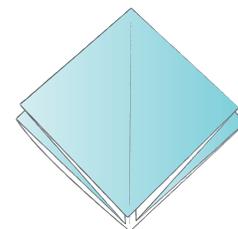
5 Orient the paper so one point faces you. Take the two side (1 and 2) points and bring them down to meet the bottom point.



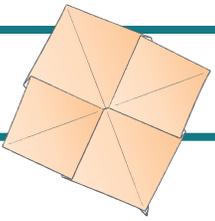
6 As you bring the three points together at the bottom, the point of the top layer (3) will start to move toward that meeting point.



7 Bring the final point down to meet the others and reinforce the creases on the sides.

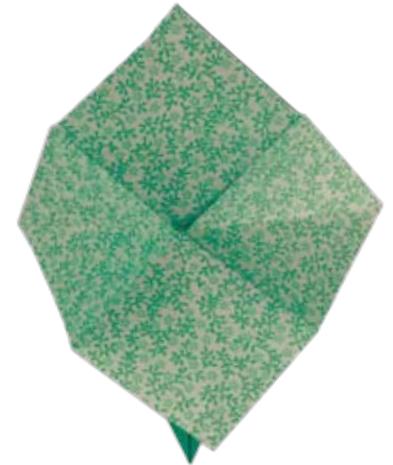


Finished Preliminary Base!

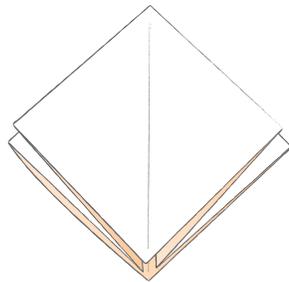
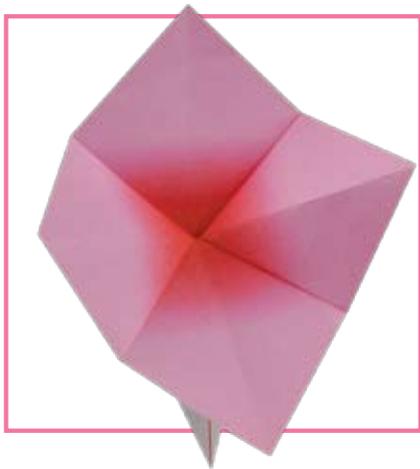


ACTIVITY 2 - Simple Flower

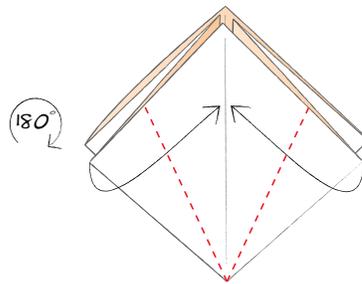
1. This model starts with a white Preliminary Base. Start with the white side up when you make the first diagonal fold in the Base.
2. Make sure when you make the first folds (step 2) that the folds are on the closed side of the flaps. Notice the symmetry of the model. After we put the folds in, has the symmetry changed?
3. While opening the flower in step 6, be aware that the flower starts to get three dimensional around the petals, and you will need to gently squash them symmetrically to make it flat.



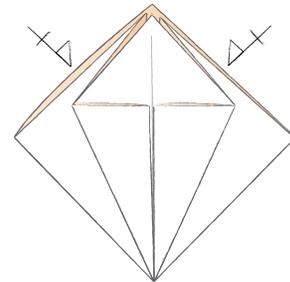
SIMPLE FLOWER *Traditional*



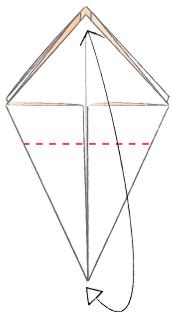
1 Start with a white Preliminary Base. Refer to the Preliminary Base and start with the colored side up.



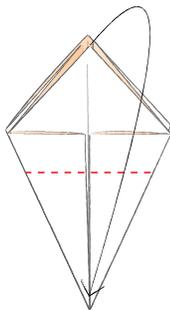
2 Make sure the open end of the Base is pointing away from you. Fold the lower side edges into the center crease.



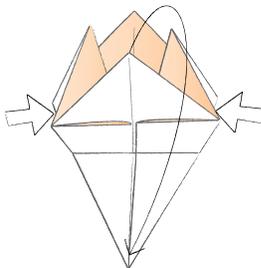
3 Turn the model over and again fold the lower side edges into the center crease.



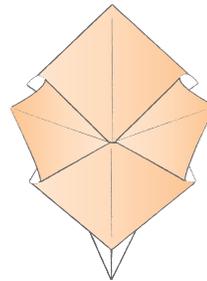
4 Fold the bottom tip up to the top. Unfold.



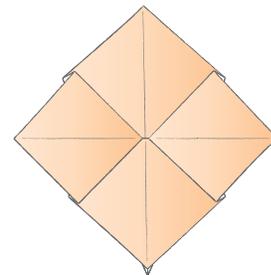
5 Take just the top layer and fold it down on the crease line made in step 4.



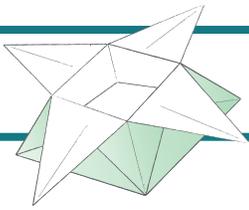
6 Gently push down the back layer and press down the two side layers.



7 Reinforce your creases. The flower will not be completely flat.

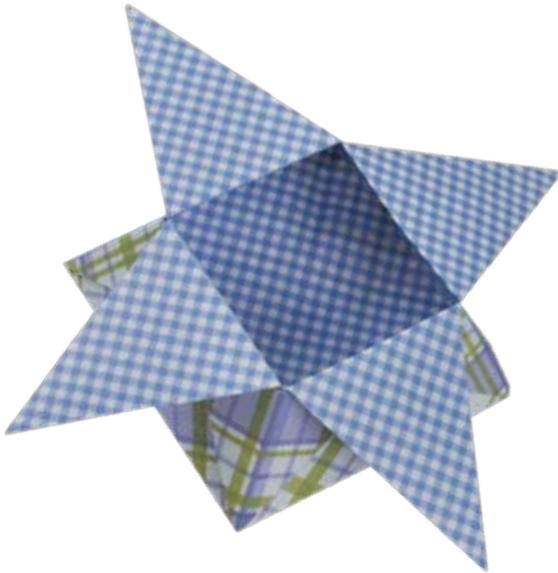


Finished Simple Flower!



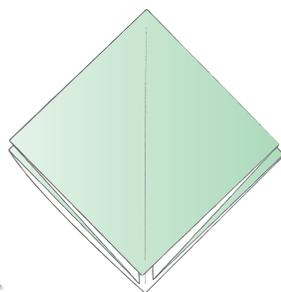
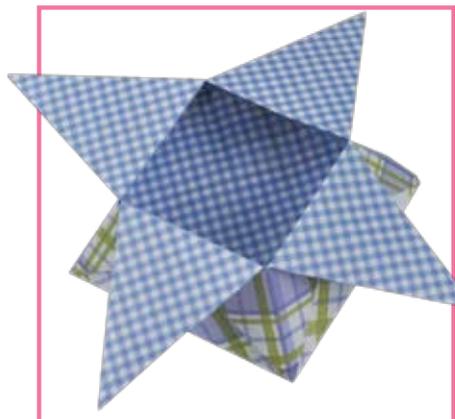
ACTIVITY 3 - *Fold a Star Basket*

1. This model starts with a colored Preliminary Base. See the instructions for the Preliminary Base for reference.
2. Make sure when you make the first folds (step 2) that the folds are on the open side of the flaps. Compare symmetry change with step 3 of the Simple Flower.
3. In step 5 and 6, notice how the symmetry of the model changes and step 6 is more symmetrical than step 5.
4. Try making the Star Basket with different sizes and compare the size of the baskets and the stars.



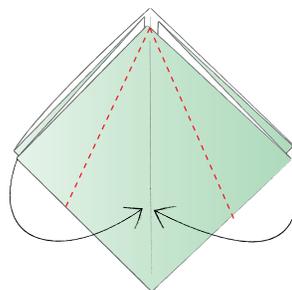
STAR BASKET

Traditional

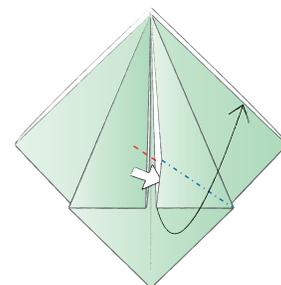


1 Start with a colored Preliminary Base.

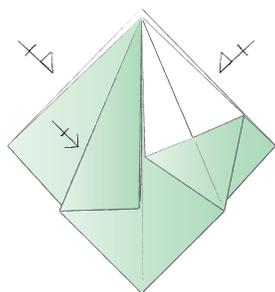
180°



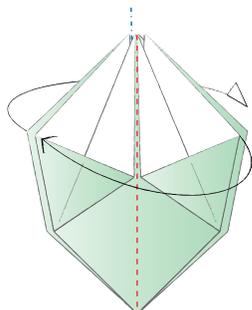
2 Orient the Base so the open end points away from you. Fold the upper sides to the center crease.



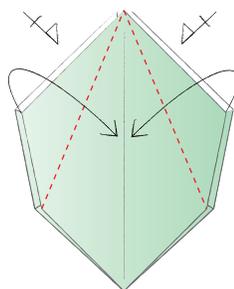
3 Put your finger inside one of the folds you made in step 2. Start opening the fold up. Line the crease on the colored part of the paper with the white folded edge and flatten. This is called a squash fold.



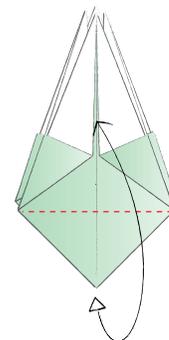
4 Repeat the squash fold on the other side. Turn over. Repeat the squash fold on both sides.



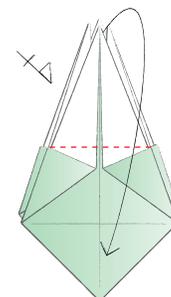
5 Take the top right layer and fold it over to the left. Turn the model over. Again take the top right layer and fold it over to the left.



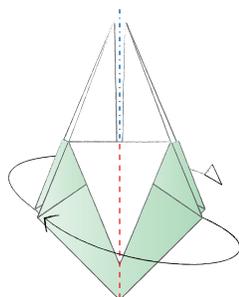
6 Fold the upper right edge to the center crease. Repeat by folding the upper left edge to the center crease. Turn over. Again, fold the upper right edge to the center crease and repeat with the upper left edge.



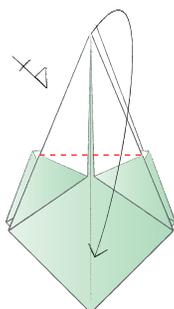
7 Fold the bottom tip up making a crease at the widest part of the model and unfold.



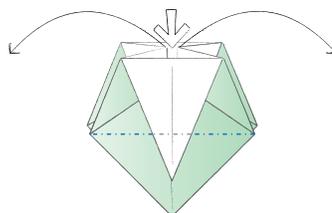
8 Starting at the tip, fold the upper layer down as far as it will comfortably go. Turn over and repeat.



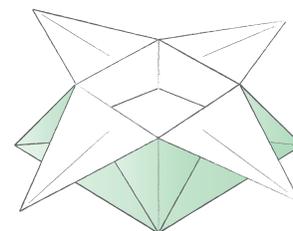
9 Take the top right layer and fold over to the left. Turn over. Repeat by taking the top right layer and folding it over to the left.



10 Starting at the tip, fold the upper layer down as far as it will comfortably go. Turn over and repeat.



11 Stand the model up with the bottom point on your desk. Put your fingers inside the model and gently open while pushing the point down on the desk to flatten the base.



Finished Star Basket!